Accounting on Capital Market: A Reading

Prof. Dr. Nera Marinda Machdar, SE.Ak, CA, CSRA, CSP, BKP
Dr. M. Jhonni Sinaga, SE., MM., CIPFM, CIERM
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Fax (+6221) 85918041

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CIFM, CIMA, CIERM, CIABV, CMA, CBV, CERA, CIBG, CIGS, CIQnR, CIQaR

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Penulis:

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@Dr. David Pangaribuan, S.E,, M.Si.
@Prof. Dr. Adler Haymans Manurung, CIFM, CMA, CIERM, CIGS

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Buku ini kupersembahkan kepada suamiku Budiono
dan putraku Bona Fauzun Nur serta Farish Faza Machya

Prof. Dr. Nera Marinda Machdar SE. Ak, Pg Dpl. Bus., M.Com (Acctg)
CA, CSRA., CSP, BKP

Buku ini kudedikasikan kepada istriku Rosalia Manurung,
anakku Calvin Jhon Junior dan boruku Jessie Jhon Junior.

Dr. M. Jhonni Sinaga, S.E., M.M., CIPFM, CIERM

Buku ini kupersembahkan kepada keluarga yang mendukung aktifitas saya
dalam bidang pendidikan.

Dr. David Pangaribuan, S.E., M.Si.

Buku ini saya dedikasikan kepada istriku Marsaurina Yudiciana Sitanggang,
boruku: Castelia Romauli dan anakku Adry Gracio.

Prof. Dr. Adler Haymans Manurung, SE., SH., M.Com., ME.
CIFM, CMA, CIMA, CIERM, CIBG, CIABV, CIQnR,. CIQaR, CIRR

Prakata

Akuntansi merupakan sebuah cabang ilmu dalam bidang Ekonomi yang memb ahas transaksi dan pencatatannya dalam ilmu ekonomi termasuk bisnis secara praktek. Akuntansi sebagai sebuah ilmu juga sering dikaitkan dengan aktifitas di pasar modal. Buku ajar ini mencoba memberikan gambaran mengenai akuntansi dan pasar modal dengan kumpulan jurnal dari berbagai jurnal internasional.

Seperti disebutkan bahwa buku merupakan kumpulan jurnal yang membahas tentang akuntansi dan pasarm modal dan diperuntukkan bagi mahasiswa Doktor Keuangan dan juga Doktor Akuntansi. Paper ini dimulai dengan menjelaskan tentang evaluasi dan angka akuntansi dan disambung dengan infromasi yang berkaitan akuntansi dan pasar modal. Angka akuntansi tersebut sering disebutkan pendapatan perusahaan dimana pendapatan perusahaan ini menjadi informasi yang berkaitan dengan harga saham di bursa saham. Kemudian pembahasan perubahan pendapatan perusahaan selalu berkaitan dengan perubahan harga saham di Bursa. Perubahan pendekatan akuntansi dalam perusahaan tersebut bisa juga mempengaruhi pasar modal. Keterbukaan perusahaan sangat penting bagi investor untuk bisa menganalisis harga saham dalam rangka memberi keputusan untuk membeli atau menjual saham yang dianalisis. Pengumuman perusahaan atas pendapatan juga merupakan transparansi perusahaan yang diwajibkan oleh regulator yaitu Bursa dan Otoritas Jasa Keuangan (OJK). Informasi tersebut juga bisa diperoleh melalui pihak orang dalam sehingga mengetahui bagaimana sewajarnya harga saham tersebut. Adanya perdagangan orang dalam juga menjadi topik bahasan dalam buku ajar ini. Kepemilikan saham perusahaan juga bisa mempengaruhi harga saham karena pemilik yang memiliki reputasi juga bisa membuat harga saham menjadi menarik.

Buku ini merupakan bahan bacaan para pengikut kuliah Akuntansi dan Pasar Modal di berbagai Program Doktor Ilmu Manajemen, karena buku ini merupakan kumpulan jurnal. Berbagai jurnal baik teori maupun empiris dikumpulkan dalam rangka bahan ajar untuk mahasiswa Doktor.

Buku ini masih banyak kekurangannya, sehingga kritik yang sangat membangun sangat terbuka kami terima dan kami mengharapkan kritikan tersebut. Buku ini akan terus diperbaharui dalam rangka mendapatkan informasi dan teori baru dalam bidang Akuntansi dan Pasar Modal. Kami mengucapkan terima kasih atas bantuan semua pihak sehingga terbitnya buku ini

Hormat kami,

Prof. Dr. Nera Miranda Machdar, S.E.Ak, CA, CSRA., CSP, BKP
Dr. M. Jhonni Sinaga, S.E., M.M., CIPFM, CIERM
Dr. David Pangaribuan, S.E., M.Si.
Prof. Dr. Adler Haymans Manurung, CIFM, CMA.

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An Empirical Evaluation of Accounting Income Numbers

RAY BALL* and PHILIP BROWN†

Accounting theorists have generally evaluated the usefulness of accounting practices by the extent of their agreement with a particular analytic model. The model may consist of only a few assertions or it may be a rigorously developed argument. In each case, the method of evaluation has been to compare existing practices with the more preferable practices implied by the model or with some standard which the model implies all practices should possess. The shortcoming of this method is that it ignores a significant source of knowledge of the world, namely, the extent to which the predictions of the model conform to observed behavior.

It is not enough to defend an analytical inquiry on the basis that its assumptions are empirically supportable, for how is one to know that a theory embraces all of the relevant supportable assumptions? And how does one explain the predictive powers of propositions which are based on unverifiable assumptions such as the maximization of utility functions? Further, how is one to resolve differences between propositions which arise from considering different aspects of the world?

The limitations of a completely analytical approach to usefulness are illustrated by the argument that income numbers cannot be defined substantively, that they lack "meaning" and are therefore of doubtful utility.[1] The argument stems in part from the patchwork development of account-

* University of Chicago. † University of Western Australia. The authors are indebted to the participants in the Workshop in Accounting Research at the University of Chicago, Professor Myron Scholes, and Messrs. Owen Hewett and Ian Watts.

[1] Versions of this particular argument appear in Canning (1929); Gilman (1939); Paton and Littleton (1940); Vatter (1947), Ch. 2; Edwards and Bell (1961), Ch. 1; Chambers (1964), pp. 267–68; Chambers (1966), pp. 4 and 102; Lim (1966), esp. pp. 645 and 649; Chambers (1967), pp. 745–55; Ijiri (1967), Ch. 6, esp. pp. 120–31; and Sterling (1967), p. 65.

ing practices to meet new situations as they arise. Accountants have had to deal with consolidations, leases, mergers, research and development, price-level changes, and taxation charges, to name just a few problem areas. Because accounting lacks an all-embracing theoretical framework, dissimilarities in practices have evolved. As a consequence, net income is an aggregate of components which are not homogeneous. It is thus alleged to be a "meaningless" figure, not unlike the difference between twenty-seven tables and eight chairs. Under this view, net income can be defined only as the result of the application of a set of procedures $\{X_1, X_2, \cdots\}$ to a set of events $\{Y_1, Y_2, \cdots\}$ with no other definitive substantive meaning at all. Canning observes:

> What is set out as a measure of net income can never be supposed to be a fact in any sense at all except that it is the figure that results when the accountant has finished applying the procedures which he adopts.[2]

The value of analytical attempts to develop measurements capable of definitive interpretation is not at issue. What is at issue is the fact that an analytical model does not itself assess the significance of departures from its implied measurements. Hence it is dangerous to conclude, in the absence of further empirical testing, that a lack of substantive meaning implies a lack of utility.

An empirical evaluation of accounting income numbers requires agreement as to what real-world outcome constitutes an appropriate test of usefulness. Because net income is a number of particular interest to investors, the outcome we use as a predictive criterion is the investment decision as it is reflected in security prices.[3] Both the content and the timing of existing annual net income numbers will be evaluated since usefulness could be impaired by deficiencies in either.

An Empirical Test

Recent developments in capital theory provide justification for selecting the behavior of security prices as an operational test of usefulness. An impressive body of theory supports the proposition that capital markets are both efficient and unbiased in that if information is useful in forming capital asset prices, then the market will adjust asset prices to that information quickly and without leaving any opportunity for further abnormal gain.[4] If, as the evidence indicates, security prices do in fact adjust rapidly to new information as it becomes available, then changes in security prices will re-

[2] Canning (1929), p. 98.

[3] Another approach pursued by Beaver (1968) is to use the investment decision, as it is reflected in transactions volume, for a predictive criterion.

[4] For example, Samuelson (1965) demonstrated that a market without bias in its evaluation of information will give rise to randomly fluctuating time series of prices. See also Cootner (ed.) (1964); Fama (1965); Fama and Blume (1966); Fama, *et al.* (1967); and Jensen (1968).

flect the flow of information to the market.[5] An observed revision of stock prices associated with the release of the income report would thus provide evidence that the information reflected in income numbers is useful.

Our method of relating accounting income to stock prices builds on this theory and evidence by focusing on the information which is unique to a particular firm.[6] Specifically, we construct two alternative models of what the market expects income to be and then investigate the market's reactions when its expectations prove false.

EXPECTED AND UNEXPECTED INCOME CHANGES

Historically, the incomes of firms have tended to move together. One study found that about half of the variability in the level of an average firm's earnings per share (EPS) could be associated with economy-wide effects.[7] In light of this evidence, at least part of the change in a firm's income from one year to the next is to be expected. If, in prior years, the income of a firm has been related to the incomes of other firms in a particular way, then knowledge of that past relation, together with a knowledge of the incomes of those other firms for the present year, yields a conditional expectation for the present income of the firm. Thus, apart from confirmation effects, the amount of new information conveyed by the present income number can be approximated by the difference between the actual change in income and its conditional expectation.

But not all of this difference is necessarily new information. Some changes in income result from financing and other policy decisions made by the firm. We assume that, to a first approximation, such changes are reflected in the average change in income through time.

Since the impacts of these two components of change—economy-wide and policy effects—are felt simultaneously, the relationship must be estimated jointly. The statistical specification we adopt is first to estimate, by Ordinary Least Squares (OLS), the coefficients (a_{1jt}, a_{2jt}) from the linear regression of the change in firm j's income ($\Delta I_{j,t-\tau}$) on the change in the average income of all firms (other than firm j) in the market ($\Delta M_{j,t-\tau}$)[8] using data up to the end of the previous year ($\tau = 1, 2, \cdots, t-1$):

$$\Delta I_{j,t-\tau} = \hat{a}_{1jt} + \hat{a}_{2jt}\Delta M_{j,t-\tau} + \hat{u}_{j,t-\tau} \qquad \tau = 1, 2, \cdots, t-1, \qquad (1)$$

[5] One well documented characteristic of the security market is that useful sources of information are acted upon and useless sources are ignored. This is hardly surprising since the market consists of a large number of competing actors who can gain from acting upon better interpretations of the future than those of their rivals. See, for example, Scholes (1967); and footnote 4 above. This evaluation of the security market differs sharply from that of Chambers (1966, pp. 272–73).

[6] More precisely, we focus on information not common to all firms, since some industry effects are not considered in this paper.

[7] Alternatively, 35 to 40 per cent could be associated with effects common to all firms when income was defined as tax-adjusted Return on Capital Employed. [Source: Ball and Brown (1967), Table 4.]

[8] We call M a "market index" of income because it is constructed only from firms traded on the New York Stock Exchange.

where the hats denote estimates. The expected income change for firm j in year t is then given by the regression prediction using the change in the average income for the market in year t:

$$\Delta \hat{I}_{jt} = \hat{a}_{1jt} + \hat{a}_{2jt}\Delta M_{jt} .$$

The unexpected income change, or forecast error ($\hat{u}_{jt}$), is the actual income change minus expected:

$$\hat{u}_{jt} = \Delta I_{jt} - \Delta \hat{I}_{jt} . \tag{2}$$

It is this forecast error which we assume to be the new information conveyed by the present income number.

THE MARKET'S REACTION

It has also been demonstrated that stock prices, and therefore rates of return from holding stocks, tend to move together. In one study,[9] it was estimated that about 30 to 40 per cent of the variability in a stock's monthly rate of return over the period March, 1944 through December, 1960 could be associated with market-wide effects. Market-wide variations in stock returns are triggered by the release of information which concerns all firms. Since we are evaluating the income report as it relates to the individual firm, its contents and timing should be assessed relative to changes in the rate of return on the firm's stocks net of market-wide effects.

The impact of market-wide information on the monthly rate of return from investing one dollar in the stock of firm j may be estimated by its predicted value from the linear regression of the monthly price relatives of firm j's common stock[10] on a market index of returns:[11]

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[9] King (1966).

[10] The monthly price relative of security j for month m is defined as dividends (d_{jm}) + closing price ($p_{j,m+1}$), divided by opening price (p_{jm}):

$$PR_{jm} = (p_{j,m+1} + d_{jm})/p_{jm} .$$

A monthly price relative is thus equal to the discrete monthly rate of return plus unity; its natural logarithm is the monthly rate of return compounded continuously. In this paper, we assume discrete compounding since the results are easier to interpret in that form.

[11] Fama, *et al.* (1967) conclude that "regressions of security on market returns over time are a satisfactory method for abstracting from the effects of general market conditions on the monthly rates of return on individual securities." In arriving at their conclusion, they found that "scatter diagrams for the [returns on] individual securities [vis-à-vis the market return] support very well the regression assumptions of linearity, homoscedasticity, and serial independence." Fama, *et al.* studied the natural logarithmic transforms of the price relatives, as did King (1966). However, Blume (1968) worked with equation (3). We also performed tests on the alternative specification:

$$\ln_e (PR_{jm}) = b'_{1j} + b'_{2j}\ln_e (L_m) + v'_{jm} , \tag{3a}$$

where $\ln_e$ denotes the natural logarithmic function. The results correspond closely with those reported below.

$$[PR_{jm} - 1] = \hat{b}_{1j} + \hat{b}_{2j}[L_m - 1] + \hat{v}_{jm}, \tag{3}$$

where PR_{jm} is the monthly price relative for firm j and month m, L is the link relative of Fisher's "Combination Investment Performance Index" [Fisher (1966)], and v_{jm} is the stock return residual for firm j in month m. The value of $[L_m - 1]$ is an estimate of the market's monthly rate of return. The m-subscript in our sample assumes values for all months since January, 1946 for which data are available.

The residual from the OLS regression represented in equation (3) measures the extent to which the realized return differs from the expected return conditional upon the estimated regression parameters (b_{1j}, b_{2j}) and the market index $[L_m - 1]$. Thus, since the market has been found to adjust quickly and efficiently to new information, the residual must represent the impact of new information, about firm j alone, on the return from holding common stock in firm j.

SOME ECONOMETRIC ISSUES

One assumption of the OLS income regression model[12] is that M_j and u_j are uncorrelated. Correlation between them can take at least two forms, namely the inclusion of firm j in the market index of income (M_j), and the presence of industry effects. The first has been eliminated by construction (denoted by the j-subscript on M), but no adjustment has been made for the presence of industry effects. It has been estimated that industry effects probably account for only about 10 per cent of the variability in the level of a firm's income.[13] For this reason equation (1) has been adopted as the appropriate specification in the belief that any bias in the estimates a_{1jt} and a_{2jt} will not be significant. However, as a check on the statistical efficiency of the model, we also present results for an alternative, naive model which predicts that income will be the same for this year as for last. Its forecast error is simply the change in income since the previous year.

As is the case with the income regression model, the stock return model, as presented, contains several obvious violations of the assumptions of the OLS regression model. First, the market index of returns is correlated with the residual because the market index contains the return on firm j, and because of industry effects. Neither violation is serious, because Fisher's index is calculated over all stocks listed on the New York Stock Exchange (hence the return on security j is only a small part of the index), and because industry effects account for at most 10 per cent of the variability in the rate

[12] That is, an assumption necessary for OLS to be the minimum-variance, linear, unbiased estimator.

[13] The magnitude assigned to industry effects depends upon how broadly an industry is defined, which in turn depends upon the particular empirical application being considered. The estimate of 10 per cent is based on a two-digit classification scheme. There is some evidence that industry effects might account for more than 10 per cent when the association is estimated in first differences [Brealey (1968)].

of return on the average stock.[14] A second violation results from our prediction that, for certain months around the report dates, the expected values of the v_j's are nonzero. Again, any bias should have little effect on the results, inasmuch as there is a low, observed autocorrelation in the $\hat{v}_j$'s,[15] and in no case was the stock return regression fitted over less than 100 observations.[16]

SUMMARY

We assume that in the unlikely absence of useful information about a particular firm over a period, its rate of return over that period would reflect only the presence of market-wide information which pertains to all firms. By abstracting from market effects [equation (3)] we identify the effect of information pertaining to individual firms. Then, to determine if part of this effect can be associated with information contained in the firm's accounting income number, we segregate the expected and unexpected elements of income change. If the income forecast error is negative (that is, if the actual change in income is less than its conditional expectation), we define it as bad news and predict that if there is some association between accounting income numbers and stock prices, then release of the income number would result in the return on that firm's securities being less than

[14] The estimate of 10 per cent is due to King (1966). Blume (1968) has recently questioned the magnitude of industry effects, suggesting that they could be somewhat less than 10 per cent. His contention is based on the observation that the significance attached to industry effects depends on the assumptions made about the parameters of the distributions underlying stock rates of return.

[15] See Table 4, below.

[16] Fama, *et al.* (1967) faced a similar situation. The expected values of the stock return residuals were nonzero for some of the months in their study. Stock return regressions were calculated separately for both exclusion and inclusion of the months for which the stock return residuals were thought to be nonzero. They report that both sets of results support the same conclusions.

An alternative to constraining the mean v_j to be zero is to employ the Sharpe Capital Asset Pricing Model [Sharpe (1964)] to estimate (3b):

$$PR_{jm} - RF_m - 1 = b'_{1j} + b'_{2j}\,[L_m - RF_m - 1] + v'_{jm}\,, \tag{3b}$$

where RF is the risk-free ex ante rate of return for holding period m. Results from estimating (3b) (using U.S. Government Bills to measure RF and defining the abnormal return for firm j in month m now as $b'_{1j} + v'_{jm}$) are essentially the same as the results from (3).

Equation (3b) is still not entirely satisfactory, however, since the mean impact of new information is estimated over the whole history of the stock, which covers at least 100 months. If (3b) were fitted using monthly data, a vector of dummy variables could be introduced to identify the fiscal year covered by the annual report, thus permitting the mean residual to vary between fiscal years. The impact of unusual information received in month m of year t would then be estimated by the sum of the constant, the dummy for year t, and the calculated residual for month m and year t. Unfortunately, the efficiency of estimating the stock return equation in this particular form has not been investigated satisfactorily, hence our report will be confined to the results from estimating (3).

TABLE 1

*Deciles of the Distributions of Squared Coefficients of Correlation, Changes in Firm and Market Income**

Variable	Decile								
	.1	.2	.3	.4	.5	.6	.7	.8	.9
(1) Net income........	.03	.07	.10	.15	.23	.30	.35	.43	.52
(2) EPS..............	.02	.05	.11	.16	.23	.28	.35	.42	.52

* Estimated over the 21 years, 1946–1966.

would otherwise have been expected.[17] Such a result ($\hat{u} < 0$) would be evidenced by negative behavioı in the stock return residuals ($\hat{v} < 0$) around the annual report announcement date. The converse should hold for a positive forecast error.

Two basic income expectations models have been defined, a regression model and a naive model. We report in detail on two measures of income [net income and EPS, variables (1) and (2)] for the regression model, and one measure [EPS, variable (3)] for the naive model.

Data

Three classes of data are of interest: the contents of income reports; the dates of the report announcements; and the movements of security prices around the announcement dates.

INCOME NUMBERS

Income numbers for 1946 through 1966 were obtained from Standard and Poor's *Compustat* tapes.[18] The distributions of the squared coefficients of correlation[19] between the changes in the incomes of the individual firms and the changes in the market's income index[20] are summarized in Table 1. For the present sample, about one-fourth of the variability in the changes

[17] We later divide the total return into two parts: a "normal return," defined by the return which would have been expected given the normal relationship between a stock and the market index; and an "abnormal return," the difference between the actual return and the normal return. Formally, the two parts are given by: $b_{1j} + b_{2j}[L_m - 1]$; and v_{jm}.

[18] Tapes used are dated 9/28/1965 and 7/07/1967.

[19] All correlation coefficients in this paper are product-moment correlation coefficients.

[20] The market net income index was computed as the sample mean for each year. The market EPS index was computed as a weighted average over the sample members, the number of stocks outstanding (adjusted for stock splits and stock dividends) providing the weights. Note that when estimating the association between the income of a particular firm and the market, the income of that firm was excluded from the market index.

TABLE 2

*Deciles of the Distributions of the Coefficients of First-Order Autocorrelation in the Income Regression Residuals**

Variable	Decile								
	.1	.2	.3	.4	.5	.6	.7	.8	.9
(1) Net income...	−.35	−.28	−.20	−.12	−.05	.02	.12	.20	.33
(2) EPS..........	−.39	−.29	−.21	−.15	−.08	−.03	.07	.17	.35

* Estimated over the 21 years, 1946–1966.

in the median firm's income can be associated with changes in the market index.

The association between the levels of the earnings of firms was examined in the forerunner article [Ball and Brown (1967)]. At that time, we referred to the existence of autocorrelation in the disturbances when the levels of net income and EPS were regressed on the appropriate indexes. In this paper, the specification has been changed from levels to first differences because our method of analyzing the stock market's reaction to income numbers presupposes the income forecast errors to be unpredictable at a minimum of 12 months prior to the announcement dates. This supposition is inappropriate when the errors are autocorrelated.

We tested the extent of autocorrelation in the residuals from the income regression model after the variables had been changed from levels to first differences. The results are presented in Table 2. They indicate that the supposition is not now unwarranted.

ANNUAL REPORT ANNOUNCEMENT DATES

The *Wall Street Journal* publishes three kinds of annual report announcements: forecasts of the year's income, as made, for example, by corporation executives shortly after the year end; preliminary reports; and the complete annual report. While forecasts are often imprecise, the preliminary report is typically a condensed preview of the annual report. Because the preliminary report usually contains the same numbers for net income and EPS as are given later with the final report, the announcement date (or, effectively, the date on which the annual income number became generally available) was assumed to be the date on which the preliminary report appeared in the *Wall Street Journal.* Table 3 reveals that the time lag between the end of the fiscal year and the release of the annual report has been declining steadily throughout the sample period.

STOCK PRICES

Stock price relatives were obtained from the tapes constructed by the Center for Research in Security Prices (CRSP) at the University of Chi-

TABLE 3

Time Distribution of Announcement Dates

Per cent of firms	Fiscal year								
	1957	1958	1959	1960	1961	1962	1963	1964	1965
25	2/07[a]	2/04	2/04	2/03	2/02	2/05	2/03	2/01	1/31
50	2/25	2/20	2/18	2/17	2/15	2/15	2/13	2/09	2/08
75	3/10	3/06	3/04	3/03	3/05	3/04	2/28	2/25	2/21

[a] Indicates that 25 per cent of the income reports for the fiscal year ended 12/31/1957 had been announced by 2/07/1958.

TABLE 4

*Deciles of the Distributions of the Squared Coefficient of Correlation for the Stock Return Regression, and of the Coefficient of First-Order Autocorrelation in the Stock Return Residuals**

Coefficient name	Decile								
	.1	.2	.3	.4	.5	.6	.7	.8	.9
Return regression r^2...	.18	.22	.25	.28	.31	.34	.37	.40	.46
Residual autocorrelation..	−.17	−.14	−.11	−.10	−.08	−.05	−.03	−.01	.03

* Estimated over the 246 months, January, 1946 through June, 1966.

cago.[21] The data used are monthly closing prices on the New York Stock Exchange, adjusted for dividends and capital changes, for the period January, 1946 through June, 1966. Table 4 presents the deciles of the distributions of the squared coefficient of correlation for the stock return regression [equation (3)], and of the coefficient of first-order autocorrelation in the stock residuals.

INCLUSION CRITERIA

Firms included in the study met the following criteria:

1. earnings data available on the *Compustat* tapes for each of the years 1946–1966;
2. fiscal year ending December 31;
3. price data available on the CRSP tapes for at least 100 months; and
4. *Wall Street Journal* announcement dates available.[22]

Our analysis was limited to the nine fiscal years 1957–1965. By beginning the analysis with 1957, we were assured of at least 10 observations when

[21] The Center for Research in Security Prices at the University of Chicago is sponsored by Merrill Lynch, Pierce, Fenner and Smith Incorporated.

[22] Announcement dates were taken initially from the *Wall Street Journal Index*, then verified against the *Wall Street Journal*.

estimating the income regression equations. The upper limit (the fiscal year 1965, the results of which are announced in 1966) is imposed because the CRSP file terminated in June, 1966.

Our selection criteria may reduce the generality of the results. The subpopulation does not include young firms, those which have failed, those which do not report on December 31, and those which are not represented on *Compustat*, the CRSP tapes, and the *Wall Street Journal*. As a result, it may not be representative of all firms. However, note that (1) the 261 remaining firms[23] are significant in their own right, and (2) a replication of our study on a different sample produced results which conform closely to those reported below.[24]

Results

Define month 0 as the month of the annual report announcement, and API_M, the Abnormal Performance Index at month M, as:

$$API_M = \frac{1}{N} \sum_{n}^{N} \prod_{m=-11}^{M} (1 + v_{nm}).$$

Then API traces out the value of one dollar invested (in equal amounts) in all securities n ($n = 1, 2, \cdots, N$) at the end of month -12 (that is, 12 months prior to the month of the annual report) and held to the end of some arbitrary holding period ($M = -11, -10, \cdots, T$) after abstracting from market affects. An equivalent interpretation is as follows. Suppose two individuals A and B agree on the following proposition. B is to construct a portfolio consisting of one dollar invested in equal amounts in N securities. The securities are to be purchased at the end of month -12 and held until the end of month T. For some price, B contracts with A to take (or make up), at the end of each month M, only the normal gains (or losses) and to return to A, at the end of month T, one dollar plus or minus any abnormal gains or losses. Then API_M is the value of A's equity in the mutual portfolio at the end of each month M.[25]

Numerical results are presented in two forms. Figure 1 plots API_M first for three portfolios constructed from all firms and years in which the income forecast errors, according to each of the three variables, were positive (the top half); second, for three portfolios of firms and years in which the income forecast errors were negative (the bottom half); and third, for a single portfolio consisting of all firms and years in the sample (the line which wanders just below the line dividing the two halves). Table 5 includes the numbers on which Figure 1 is based.

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[23] Due to known errors in the data, not all firms could be included in all years. The fiscal year most affected was 1964, when three firms were excluded.

[24] The replication investigated 75 firms with fiscal years ending on dates other than December 31, using the naive income-forecasting model, over the longer period 1947–65.

[25] That is, the value expected at the end of month T in the absence of further abnormal gains and losses.

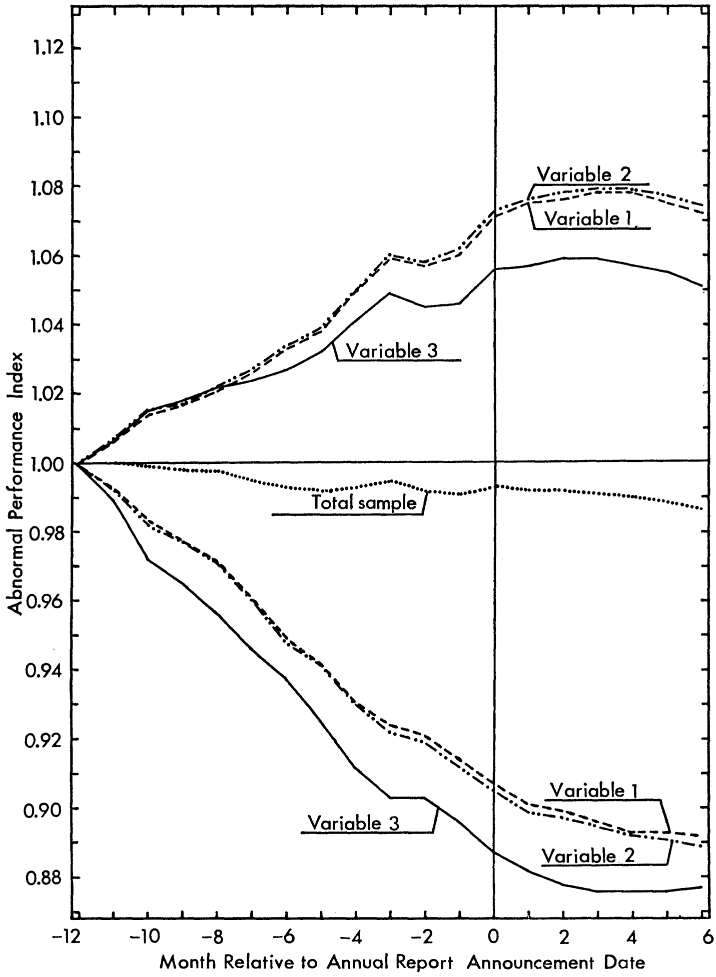

FIG. 1 Abnormal Performance Indexes for Various Portfolios

Since the first set of results may be sensitive to the distributions of the stock return disturbances,[26] a second set of results is presented. The third column under each variable heading in Table 5 gives the chi-square statistic for a two-by-two classification of firms by the sign of the income forecast error, and the sign of the stock return residual for that month.

OVERVIEW

As one would expect from a large sample, both sets of results convey essentially the same picture. They demonstrate that the information contained in the annual income number is useful in that if actual income differs

[26] The empirical distributions of the stock return residuals appear to be described well by symmetric, stable distributions that are characterized by tails longer than those of the normal distribution [Fama (1965); Fama, *et al.* (1967)].

TABLE 5

Summary Statistics by Month Relative to Annual Report Announcement Date

Month relative to annual report announcement date	Regression model						Naive model			Total sample
	Net income			EPS			EPS			
	(1)[a]	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	
−11	1.006	.992	16.5	1.007	.992	20.4	1.006	.989	24.1	1.000
−10	1.014	.983	17.3	1.015	.982	20.2	1.015	.972	73.4	.999
−9	1.017	.977	7.9	1.017	.977	3.7	1.018	.965	20.4	.998
−8	1.021	.971	9.5	1.022	.971	12.0	1.022	.956	9.1	.998
−7	1.026	.960	21.8	1.027	.960	27.1	1.024	.946	9.0	.995
−6	1.033	.949	42.9	1.034	.948	37.6	1.027	.937	19.4	.993
−5	1.038	.941	17.9	1.039	.941	21.3	1.032	.925	21.0	.992
−4	1.050	.930	40.0	1.050	.930	39.5	1.041	.912	41.5	.993
−3	1.059	.924	35.3	1.060	.922	33.9	1.049	.903	37.2	.995
−2	1.057	.921	1.4	1.058	.919	1.8	1.045	.903	0.1	.992
−1	1.060	.914	8.2	1.062	.912	8.2	1.046	.896	5.7	.991
0	1.071	.907	28.0	1.073	.905	28.9	1.056	.887	35.8	.993
1	1.075	.901	6.4	1.076	.899	5.5	1.057	.882	9.4	.992
2	1.076	.899	2.7	1.078	.897	1.9	1.059	.878	8.1	.992
3	1.078	.896	0.6	1.079	.895	1.2	1.059	.876	0.1	.991
4	1.078	.893	0.1	1.079	.892	0.1	1.057	.876	1.2	.990
5	1.075	.893	0.7	1.077	.891	0.1	1.055	.876	0.6	.989
6	1.072	.892	0.0	1.074	.889	0.2	1.051	.877	0.1	.987

[a] Column headings:

(1) Abnormal Performance Index—firms and years in which the income forecast error was positive.

(2) Abnormal Performance Index—firms and years in which the income forecast error was negative.

(3) Chi-square statistic for two-by-two classification by sign of income forecast error (for the fiscal year) and sign of stock return residual (for the indicated month).

Note: Probability (chi-square $\geq 3.84 \mid \chi^2 = 0) = .05$, for 1 degree of freedom.
Probability (chi-square $\geq 6.64 \mid \chi^2 = 0) = .01$, for 1 degree of freedom.

from expected income, the market typically has reacted in the same direction. This contention is supported both by Figure 1 which reveals a marked, positive association between the sign of the error in forecasting income and the Abnormal Performance Index, and by the chi-square statistic (Table 5). The latter shows it is most unlikely that there is no relationship between the sign of the income forecast error and the sign of the rate of return residual in most of the months up to that of the annual report announcement.

However, most of the information contained in reported income is anticipated by the market before the annual report is released. In fact, anticipation is so accurate that the actual income number does not appear to cause any unusual jumps in the Abnormal Performance Index in the announcement month. To illustrate, the drifts upward and downward begin at least 12 months before the report is released (when the portfolios are first

TABLE 6

Contingency Table of the Signs of the Income Forecast Errors—by Variable

Sign of income forecast error	Sign of income forecast error					
	Variable (1)		Variable (2)		Variable (3)	
	+	−	+	−	+	−
Variable (1)						
+	1231	—	1148	83	1074	157
−	—	1109	83	1026	399	710
Variable (2)						
+	1148	83	1231	—	1074	157
−	83	1026	—	1109	399	710
Variable (3)						
+	1074	399	1074	399	1473	—
−	157	710	157	710	—	867

constructed) and continue for approximately one month after. The persistence of the drifts, as indicated by the constant signs of the indexes and by their almost monotonic increases in absolute value (Figure 1), suggests not only that the market begins to anticipate forecast errors early in the 12 months preceding the report, but also that it continues to do so with increasing success throughout the year.[27]

SPECIFIC RESULTS

1. There appears to be little difference between the results for the two regression model variables. Table 6, which classifies the sign of one variable's forecast error contingent upon the signs of the errors of the other two variables, reveals the reason. For example, on the 1231 occasions on which the income forecast error was positive for variable (1), it was also positive on 1148 occasions (out of a possible 1231) for variable (2). Similarly, on the 1109 occasions on which the income forecast error was negative for variable (1), it was also negative on 1026 occasions for variable (2). The fact that the results for variable (2) strictly dominate those for variable (1) suggests, however, that when the two variables disagreed on the sign of an income forecast error, variable (2) was more often correct.

While there is little to choose between variables (1) and (2), variable (3) (the naive model) is clearly best for the portfolio made up of firms with negative forecast errors. A contributing factor is the following. The naive model gives the same forecast error as the regression model would give if

[27] Note that Figure 1 contains averages over many firms and years and is not indicative of the behavior of the securities of any particular firm in any one year. While there may be, on average, a persistent and gradual anticipation of the contents of the report throughout the year, evidence on the extent of autocorrelation in the stock return residuals would suggest that the market's reaction to information about a particular firm tends to occur rapidly.

(a) the change in market income were zero, and (b) there were no drift in the income of the firm. But historically there has been an increase in the market's income, particularly during the latter part of the sample period, due to general increase in prices and the strong influence of the protracted expansion since 1961. Thus, the naive model [variable (3)] typically identifies as firms with negative forecast errors those relatively few firms which showed a decrease in EPS when most firms showed an increase. Of the three variables, one would be most confident that the incomes of those which showed negative forecast errors for variable (3) have in fact lost ground relative to the market.

This observation has interesting implications. For example, it points to a relationship between the magnitudes of the income forecast errors and the magnitudes of the abnormal stock price adjustments. This conclusion is reinforced by Figure 1 which shows that the results for positive forecast errors are weaker for variable (3) than for the other two.

2. The drift downward in the Abnormal Performance Index computed over all firms and years in the sample reflects a computational bias.[28] The bias arises because

$$E[\prod_m (1 + v_m)] \neq \prod_m [1 + E(v_m)],$$

where E denotes the expected value. It can readily be seen that the bias over K months is at least of order $(K - 1)$ times the covariance between v_m and v_{m-1}.[29] Since this covariance is typically negative,[30] the bias is also negative.

While the bias does not affect the tenor of our results in any way, it should be kept in mind when interpreting the values of the various API's. It helps explain, for example, why the absolute changes in the indexes in the bottom panel of Figure 1 tend to be greater than those in the top panel; why the indexes in the top panel tend to turn down shortly after month 0; and finally, why the drifts in the indexes in the bottom panel tend to persist beyond the month of the report announcement.

3. We also computed results for the regression model using the additional definitions of income:

(a) cash flow, as approximated by operating income,[31] and

(b) net income before nonrecurring items.

Neither variable was as successful in predicting the signs of the stock return

[28] The expected value of the bias is of order minus one-half to minus one-quarter of one per cent per annum. The difference between the observed value of the API computed over the total sample and its expectation is a property of the particular sample (see footnote 26).

[29] In particular, the approximation neglects all permutations of the product $v_s \cdot v_t$, $s = 1, 2, \cdots, K-2$, $t = s+2, \cdots, K$, as being of a second order of smallness.

[30] See Table 4.

[31] All variable definitions are specified in Standard and Poor's *Compustat Manual* [see also Ball and Brown (1967), Appendix A].

residuals as net income and EPS. For example, by month 0, the Abnormal Performance Indexes for forecast errors which were positive were 1.068 (net income, including nonrecurring items) and 1.070 (operating income). These numbers compare with 1.071 for net income [Table 5, variable (1)]. The respective numbers for firms and years with negative forecast errors were 0.911, 0.917, and 0.907.

4. Both the API's and the chi-square test in Table 5 suggest that, at least for variable (3), the relationship between the sign of the income forecast error and that of the stock return residual may have persisted for as long as two months beyond the month of the announcement of the annual report. One explanation might be that the market's index of income was not known for sure until after several firms had announced their income numbers. The elimination of uncertainty about the market's income subsequent to some firms' announcements might tend, when averaged over all firms in the sample, to be reflected in a persistence in the drifts in the API's beyond the announcement month. This explanation can probably be ruled out, however, since when those firms which made their announcements in January of any one year were excluded from the sample for that year, there were no changes in the patterns of the overall API's as presented in Figure 1, although generally there were reductions in the χ^2 statistics.[32]

A second explanation could be random errors in the announcement dates. Drifts in the API's would persist beyond the announcement month if errors resulted in our treating some firms as if they had announced their income numbers earlier than in fact was the case. But this explanation can also probably be ruled out, since all announcement dates taken from the *Wall Street Journal Index* were verified against the *Wall Street Journal.*

A third explanation could be that preliminary reports are not perceived by the market as being final. Unfortunately this issue cannot be resolved independently of an alternative hypothesis, namely that the market does take more time to adjust to information if the value of that information is less than the transactions costs that would be incurred by an investor who wished to take advantage of the opportunity for abnormal gain. That is, even if the relationship tended to persist beyond the announcement month, it is clear that unless transactions costs were within about one per cent,[33]

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[32] The general reduction in the χ^2 statistic is due largely to the reduction in sample size.

[33] This result is obtained as follows. The ratio API_m/API_{m-1} is equal to the marginal return in month m plus unity:

$$\frac{API_m}{API_{m-1}} = (1 + r_m).$$

Similarly,

$$\frac{API_m}{API_{m-2}} = \frac{API_m}{API_{m-1}} \cdot \frac{API_{m-1}}{API_{m-2}} = (1 + r_m)\cdot(1 + r_{m-1}),$$

there was no opportunity for abnormal profit once the income information had become generally available. Our results are thus consistent with other evidence that the market tends to react to data without bias, at least to within transactions costs.

THE VALUE OF ANNUAL NET INCOME RELATIVE TO OTHER SOURCES OF INFORMATION[34]

The results demonstrate that the information contained in the annual income number is useful in that it is related to stock prices. But annual accounting reports are only one of the many sources of information available to investors. The aim of this section is to assess the relative importance of information contained in net income, and at the same time to provide some insight into the timeliness of the income report.

It was suggested earlier that the impact of new information about an individual stock could be measured by the stock's return residual. For example, a negative residual would indicate that the actual return is less than what would have been expected had there been no bad information. Equivalently, if an investor is able to take advantage of the information either by selling or by taking a short position in advance of the market adjustment, then the residual will represent, ignoring transactions costs, the extent to which his return is greater than would normally be expected.

If the difference between the realized and expected return is accepted as also indicating the value of new information, then it is clear that the value of new, monthly information, good or bad, about an individual stock is given by the absolute value of that stock's return residual for the given month. It follows that the value of all monthly information concerning the average firm, received in the 12 months preceding the report, is given by:

$$TI_0 = \frac{1}{N} \sum_{j}^{N} \left[\prod_{m=-11}^{0} (1 + |v_{jm}|) \right] - 1.00,$$

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and, in general,

$$\frac{API_m}{API_s} = (1 + r_{s+1}) \cdots (1 + r_m).$$

Thus, the marginal return for the two months after the announcement date on the portfolio consisting of firms for which EPS decrease would have been $0.878/0.887 - 1 \cong -.010$; similarly, the marginal return on the portfolio of firms for which EPS increased would have been $1.059/1.056 - 1 \cong .003$. After allowing for the computational bias, it would appear that transactions costs must have been within one per cent for opportunities to have existed for abnormal profit from applying some mechanical trading rule.

[34] This analysis does not consider the *marginal* contribution of information contained in the annual income number. It would be interesting to analyze dividends in a way similar to that we have used for income announcements. We expect there would be some overlap. To the extent that there is an overlap, we attribute the information to the income number and consider the dividend announcement to be the medium by which the market learns about income. This assumption is highly artificial in that historical income numbers and dividend payments might both simply be reflections of the same, more fundamental informational determinants of stock prices.

where TI denotes total information.[35] For our sample, averaged over all firms and years, this sum was 0.731.

For any one particular stock, some of the information between months will be offsetting.[36] The value of net information (received in the 12 months preceding the report) about the average stock is given by:

$$NI_0 = \frac{1}{N}\sum_{j}^{N}\left|\prod_{m=-11}^{0}(1 + v_{jm}) - 1.00\right|,$$

where NI denotes net information. This sum was 0.165.

The impact of the annual income number is also a net number in that net income is the result of both income-increasing and income-decreasing events. If one accepts the forecast error model,[37] then the value of information contained in the annual income number may be estimated by the average of the value increments from month -11 to month 0, where the increments are averaged over the two portfolios constructed from (buying or selling short) all firms and years as classified by the signs of the income forecast errors. That is,

$$II_0 = \frac{N1(API_0^{N1} - 1.00) - N2(API_0^{N2} - 1.00)}{(N1 + N2)},$$

where II denotes income information, and $N1$ and $N2$ the number of occasions on which the income forecast error was positive and negative respectively. This number was 0.081 for variable (1), 0.083 for variable (2), and 0.077 for variable (3).

From the above numbers we conclude:

(1) about 75 per cent [(.731 − .165)/.731] of the value of all information appears to be offsetting, which in turn implies that about 25 per cent persists; and

(2) of the 25 per cent which persists, about half [49 %, 50 %, and 47 %—calculated as .081/.165, .083/.165, and .077/.165—for variables (1)–(3)] can be associated with the information contained in reported income.

Two further conclusions, not directly evident, are:

(3) of the value of information contained in reported income, no more than about 10 to 15 per cent (12 %, 11 %, and 13 %) has not been anticipated by the month of the report;[38] and

[35] Note that the information is reflected in a value increment; thus, the original $1.00 is deducted from the terminal value.

[36] This assertion is supported by the observed low autocorrelation in the stock return residuals.

[37] Note that since we are interested in the "average firm," an investment strategy must be adopted on every sample member. Because there are only two relevant strategies involved, it is sufficient to know whether one is better off to buy or to sell short. Note also that the analysis assumes the strategy is first adopted 12 months prior to the announcement date.

[38] The average monthly yield from a policy of buying a portfolio consisting of all firms with positive forecast errors and adopting a short position on the rest would have resulted in an average monthly abnormal rate of return, from -11 to -1, of

(4) the value of information conveyed by the income number at the time of its release constitutes, on average, only 20 per cent (19%, 18%, and 19%) of the value of all information coming to the market in that month.[39]

The second conclusion indicates that accounting income numbers capture about half of the net effect of all information available throughout the 12 months preceding their release; yet the fourth conclusion suggests that net income contributes only about 20 per cent of the value of all information in the month of its release. The apparent paradox is presumably due to the fact that: (a) many other bits of information are usually released in the same month as reported income (for example, via dividend announcements, or perhaps other items in the financial reports); (b) 85 to 90 per cent of the net effect of information about annual income is already reflected in security prices by the month of its announcement; and (c) the period of the annual report is already one-and-one-half months into history.

Ours is perhaps the first attempt to assess empirically the relative importance of the annual income number, but it does have limitations. For example, our results are systematically biased against findings in favor of accounting reports due to:

1. the assumption that stock prices are from transactions which have taken place simultaneously at the end of the month;
2. the assumption that there are no errors in the data;
3. the discrete nature of stock price quotations;
4. the presumed validity of the "errors in forecast" model; and
5. the regression estimates of the income forecast errors being random variables, which implies that some misclassifications of the "true" earnings forecast errors are inevitable.

Concluding Remarks

The initial objective was to assess the usefulness of existing accounting income numbers by examining their information content and timeliness. The mode of analysis permitted some definite conclusions which we shall briefly restate. Of all the information about an individual firm which becomes available during a year, one-half or more is captured in that year's income number. Its content is therefore considerable. However, the annual income report does not rate highly as a timely medium, since most of its content (about 85 to 90 per cent) is captured by more prompt media which perhaps include interim reports. Since the efficiency of the capital market

0.63%, 0.66%, and 0.60% for variables (1), (2), and (3) respectively. The marginal rate of return in month 0 for that same strategy would have been 0.92%, 0.89%, and 0.94% respectively. However, relatively much more information is conveyed in the month of the report announcement than in either of the two months immediately preceding the announcement month or in the two months immediately following it. This result is consistent with those obtained by Beaver (1968).

[39] An optimum policy (that is, one which takes advantage of all information) would have yielded an abnormal rate of return of 4.9% in month 0.

is largely determined by the adequacy of its data sources, we do not find it disconcerting that the market has turned to other sources which can be acted upon more promptly than annual net income.

This study raises several issues for further investigation. For example, there remains the task of identifying the media by which the market is able to anticipate net income: of what help are interim reports and dividend announcements? For accountants, there is the problem of assessing the cost of preparing annual income reports relative to that of the more timely interim reports.

The relationship between the magnitude (and not merely the sign) of the unexpected income change and the associated stock price adjustment could also be investigated.[40] This would offer a different way of measuring the value of information about income changes, and might, in addition, furnish insight into the statistical nature of the income process, a process little understood but of considerable interest to accounting researchers.

Finally, a mechanism has been provided for an empirical approach to a restricted class of the controversial choices in external reporting.

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[40] There are some difficult econometric problems associated with this relationship, including specifying the appropriate functional form, the expected statistical distributions of the underlying parameters, the expected behavior of the regression residuals, and the extent and effects of measurement errors in both dependent and independent variables. (The functional form need not necessarily be linear, if only because income numbers convey information about the covariability of the income process.)

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EFFICIENT CAPITAL MARKETS AND THE INFORMATION CONTENT OF ACCOUNTING NUMBERS

*John T. Emery**

I. Introduction

The theory of efficient capital markets suggests that if the capital markets are efficient, security prices can be assumed at any time to "fully reflect" all available information. Various forms of the model have been subjected to extensive empirical testing. The results of these tests have been such that in reviewing the literature on the theory Fama [3] states, ". . . the evidence in support of the efficient markets model is extensive, and (somewhat uniquely in economics) contradictory evidence is sparse." Most of the research, however, has been addressed to the question of whether prices "fully reflect" particular subsets of available information. The validity of these results depends on the extent to which the information in the subset used for testing captures the information actually impounded in prices.

There is some evidence in support of the idea that prices may not impound all available information. Niederhoffer and Osborne [10] provide results which suggest that specialists on the New York Stock Exchange may possess and exploit monopolistic access to information. Also, in examining trading by corporate insiders Scholes [11] found significant market reactions to large trades by corporate insiders. His results support the efficient markets model when the efficiency conditions are defined relative to all *publicly* available information. If the efficiency conditions are defined relative to all available information including that possessed by corporate insiders, he finds some evidence that is inconsistent with the model. In particular, the price changes which often occur immediately after the disclosure of corporate insider trading actually suggest that insiders may be acting on information which is not publicly available.

If management may occasionally have monopolistic access to undisclosed information, i.e., insider information, to which the market would react if it were available or predictable, the question of whether there is some optimum strategy for disclosing this information arises. Perhaps the most extensive treatment of such strategies is in the accounting literature where there are numerous references to the suggestion that accountants smooth or normalize the income of firms. Most versions of the "income-smoothing" hypothesis are concerned with the extent to which managers may be able to alter a series of reported accounting numbers *via* the choice of accounting procedures. The most commonly alleged motivation for such practices is to reduce the extent to which

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"bad times" or, conversely, "good times" are revealed by reported accounting numbers. Occasionally firms with large operating losses appear to adopt a "big bath" strategy by declaring large losses over a short period of time. The presumed effect is that once the firm has purged itself of the losses, it will be able to report a more favorable earnings pattern. The implication is that a smoothed series of accounting numbers, especially income numbers, will enhance the value of the firm--presumably by reducing the risk of the firm as perceived by the market. Essentially the same idea is presented in the functional fixation hypothesis of Ijiri, Jaedicke, and Knight [7]. In essence, this hypothesis states that two firms could be alike in all "real" economic respects and yet their securities could sell for different prices simply because of the way the accountant reported the results of operations.

For an income smoothing strategy to enhance the value of the firm, the accounting numbers must disclose or imply information that is not already impounded in current market prices. Accounting numbers, however, are not the only source of information about a firm. Competing sources include such items as statements by corporate officials, releases issued by brokerage firms or market-newsletter services, reports filed with the SEC on insider trading or for registrations with respect to security floatations, information "leakages," and the results of forecasting models.[1]

Much of the literature on the income smoothing hypothesis has attempted to test for the existence of possible income smoothing procedures without determining whether they would increase the value of the firm. If income smoothing is to increase prices above what they would be otherwise, the information content of the reported accounting numbers must be such that the market will react in a more favorable manner than if the numbers had not been transformed through accounting manipulations. In an efficient market, though, the manipulation of accounting numbers would not alter prices unless the numbers convey information which is not contained in other publicly available sources.

This paper compares the relation between reported accounting income and prices with the relation between certain adjusted (unsmoothed) income series and prices. If the market is efficient and alternative sources of information are available, a stronger relation between unsmoothed income and prices than between reported income and prices would suggest that the market can decide for itself what the correct accounting numbers should be. Alternatively, evidence that the manipulation of accounting numbers can influence prices implies the existence of optimal strategies for disclosing information. The success of such strategies has implications for both management and investors. The methodology is presented in the following section.

II. Methodology

While the efficient markets model is typically expressed in terms of rates of return, the income smoothing hypothesis has been defined in various ways including income levels, rates of change in income, and accounting rates of return on equity. It is assumed that if firms actually do engage in smoothing practices, they attempt to smooth the rate of return on the market value of equity. For purposes of this paper the

[1]Nicholas J. Gonedes, "Efficient Capital Markets and External Accounting," *Accounting Review* (January 1972), p. 16.

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rate of return will be expressed as the ratio of earnings per share to price per share. Earnings per share will be taken as the smoothing objective. These rates of return will be considered with respect to mean-reverting stochastic processes.

The accounting numbers presented by the firm can be viewed as the product of two processes. One is the stochastic process generating *basic* accounting numbers which with a given set of accounting procedures will reflect the influence of various events on the firm's production function. These events include changes in the firm's factor-input markets and changes in its output markets. Once the basic numbers are created, smoothing procedures may then be used to transform these numbers for the purpose of controlling the disclosure of information in the *reported* accounting numbers.

While a firm may have only limited control over changes in its input and output markets, it does have direct control over asset and financing decisions and can attempt to smooth basic accounting numbers through changes in operations. In an efficient market, however, the effect of real changes will be reflected in prices. The smoothing problem is whether accounting manipulations by themselves can alter prices successfully.

Gonedes [5] provides one of the clearest statements of the problem. His formulation is expressed as follows:

$$\text{(1)} \qquad \underset{(\alpha_t;\ 1\leq t\leq N)}{\text{Max}}\ \Psi = E\left[\sum_{t=1}^{N} \tilde{r}_t^c - \lambda(\tilde{r}_t^c - \Phi)^2\right] \quad ,$$

$$\text{(2)} \qquad \text{Subject to } \tilde{r}_t^c = \tilde{r}_t + \alpha_t \quad ,$$

$$\text{(3)} \qquad \sum_{t=1}^{N} \alpha t = 0 \quad ,$$

where

α = smoothing adjustment to basic rate of return,

$\tilde{r}$ = basic rate of return,

$\tilde{r}^c$ = reported rate of return,

λ = parameter measuring disutility of squared deviations about Φ,

Φ = parameter delineating the measure about which smoothing occurs. The hypothesis stated here minimizes deviation from reported income in the previous period, $\tilde{r}_t^c$-1.

The disutility represented by λ is a measure of the information content of a change in the reported rate of return. It can be expected to vary for different firms.

It is assumed that accounting manipulations are meant to redistribute income over time rather than alter total reported income permanently. This implies

$$\text{(4)} \qquad \sum_{t=1}^{N} \tilde{r}_t^c = \sum_{t=1}^{N} \tilde{r}_t \quad .$$

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Both total reported income and the resulting rate of return based on this income will present the same information when the base for calculating the rate of return is specified properly. To avoid introducing bias from improperly estimating the base, earnings per share will be taken as the smoothing objective.

When information about income is available from sources other than accounting statements, prices can be expected to reflect not only the information reported by the accounting statements but also that obtained from other publicly available sources. If attempts to smooth earnings through accounting manipulations do influence prices successfully, reported accounting numbers should be more highly correlated with the price of the stock than basic accounting numbers. The basic accounting numbers, however, are not generally available. Any attempt to transform the reported numbers back to the basic numbers from which they originated must rely on assumptions about the nature of the smoothing process employed. This paper examines one class of mean reverting procedures that might be used to smooth reported income.

It is supposed that management desires to report a rate of return that is as high as possible and acceptably close to the previous period's reported rate of return. By reducing the change in reported income as measured by $(\tilde{r}_t^c - \tilde{r}_{t-1}^c)^2$, management attempts to lower the market's perception of the amount of risk represented by the stock of the firm. If some firms actually employ this type of smoothing procedure, the reported numbers should exhibit less variance than the basic numbers.

To test for the possible effect of income smoothing on prices, it is necessary to estimate the basic, but not directly observable, numbers. The most common approach is that used by Kaplan and Roll [9] in which the accounting statements are adjusted to examine the effect on prices of different methods of reporting certain items. Due to the large number of possible accounting manipulations, simulation procedures are used to estimate what the basic numbers might have been by unsmoothing the reported numbers. This is done by rearranging the reported earnings into alternative series which have greater total variance than the reported series. The correlation between reported earnings and stock prices is then compared with the correlations between the simulated unsmoothed earnings and prices.

Whether firms attempt to smooth earnings through accounting manipulations or not, any procedure which alters the reported income series is likely to create artificially some basic earnings series that have a greater correlation with prices than the reported numbers but do not empirically represent fact. If the market has sources of information about income other than the reported numbers and can decide for itself what the basic numbers should be, the unsmoothing procedure described above should produce a greater number of earnings series with a higher correlation between the series and prices for firms that attempt to smooth earnings than for firms that do not. This approach will detect only smoothing behavior which the market does not impound in prices. No evidence of the type of smoothing described is expected if firms do not engage in smoothing practices or if those firms which do are successful in influencing prices through accounting manipulations.

To test the hypothesis a sample of 110 firms was selected from two-digit Standard Industrial Classification industries. The industries were aerospace, auto parts, building materials, chemicals, electronics and electronic components, petroleum products, and steel. A list of the firms is included in the Appendix. Annual earnings and price data for the years 1963 through 1972 were taken from the Compustat Annual and Quarterly tapes, respectively. The prices used were month-end closing prices two months after the end of the fiscal year. Both prices and earnings were adjusted for stock splits and stock dividends.

The smoothness of reported earnings was measured in two ways. One was the standard error of the autoregressive trend equation $EPS_t = \alpha + \beta\ EPS_{t-1}$ where EPS is earnings per share and t represents the time period. Since some firms exhibited low R^2's, the variance of the annual change in earnings per share was used as an alternative measure of smoothness.

Table 1 presents the results of the simulation to unsmooth earnings on an industry basis. The smoothing procedure simply transfers adjusted income on a per share basis from one period to another. Simulated series with a lower variance than the reported series are not considered. The correlation coefficients in Table 1 are those calculated between either the standard error about the earnings trend, SEE_j, or the variance of the yearly change in reported earnings, $\sigma^2(\Delta EPS_j)$, and the data generated by the simulation procedures. The columns labeled ρ_j contain the correlations between either SEE_j or $\sigma^2(\Delta EPS_j)$ and the number of transformed income series with a greater $\sum_t (EPS_t - EPS_{t-1})^2$ than the reported series, $\sigma^2(\Delta EPS_j^c)$. The ρ_j^c column is correlation between the number of these transformed series which have a higher correlation with prices than the reported series and the SEE_j or $\sigma^2(\Delta EPS_j)$. Let N_j be the number of the c unsmoothed earnings streams simulated for firm j for which $\sigma^2(\Delta EPS_j^c) > \sigma^2(\Delta EPS_j)$. Also, define N_j^* to be the number of these N_j earnings streams for which $\rho_j^c > \rho_j$. Then the ratio N_j^*/N_j is the percent of unsmoothed simulated series which have a higher correlation with prices than the reported earnings. The numbers in the table are the correlations between this ratio and the smoothing measures. The level of significance for the one-tailed t test is given in parentheses beneath the coefficient.

For the firms chosen from the seven industries in this sample the ρ_j coefficients which are statistically significant suggest an inverse relation between the smoothing measures and the number of new series created from the reported income numbers. Also, the significant ρ_j^c coefficients for the relation between the smoothing variables and the number of new earnings series with a higher correlation to prices than the reported earnings are negative. These results suggest that within the selected industries the number of alternative earnings series providing a better explanation of prices than reported earnings increases as the reported numbers become smoother.

If the market is efficient and has access to other sources of infomation than accounting numbers, there should be a negative relation between the measures of smoothness and the ratio N_j^*/N_j. The chemical industry is the only industry with a negative and statistically significant coefficient for the variance smoothness measure. The auto parts industry demonstrates the same relation at a lower level of significance for the variance. In general, the variance seems to be a better statistic with which to measure smoothness for these data.

TABLE 1

PEARSON CORRELATION COEFFICIENTS BETWEEN MEASURES OF SMOOTHNESS IN REPORTED INCOME AND SIMULATED EARNINGS NUMBERS*

		Correlation between SEE_j and			Correlation between $\sigma^2(\Delta EPS_j)$		
Industry	Number of Firms	ρ_j	ρ_j^c	N_j^*/N_j	ρ_j	ρ_j^c	N_j^*/N_j
Aerospace	13	-.3605 (.114)	.2770 (.180)	.5860 (.018)	-.4914 (.045)	-.0155 (.480)	.7010 (.004)
Auto Parts	10	-.2272 (.264)	-.1942 (.296)	.2011 (.289)	-.5580 (.047)	-.5540 (.049)	-.5009 (.071)
Building Materials	22	-.0757 (.369)	-.0832 (.357)	-.1898 (.199)	-.2202 (.163)	-.2377 (.144)	-.1892 (.200)
Chemicals	21	.2716 (.117)	-.1578 (.248)	-.2430 (.145)	.1030 (.329)	-.3838 (.043)	-.4747 (.015)
Electronics	13	-.2062 (.250)	-.1491 (.314)	.1080 (.363)	-.3849 (.097)	-.1959 (.261)	.6438 (.009)
Petroleum Products	19	-.6045 (.004)	-.2503 (.151)	.2347 (.167)	-.4729 (.021)	-.3869 (.051)	-.0367 (.441)
Steel	12	-.4823 (.057)	-.1881 (.280)	.8144 (.001)	-.7286 (.004)	-.6880 (.007)	-.2066 (.260)
Total	110	-.1703 (.038)	-.1279 (.092)	-.1210 (.104)	-.3658 (.001)	-.2154 (.012)	.3523 (.001)

*Level of significance in parentheses.

Table 2 presents the same analysis as Table 1 except that Spearman rank order correlation coefficients are used. When the numbers are ranked, the reported relations are somewhat stronger. Both the chemical and auto parts industry have a significant negative relation for N_j^*/N_j. While little attention has been given to the auto parts industry, Gordon, Horwitz and Meyers [6], Copeland [1], Dascher and Malcom [2], and White [12] examined income smoothing in the chemical industry. Their results, however, were not conclusive.

III. Conclusions

This paper examines the relation between reported accounting income and prices with the relation between certain adjustments to the reported income series and prices. The simulation procedures used to transform the reported accounting numbers provide evidence that some firms in the chemical and auto parts industry may have manipulated accounting numbers to report a smoother earnings trend than would have existed without such accounting adjustments. The significant negative relations, for the chemical industry in particular, suggest that enough of the information contained in accounting numbers is available through alternative sources that the market can estimate what the correct accounting numbers should be and price the stock accordingly. The methodology employed here examines only one type of income smoothing and does not exclude the possibility of short-term price effects. Since there is some evidence that the market is able to rely on sources of information other than accounting numbers, it would be desirable to expand the sample size. Recognizing these limitations, the implication here is consistent with the conclusion reached by Kaplan and Roll, "Earnings manipulation may be fun, but its profitability is doubtful."[2]

[2]Robert Kaplan and Richard Roll, "Accounting Changes and Stock Prices," *Financial Analysts Journal* (January-February 1973), p. 52.

TABLE 2

SPEARMAN RANK ORDER CORRELATION COEFFICIENTS BETWEEN MEASURES OF SMOOTHNESS IN REPORTED INCOME AND SIMULATED EARNINGS NUMBERS*

Industry	Number of Firms	Correlation between SEE_j and			Correlation between $\sigma^2(\Delta EPS_j)$		
		ρ_j	ρ_j^c	N_j^*/N_j	ρ_j	ρ_j^c	N_j^*/N_j
Aerospace	13	-.5989 (.016)	-.1648 (.296)	.3934 (.092)	-.6374 (.010)	-.0714 (.409)	.6162 (.013)
Auto Parts	10	-.0667 (.428)	-.0788 (.415)	-.1394 (.351)	-.3818 (.139)	-.5394 (.054)	-.6485 (.022)
Building Materials	22	.1711 (.224)	.1133 (.308)	-.1011 (.328)	-.3868 (.038)	-.4100 (.030)	-.3145 (.077)
Chemicals	21	.1974 (.196)	.1195 (.303)	.0662 (.388)	.0623 (.395)	-.4844 (.014)	-.5247 (.008)
Electronics	13	-.1183 (.351)	.1265 (.341)	.1978 (.259)	-.3989 (.089)	.1486 (.315)	.4615 (.057)
Petroleum Products	19	-.3842 (.053)	-.2281 (.174)	.0649 (.396)	-.3719 (.059)	-.3877 (.051)	-.1228 (.309)
Steel	12	-.4545 (.069)	-.0035 (.496)	.5175 (.043)	-.6713 (.009)	-.7811 (.002)	-.3497 (.133)
Total	110	0.0985 (.154)	.0069 (.472)	.1533 (.055)	-.3479 (.001)	-.2594 (.004)	.0235 (.404)

*Level of significance in parentheses.

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APPENDIX

List of Firms Included in Sample

Aerospace

Aerojet General Corp.
AVCO Corp.
Bendix Corp.
Curtis-Wright Corp.
General Dynamics Corp.
Grumman Corp.
Lockheed Aircraft Corp.
Martin-Marietta Corp.
Northrop Corp.
Thiokol Chemical Corp.
TRW Corp.
United Aircraft Corp.

Auto Parts

Borg-Warner Corp.
Budd Co.
Champion Spark Plug
Dana Corp.
ESB Corp.
Eaton Corp.
Federal-Mogul Corp.
Kelsey Hayes Co.
Libbey-Owens-Ford Co.
Systron-Donner Corp.
Timken Co.

Building Materials

Alpha Portland Cement Co.
American Cement Corp.
American Standard, Inc.
Carrier Corp.
Certain-Teed Products
Crane Co.
Fedders Corp.
Flintkote Co.
General Portland Cement Co.
Ideal Basic Inds., Inc.
Johns-Manville Corp.
Kaiser Cement and Gypsum Corp.
Lehigh Portland Cement Co.
Long Star Inds.
Marquette Cement Mfg. Co.
Masonite Corp.
National Gypsum Co.
Owens-Corning Fiberglass Corp.
Penn-Dixie Cement Corp.
Tecumseh Products Co.
Trane Co.
U. S. Gypsum Co.

Chemicals

Airco, Inc.
Allied Chemical Corp.
American Cyanamid Co.
Celanese Corp.
Chemetron Corp.
Commercial Solvents Corp.
Dart Inds.
Dow Chemical
Du Pont
Eagle-Picher Inds.
Ethyl Corp.
FMC Corp.
W. R. Grace and Co.
Inmont Corp.
Koppers Co.
Monsanto Co.
Olin Corp.
Purex Corp., Ltd.
Stauffer Chemical Co.
Union Carbide
Witco Chemical Corp.

Electronics

AMP, Inc.
Ampex Corp.
Collins Radio Co.
E G and G, Inc.
Fairchild Camera and Instrument
General Instrument Corp.
General Signal Co.
Hewlett-Packard Co.
High Voltage Engineering
Raytheon Co.
Sanders Assoc. Inc., Del.
Varian Assoc.

Petroleum Products

Cities Service
Continental Oil Co.
General American Oil, Texas
Kerr-McGee Corp.
Louisiana Land and Exploration
Marathon Oil Co.
Midwest Oil Corp.
Mobil Oil Corp.
Phillips Petroleum Co.
Royal Dutch Petroleum Co.
Shell Oil Co.
Skelly Oil Co.
Standard Oil of California
Standard Oil Co., Indiana
Standard Oil Co., New Jersey
Standard Oil Co., Ohio
Superior Oil Co.
Tenneco, Inc.
Texaco

Steel

Allegheny Ludlum Inds.
Armco Steel Corp.
Bethlehem Steel Corp.
Carpenter Technology
Copperweld Steel
Inland Steel Co.
Jones and Laughlin
Kaiser Steel Corp.
McLouth Steel Corp.
National Steel Corp.
Republic Steel Corp.
U. S. Steel Corp.

SESSION TOPIC: FINANCE AND ACCOUNTING

SESSION CHAIRPERSON: WILLIAM BEAVER*

THE CAPITAL MARKET, THE MARKET FOR INFORMATION, AND EXTERNAL ACCOUNTING

NICHOLAS J. GONEDES**

1. INTRODUCTION

EQUILIBRIUM PRICES of firms' shares depend on assessed distribution functions of returns to those shares. Such assessed distributions depend, in turn, upon available information pertaining to firms' production-investment ("operating") and financing decisions. One potential source of this type of information is the collection of accounting numbers periodically issued by firms. If accounting numbers do reflect events pertaining to firms' decisions, then they can serve as sources of information pertinent to valuing firms.

Given the relationship between the equilibrium prices of firms' shares, available information, and accounting numbers, it is probably not surpirsing that the notion of capital market efficiency—which also deals with information and equilibrium prices—has played an important role in research dealing with external accounting, such as research on the information content of numbers produced via the external accounting mechanism and research on the effects of disclosure law regulations (adopted by, for example, the Securities and Exchange Commission and the Financial Accounting Standards Board).[1] In a general sense, work of this sort is a subset of the growing literature on information-production activities and capital market equilibrium; see e.g., Fama and Laffer [1971], Gonedes [1975], Gonedes and Dopuch [1974], Jaffe [1975], Ng [1975], Kihlstrom and Mirman [1975], and Rubenstein [1973], among others. Thus, in general, the theoretical connection between information-production activities and capital market equilibrium provides some of the theoretical underpinnings to be exploited in work that deals with external accounting (e.g., information content issues and disclosure-law issues) via the notion of capital market efficiency.

The purpose of this paper is to explore several aspects of information-production and capital market efficiency that appear to have been glossed over in the available literature. Our explorations have implications for work on external accounting. In addition, they have implications for a variety of other issues that have been the subject of both theoretical and empirical work—such as the extent to which portfolio managers can earn "abnormal returns," the role of financial statement analysis, and the role of a body (e.g., the SEC or the FASB) that regulates disclosures by firms.[2]

* Stanford University.

** University of Chicago; The comments and criticisms of Nicholas Dopuch, George Foster, Eugene Fama, Merton Miller, Hans Stoll, and John Dickhaut are gratefully acknowledged.

1. A review of this kind of work is provided in Gonedes and Dopuch [1974; Sec. 8].

2. Implications for the role of bodies such as the FASB and the SEC are more thoroughly discussed by Gonedes, Dopuch, and Penman [1975; Sec. 3].

Some of our arguments are developed in an informal way. A variety of details (and topics) not considered here are considered in Gonedes [1974].

Section 1 briefly reviews the notion of capital market efficiency in a way that leads directly to the main topic of interest: the relationship between the market for information and the capital market. The conditions on the information market that are implicit in the conventional definition of an efficient capital market are identified and discussed in Section 3. Section 4 deals with a variety of issues that arise when the market for information is given explicit consideration. The discussion in Section 4 is used in Section 5 in a brief re-examination of some existing evidence on abnormal returns. This re-examination illustrates how explicit treatment of the information market can affect interpretations of empirical results. Section 6 discusses some issues and implications pertinent to external accounting. A summary of the paper is given in Section 7.

2. Capital Market Efficiency Conditions

The strongest and most conventional definition of an efficient capital market is: An efficient capital market is one wherein prices fully reflect all available information and, thus, one wherein prices adjust rapidly and unbiasedly to new information.[3] While this definition conveys some of what is involved, it is not very concrete. So, a more concrete characterization will be stated. Unless otherwise indicated, a conventional "homogeneous expectations" assumption will be used. Specifically, all capital market agents having the same information are assumed to agree on the assessed distribution functions of returns on assets. This assumption may seem overly restrictive. It does not, however, affect the major points made below, particularly those in Sections 3 and 4. Some other conventional assumptions used throughout are as follows: (1) all agents act as price-takers in a frictionless capital market and (2) equilibrium in the capital market is established via a process of tâtonnement with recontracting. Another assumption made in this section but relaxed at a later point is that all available information is costlessly available to each agent. For convenience, the standard one-period framework is used; this is not something that affects the major points made below.

Let I_t denote the set of all information available at time t.[4] Since information available at time t is also available at time $t+1$, I_t is a never-decreasing set with respect to time. That is, $I_{t-s} \subseteq I_{t-s+1} \subseteq \cdots \subseteq I_t$, for all $s>0$. In short, I_t contains all available information on the present and past of the economic system, including information on the present and past structure of the system. Thus, I_t includes realizations of random variables (e.g., firms' earnings and returns on firms' shares for periods $\tau \leqslant t$) as well as all identifiable relationships amongst such variables (e.g., joint distribution functions).

Next, let I_t^m denote the set of information used by the capital market (i.e., each

3. A review of theory and evidence pertaining to this notion of capital market efficiency is provided by Fama [1970]. See also Fama [1976].

4. The descriptions "at time t" and "at the beginning of time period t" will be used interchangeably.

agent) at time t in establishing equilibrium prices. The precise relationship between I_t^m and the equilibrium prices of assets will depend upon whatever model of equilibrium prices is appropriate. The two-parameter asset pricing model is one such model. The appropriate equilibrium model is not, however, an issue that needs to be considered now. Finally, let $\tilde{\pi}_{jt+1}$ denote the value of asset j at time $t+1$, where tilde ($\tilde{}$) denotes random variable.

By definition, an efficient capital market is one wherein:

$$I_t^m = I_t, \qquad \text{for all } t. \tag{2.1}$$

That is, in an efficient capital market, agents act as if they use all of the information available at time t in establishing equilibrium prices at time t, for all t. Condition (2.1) implies that an efficient capital market is one wherein, for all j and t,

$$F_m(\pi_{jt+1} \mid I_t^m) = F_m(\pi_{jt+1} \mid I_t) = F(\pi_{jt+1} \mid I_t), \tag{2.2}$$

where F_m is a generic symbol for a distribution function assessed by the market, conditional on the information that it uses, and F is a generic symbol for the corresponding correct distribution function, conditional upon I_t. Taken together, (2.1) and (2.2) say: (1) that the market acts as if it uses all of the information available at time t in setting equilibrium prices at time t and (2) that the market acts as if it uses that information correctly, in the sense that its assessed distribution functions of assets' values are precisely those implied by I_t.[5] When viewed in this light, expressions (2.1) and (2.2) formalize what is usually meant when stating that an efficient capital market "fully reflects" all available information. And, of course, if the capital market is to fully reflect all available information, it must adjust instantaneously to new information (i.e., changes in I_t). Moreover, these adjustments must be unbiased in the sense that condition (2.2) underlies the resulting equilibrium prices.

$F(\pi_{jt+1} \mid I_t)$ was referred to as the "correctly assessed" distribution function of $\tilde{\pi}_{jt+1}$, conditional on I_t. The perspective underlying this characterization is as follows: I_t is taken to be the set of all available information at time t and it is assumed that, conditional on I_t, there is a "true" or "underlying" distribution function of $\tilde{\pi}_{jt+1}$, a function that is an element of I_t.[6] The statement that the market "correctly" assesses the distribution function of $\tilde{\pi}_{jt+1}$, for each j, simply means that the market fully understands the implications of I_t. That implies that the market's assessed distribution function for $\tilde{\pi}_{jt+1}$, conditional on I_t, is none other than the "true" one, given I_t. If this were not the case, there would be a detectable difference between $F_m(\pi_{jt+1} \mid I_t^m)$ and $F(\pi_{jt+1} \mid I_t)$, for some j. Any such difference

5. Given homogeneous expectations, there is no disagreement over what is implied by I_t.

6. Recall that I_t contains specifications of all identifiable relationships (e.g., distribution functions) pertinent to describing the economic system.

would imply either that $I_t^m \neq I_t$ or that the market does not fully understand the implications of I_t—conditions that contradict our assumptions.

The above characterization can, of course, be easily recast in terms of one-period rates of return, $\tilde{R}_{jt+1} = (\tilde{\pi}_{jt+1}/\pi_{jt}) - 1$, for all j. Given the "perfect market" assumption, no agent affects current prices. Thus, given a set of prices at time t for all assets and given condition (2.2), all agents face the same distribution functions of one period rates of return. That is, the same gambles are confronted by each agent.

It might seem that the above characterization deals with only the capital market. Nothing was said about, for example, the nature (perfect vs. imperfect) of any market for goods or services. Upon closer examination, one should recognize, however, that our characterization of the capital market incorporates some strong assumptions about a different market, viz., the market for information. This issue is considered in the next section.

3. Implicit Conditions on the Market for Information

Condition (2.1) and—under the homogeneous expectations assumption—Condition (2.2) must hold for every capital market agent. Thus, every agent must have unrestricted access to all information available at time t. That implies that each agent has unrestricted access to all of the initially available information (i.e., the information available when agents first come to the market at time t) as well as all results of information-production activities initiated by any agent on personal account. And for both of these subsets of I_t, the terms of trade facing every agent are assumed to be identical, namely, costless access. In short, it is implicitly assumed that there is no discrimination in terms of the costs of or the opportunities for information-production.

The fact that information costs are assumed to be zero for each agent guarantees that all agents will fully exploit all available information-production opportunities. But this assumption does more: it discourages explicit recognition of collusion in the market for information. As indicated in Section 4, the public good attribute of information provides incentives for collusion in the production of costly information.

It should be clear, therefore, that the conventional notion of capital market efficiency—as developed in Section 2—really deals with both the capital market and the market for information.[7] Thus if one finds, for example, inconsistencies between available evidence and the capital market efficiency conditions, it is possible that the true source of the inconsistencies turns on the information market's nature, rather than the capital market's nature. Of course, inconsistencies between available evidence and these efficiency conditions can be due to an inadequacy of any of the jointly tested hypotheses used in empirical work on capital market efficiency (e.g., the hypothesis about the appropriate equilibrium

7. One might have expected recognition of this issue to have been induced by the popular trichotomizing of the efficient capital market notion into the so-called weak, semistrong, and strong forms; see Fama [1970]. It seems, however, that this trichotomy has been used to characterize the capital market and the results of tests dealing with that market. It has not shifted attention from the capital market to the market for information. Hence, the importance of the latter market's structure is not exposed via the trichotomy.

model, the implicit assumptions about the information market, and the efficiency conditions themselves). It is often impossible to determine, within a given study, which members of the joint hypothesis are descriptively invalid. Yet, it is important to recognize precisely what the components of that hypothesis are—to provide a basis for both future theoretical and future empirical work and to provide a basis for identifying the possible (and most likely) sources of observed inconsistencies between evidence and theory. The above discussion identifies an overlooked component of that jointly tested hypothesis—one that can alter interpretations of empirical results.

Moreover, by not giving explicit attention to the market for information, some important theoretical issues may be overlooked. For example, discrimination in the market for information can induce a capital market setting characterized by problems of "adverse selection"—of the kind discussed by Akerloff [1970]—and by problems associated with "signaling" behavior—of the kind discussed by Spence [1974]; see, for example, Gonedes, Dopuch, and Penman [1975].[8] It is with these possibilities in mind that we provide a brief discussion of the market for information in Section 4. Then, in the remaining sections, we consider some implications obtained by explicitly considering the market for information, rather than implicitly imposing conditions on it via a characterization of the capital market (as was done in Section 2).

4. Issues Specific to the Market for Information

4.1 Preliminaries

Some remarks on the mechanism through which resource allocation is affected by produced information are in order. The game-theoretic mechanism introduced by Gonedes [1975] is used as a starting point. It can be losely described as follows. The market for inputs (e.g., labor and capital) used by information-producers and the capital market are assumed to be perfect in the sense that all participants in these markets act as price-takers in frictionless markets. The production and dissemination of information are permitted to be handled via the unrestricted contracting and recontracting of groups or "coalitions."

In order to make optimal portfolio decisions, agents assess the distributions of returns on assets. Newly produced information permits the use of distributions conditional upon completely reliable signals (from Nature) on the exact distributions of returns. Thus, produced information affects the distributions used by investors in making optimal portfolio decisions and, consequently, if affects the equilibrium prices of firms' shares. Given firms' adherence to the "market value rule," such information affects, therefore, firms' production-investment decisions, or the allocation of real resources. In short, information produced for investors' use on personal account affects firms' production-investment decisions via the information's effects on the prices of firms' shares. Details are provided in Gonedes [1975].

8. A framework that allows for these problems permits a natural identification of the kinds of issues considered by Jensen and Meckling [1975].

4.2 Remarks on Produced Information

One of the basic problems faced in considering the market for the results of information-production is that, unlike, "private" goods, one person's use of produced information does not reduce the "amount," or affect the attributes, of produced information that is available for other users. Suppose, for example, that returns on assets can be characterized by the familiar two-parameter model. This model implies that the equilibrium expected return on an asset is linearly related to that asset's relative risk, which is conditional upon the portfolio held by an agent in equilibrium. Next, suppose that one provides a completely reliable signal pertaining to the true value of an asset's relative risk. That signal can be used by that person in assessing the equilibrium expected return on the asset. But the same signal can be used by any other agent who wishes to assess the equilibrium expected return on the asset. And the first person's use or nonuse of the signal does not affect the information content of the signal insofar as any other agent's assessments of equilibrium expected returns are concerned. In short, produced information is a "public good."

Information's being a public good does not imply that the market mechanism cannot be used for information-production. It does imply that special care is needed in specifying the kind of market setting that can be used. Two plausible specifications are discussed by Gonedes and Dopuch [1974; Sec. 5]. One is based upon the game-theoretic perspective used by Gonedes [1975]. The other involves a setting discussed by Demsetz [1970] regarding the private production of public goods. Using either specification, one gets a setting for information-production that leads to a competitive pricing mechanism for the results of information-production. The equilibrium induced by this mechanism will consist of a Pareto Optimal set of information-production decisions. In equilibrium, no information used solely for "trading" purposes—such as that considered by Fama and Laffer [1971], Hirshleifer [1971], Marshall [1974], and Ng [1975]—is produced if doing so requires the use of real resources. This does not imply, however, that there will be no wealth transfers, since side-payments may be needed to prevent information-production that requires the use of real resources and that simply induces wealth redistributions.

4.3 Observations and Implications

There are several noteworthy features of the scenario for information-production sketched in Section 4.1 and 4.2. First, there are obvious incentives for collusion—collusion that might involve the managements of different firms, the holders of different classes of securities (or the same class), managements and securities analysts, or managements and "institutional investors." Basically, these incentives exist because of the public good attribute of produced information and a setting wherein mutually acceptable arrangements for group action are feasible and enforceable.

Secondly, the scenario indicates that one cannot reject on theoretical grounds the characterization of the market for information implicit in the conventional notion of capital market efficiency (see Section 2). This holds even though there may be collusive actions amongst agents in the market for information and even though different agents may pay different prices for the same property rights in the information market.[9]

Thirdly, and most importantly, the information-market conditions leading to the above scenario's results identify a variety of potential inconsistencies between: (1) the nature of the market for information and (2) the nature of that market implicitly assumed in the conventional characterization of capital market efficiency. Consider, for example, the "exclusion of nonpurchasers" rule, which plays a critical role in the mechanisms that induce a Pareto Optimal competitive equilibrium in the market for information.

Suppose that the existing technology or the existing property rights system does not sustain enforcement of the exclusion of nonpurchasers rule. This may lead to a "failure" in the market for information. If it does, then the information-production results implied by the conventional notion of capital market efficiency may not be attained. To be sure, contemporary disclosure laws may alleviate the effects of this "market failure." But there are a variety of reasons for not expecting them to do so; see Gonedes, Dopuch, and Penman [1975; Sec. 3]. Moreover, disclosure laws are not intended to deal with all forms of information-production activities. For the most part, they deal with a firm's production of information about itself.

The issue of excluding nonpurchasers is related to an arrangement that has been discussed frequently: the bundling of services by market institutions. A bundling of the results of information-production activities and the results of other activities (e.g., portfolio management activities, safekeeping activities, and trade-execution activities) is equivalent to creating a so-called "tying arrangement," which has been widely discussed in the industrial organization literature. On the one hand, this kind of tying-in can be viewed as a practice that imposes restrictions on agents' latitude of choice and one whose elimination would induce an increase in agents' welfare. Mann [1975; p. 315] seems to adopt this perspective. On the other hand, such a tie-in arrangement can be viewed as an attempt to enforce the exclusion of nonpurchasers rule for a particular public good, *viz.*, the results of information-production activities. Purchases of the tied good(s) or service(s)—e.g., portfolio management activities—may serve as an effective metering device for measuring usage of that public good. Charging a price for the tied good in excess of the tied good's marginal cost would then be consistent with practicing price discrimination vis-à-vis sales of the public good.[10] That is not inconsistent with attaining Pareto Optimal results for the problem at hand; see footnote 9.

In the tying-in situation, forced unbundling of services may not increase agents' welfare. It will not do so if the tying arrangements are the most efficient means of enforcing exclusion of nonpurchasers vis-à-vis information-production activities. In

9. The existence of different equilibrium prices for different agents is not inconsistent with competitive equilibrium and Pareto Optimality when one is dealing with a public good; see, e.g., Samuelson [1954], [1955], and Demsetz [1970].

10. See, e.g., Bowman [1973]; Burstein [1960]; and Singer [1968; Ch. 16]. Of course, the possibility of re-selling information may weaken the metering power of the tied good, insofar as the original producers are concerned. Presumably, they recognize this possibility and attempt to make appropriate adjustments in their prices, contractual terms, selections of customers, etc. One can also presume that potential purchasers recognize these possibilities and bid accordingly. Note that related issues arise in, e.g., analyses of markets for new and used durable goods; see Benjamin and Kormendi [1974].

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the latter case, untying may lead to no change in information-production activities but the use of more resources in the enforcement of property rights. Or, if other means of enforcement are less effective, it may lead to changes in the composition and/or scale of information-production activities.[11]

Other kinds of inconsistencies can arise when there are discriminatory terms of trade in the market for information, due to differential costs of or opportunities for information-production. One kind of discriminatory setting arises when a firm (i.e., a firm's management) is a "monopolist" in the market for information about itself. Situations involving "inside" information are essentially of this type.

Another kind of discriminatory setting arises when some agent has a monopolistic position vis-à-vis some kind of human capital. Recognition of this possibility enables one to assess the forcefulness of some arguments dealing with, for example, portfolio management activities. It has often been suggested that economic rents on such activities attributable to special skills (e.g., data-analysis skills) are not to be expected in an efficient capital market. This suggestion often leads to a recommendation of "passive portfolio management."[12] But the situation of interest pertains to the market for information, not the capital market. Specifically, skills such as data-analysis skills (due, for example, to accounting, legal, or economic expertise) constitute a productive resource with respect to information-production, just as management skills constitute a productive resource with respect to producing, say, hand calculators or medical products.[13] To say that one has "special" skills presumably means that one has a monopoly over some kind of human capital at a particular point in time. One does not have to resort to mysterious arguments about capital market agents' "errors" or to challenge the descriptive validity of capital market efficiency conditions in order to explain the potential existence of such a position.[14] Indeed, such arguments fail to deal with the relevant market, *viz*, the market for information.

Whether or not the kind of monopolistic position described above can be perserved (ie., whether or not it can support systematic economic rents) depends upon the structure of the market for information (e.g., entry possibilities). Capital market efficiency is, in general, not sufficient to undo such a position. Specifically, the oft-heard argument that no "superior" type of portfolio management system can be superior for very long "because of capital market efficiency" is a seemingly misguided argument. The latter argument attempts to state the consequences of entry conditions in the capital market for results in the information market. Entry conditions in one of these markets need not, however, be the same as in the other. More generally, the structure of one of these markets need not provide any

11. Note that we are here dealing with tying arrangements per se, not the now defunct "fixed commission" regime usually associated with the bundling of services by members of organized national securities exchanges.

12. This notion is discussed by Black [1971].

13. Note that the nature of human capital affects what one can do with the information-production technology perceived to exist as well as one's perception of what the existing technology is relative to the economy as a whole (i.e., at least one agent). For example, agents with special legal or accounting skills may, at given point in time, be aware of opportunities unknown to agents without such skills.

14. See, e.g., Treynor [1974] and Bernstein [1975] for discussions that resort to these kinds of arguments.

implications on results in the other market. A recent paper in which this is ignored is Boudreaux [1975]. He correctly notes that the notion of capital market efficiency deals with the rapidity and unbiasedness of the capital market's reaction to new available information. He then proceeds to use these (and other) features of an efficient capital market to make statements about information-production activities, such as statements about the equilibrium allocation of real resources to information-production. Alas, this involves confusing two different markets. It is just as misleading as using the structure of the capital market to make statements about the structure of the input markets in which factors of production are sold to firms whose shares are traded in the capital market.

The kinds of inconsistencies mentioned above may lead to important inconsistencies between: (1) available evidence and (2) the conditions and implications of the conventional notion of capital market efficiency. Such violations may be observed even though each agent is correctly using all the information available to that agent (which is not necessarily the same as all the available information). When such departures are observed, it seems best to ascribe them to an aspect of the market for information rather than to an aspect of the capital market, even though the effects of the departures show up in attributes of the capital market.[15]

In short, it appears that the capital market efficiency conditions, as originally stated in Section 2, encompass conditions on capital market agents' behavior, the nature of the capital market (e.g., whether it is frictionless or not), and the nature of the market for information. If one is primarily interested in the descriptive validity of the conditions vis-à-vis the capital market, then it appears appropriate to restrict the efficiency conditions to situations for which one is willing to adopt (on *a priori* and/or empirical grounds) the maintained hypothesis of nondiscriminatory opportunities for information production at zero cost. Situations involving readily available public data and announcements that are specified (on *a priori* and/or empirical grounds) to have known implications are examples of such situations.[16]

At first glance, it might seem that the suggested restriction is important for only empirical work. I would argue that this is not the case. The theory of capital market efficiency is, presumably, supposed to provide insights into the allocation of resources and the effects of the capital market's structure on that allocation. If, however, the role of the market for information is not recognized, then it seems unlikely that a complete understanding (at least at a theoretical level) of resource allocation under uncertainty will be obtained. In a world of uncertainty, information and the opportunities for information-production play important roles in the allocation of resources. This has not gone unrecognized, as is indicated by the burgeoning literature on information economics; see, for example, the recent survey article by Hirshleifer [1973] and the overview paper by Arrow [1974].

15. As indicated earlier, it may not always be possible to determine the precise reason for a departure from the market efficiency conditions. In such cases, pending additional work, all that one can do is recognize the possibility of the information market's structure having induced the departure.

16. If the implications of such data and announcements are not presumed to be known by all market agents, then one must say something about the opportunities for and costs of ferreting out those implications. In this regard, one would have to consider, for example, the extent to which there is restricted access to forms of human capital (e.g., accounting, legal, or economic expertise) that are useful in ferreting out those implications.

The above discussion points to a variety of areas for research on the information market, such as: the kinds of collusive arrangements (if any) used, the extent to which there are discriminatory costs of or opportunities for information-production, entry conditions and opportunities, etc. The recent work by Herman and Safanda [1973] on allocating "investment information," the work by Stillson [1974] on financial institutions' information services, and the proposed work by Maisel [1975] on information and the regulation of financial institutions essentially deal with some issues of this sort.

The above discussion also provides a new perspective for interpreting empirical results on the "abnormal returns" earned by various types of market agents. This topic is the subject of the next section.

5. Discrimination in the Market for Information: Another Look at Some Existing Evidence

5.1 Preliminaries

Suppose we identify groups of agents who might have special information-production opportunities. And suppose their produced information is used for allocating resources to securities. If, in fact, those groups do have special information-production opportunities, then one expects to observe their earning, on average, economic rents or "abnormal returns." If no such rents are, on average, observed for the groups deemed most likely to have special information-production opportunities, then we shall have evidence inconsistent with the existence or at least the persistence of rent-producing discriminatory opportunities for information-production.[17] In this regard, several types of agents come immediately to mind, such as mutual funds, corporate insiders, and specialists on the New York and American Stock Exchanges. Empirical evidence pertaining to the first two groups is provided by Jensen [1969], Scholes [1972], and Jaffe [1974], among others. A brief review of their work is given in Section 5.2. A variety of observations and implications are given in Section 5.3, where the issues discussed in Section 4 are recognized.

As with many other aspects of capital market efficiency, dealing with the issue of special information-production opportunities requires some statements about the relationship between information and asset prices, and thus a characterization of capital market equilibrium. One such statement is provided by the equilibrium expected return/risk relationship implied by the familiar two-parameter asset pricing model. That relationship provides a specification of equilibrium expected returns conditional on available information. If the special groups considered here do have and use special information-production opportunities, then their expected returns, before deducting information-production costs, should differ systematically from the equilibrium expected returns conditional on readily available public information presumed to have known implications. In short, the two-parameter

17. Forces acting against the persistence of such opportunities are discussed below.

model provides a norm or benchmark that can be used in testing for agents' access to special information-production opportunities. A recent review of theory and evidence pertaining to this model is provided by Jensen [1972].

5.2 *A Brief Review of Some Evidence*[18]

The norm provided by the two-parameter framework was used by Jensen [1969] in his examination of 115 mutual funds. The returns on the 115 mutual fund shares were compared to the expected returns implied by the two-parameter model, holding portfolio risk constant.

Jensen assessed the funds' performance at several levels of analysis. He considered, for example, shareholders' returns net of management fees, loading charges, and other avoidable expenses and shareholders' returns measured gross of loading charges and all other identifiable expenses (conditional on the information disclosed by the funds). The crux of his results is that, on average, the funds' performance was not superior to the two-parameter model's predictions. In general, Jensen's results seem to provide no support for the funds having had persistent special information-production opportunities.[19]

The two-parameter model was also used by Jaffe [1974] in his examination of insider trading. The extent to which insiders earn systematic abnormal profits was assessed by estimating the differences between returns on insiders' transactions and the predictions of the two-parameter model.[20] His estimation results are consistent with the claim that insiders have special information-production opportunities. After recognizing transactions costs, only the results for his "intensive trading" samples are consistent with this claim.

Additional evidence on the extent to which insiders and other groups have special information-production opportunities is provided by Scholes [1972]. His analysis deals with the expected value of a departure from the two-parameter model's equilibrium expected rate of return. These expected values were estimated for the day of and several days surrounding those large-block sales called secondary distributions. On balance, his results are consistent with the "information hypothesis." This hypothesis states that a large block sale will affect a security's price if there is information implicit in the fact that some capital market agent is trying to sell a large block of shares. Shortly after the day of the secondary (on average, one to five days), there appeared to be no further price adjustments. The extent of the price adjustment appeared to depend on the initiator of the sale, with

18. Some familiarity with the studies reviewed here is assumed. A lengthy review of these and related studies is provided by Fama [1970].

19. One might argue that some of Jensen's results are consistent with the existence of special information-production opportunities and the subsequent dissipation of rents via costly rent-seeking behavior, which affects the funds' expenses. Yet, his results based upon ignoring all identifiable expenses seem inconsistent with that argument. In any event, this alternative interpretation does not affect our major points. It does, however, lead to implications not considered here. See, e.g., Posner [1975] and Krueger [1974].

20. Jaffe's technique is more complicated than this statement suggests. But his method boils down to the indicated kind of comparison.

the largest observed for corporations or corporate officers and the second largest observed for investment companies and mutual funds; see Scholes [1972; Table 6].

Scholes' results are consistent with the following. Up to the time of a secondary offering, the source of the distribution had special information and this information is "received" by the market via the selling activity (given the source) rather than before that activity (when the source of the distribution acquired the information). In short, one can view Scholes' results as being consistent with some agents'—in particular, corporations' and corporate officers'—having special information-production opportunities.

Scholes' results, which are based on returns measured gross of all expenses, seem to be somewhat consistent with investment companies' and mutual funds' occasionally having special information-production opportunities. This finding appears to be somewhat inconsistent with Jensen's [1969] results for returns measured gross of all expenses. Note, however, that Scholes' analyses deal with selected transactions (i.e., large-block secondary distributions) of funds rather than their overall performance. We shall return to this issue in Section 5.3.

5.3 Some Interpretations and Observations

Taken at face value, the evidence discussed above seems to be consistent with the statement that some groups of agents have special information-production opportunities. That is, there seems to be an inconsistency between this evidence and the conventional statement of the capital market efficiency conditions; see Section 2. In terms of the perspective adopted here (see Section 3), this inconsistency is something that can be ascribed (at least in part) to the nature of the market for information rather than the capital market.

Upon closer analysis, however, it is not even clear that there is an inconsistency to be ascribed to the nature of the market for information. With one exception, the abnormal returns found to have accrued to selected groups (e.g., corporate insiders) were measured before costs of information-production, both explicit and implicit. The one exception is Jensen's study of mutual funds, wherein the effects of the explicit expenses of the funds were (to the extent possible) recognized. It is quite possible that all of the apparent cases of abnormal expected returns would vanish if all explicit and implicit costs of information-production were recognized. Indeed, this cost factor may explain the weak inconsistency (see above) between Jensen's and Scholes' results on the extent to which mutual funds have access to special information-production opportunities. Scholes' results effectively assume zero information-production costs. Jensen's results based upon ignoring *identifiable* expenses are the most comparable to Scholes' results. But, as Jensen himself indicated, his adjustments were not very precise because of deficiencies in the data disclosed by funds.[21] And, of course, implicit costs (opportunity costs) would not be easily computed—by either Scholes or Jensen—even if there were no disclosure problems. If Jensen's adjustments were more precise—or if Scholes had made some adjustment for nonzero information-production costs—the evidence from the two

21. Adjusting returns for brokerage commissions was one of his important problems; see Jensen [1969, p. 228, fn. 89].

studies might have been more consistent, insofar as their implications for the information market are concerned.[22]

If the kinds of studies reviewed above are viewed as attempts to test for the existence of discrimination in the market for information, then the inadequate adjustments for the resources consumed by information-production activities appear to severely restrict the studies' implications. Such adjustments seem to be important for making inferences about the opportunities available to the indicated groups, but not other agents. In addition, they seem to be important in testing for differences in the opportunities available to the identified special groups. Both types of differences (if they exist) can provide insights into the market for information.

In this regard, note that completely adjusting results for information-production costs may involve adjusting the returns on benchmark portfolios. Suppose, for example, that the version of the two-parameter model used to provide benchmark results implies that agents must make inferences about various parameters' values (e.g., the values of assets' expected returns and risks) in order to select optimal portfolios.[23] This implies that selecting optimal portfolios involves at least estimation costs, which are types of information-production costs. If the returns on those portfolios are used to establish benchmarks and if those returns are not adjusted for information-production costs, then one's results will be biased against detecting special information-production opportunities. This is obviously important when there is a high probability of discrimination with respect to the costs of, but not necessarily the technology for, information-production.

Adjusting for the costs of information-production activities involves, of course, a variety of heady problems in data collection. This is illustrated by the problems encountered by Jensen [1969], because of inadequate disclosures regarding expenditures. But the problems encompass more than disclosures of explicit expenditures. Some transactions in the market for information may be barter transactions involving swaps of produced information. Others may involve tie-in sales or similar arrangements designed to enforce exclusion of nonpurchasers. It is not clear that any "real world" data are available for attacking these problems—not a very cheery thought for those interested in empirical work.

Finally, note that the various alleged forms of collusion amongst groups such as those identified above (e.g., collusion amongst analysts and managements) are not indications of "failure" in the market for information.[24] As indicated earlier (see Section 3), there are reasons for expecting collusion in a well-functioning market

22. Scholes' estimated value of the information impounded in funds' distributions is substantially reduced, but still nonnegative, after adjusting by his assumed commission rate of 1 percent; see his Table 6. The estimated value implied by Jensen's results for returns measured *gross of all costs* is essentially zero; adjusting for commissions leads to negative estimates. Thus, the slight inconsistency between Scholes' and Jensen's results exists even after recognizing the transactions costs that would be induced by attempts to exploit information.

23. Several versions of the two-parameter model are reviewed by Jensen [1972].

24. An illustrative allegation is provided in the SEC's recent proposal on forecast disclosures; see Securities and Exchange Commission [April 28, 1975; p. 3] and the analysis in Gonedes, Dopuch, and Penman [1975].

for information. Thus, taken by themselves, collusive acts in the market for information do not imply that some agents face obstacles not confronted by or induced by other agents. Dealing with this issue requires an analysis of the extent to which the opportunities for collusion are discriminatory.

6. External Accounting: Issues and Implications

6.1 *Preliminaries*

As indicated in Section 1, some of the theoretical underpinnings that can be exploited in work on external accounting and disclosure laws arise from the connection between information-production activities and capital market equilibrium. In this section, we consider some implications of our previous analysis of those activities and the capital market. Implications based upon the conventional definition of capital market efficiency are considered. Also, implications of the altered perspective developed in Section 3 are considered. We begin with a discussion of some issues that motivate some investigations of external accounting and capital market equilibrium.

6.2 *Illustrative Issues*

Consider a change in the accounting procedures used by some firm for external accounting (e.g., a switch from FIFO to LIFO for external reporting, perhaps induced by making that change for tax reporting). It is often alleged that the effect of any such change on reported earnings plays a critical role in managements' decisions about effecting the change.[25] This role is ascribed to the perceived influence of reported earnings on firms' equilibrium values. This perspective seems to involve an important assumption about the determination of firms' equilibrium values. Specifically, it seems to assume a somewhat mechanical relationship between firms' reported earnings and firms' equilibrium values. As it stands, this perspective implies, therefore, that a firm can change its equilibrium value by changing its accounting techniques, even though the firm undergoes no substantive economic changes.

The perspective just ascribed to some managements is not unlike that adopted by many in the accounting profession.[26] Thus, in addition to affecting some managements' decisions, it may motivate a variety of accounting rules and regulations. A glance at some official pronouncements—e.g., Opinions of the Accounting Principles Board, Statements of the Financial Accounting Standards Board, and the SEC's Accounting Series Releases—will probably suffice to indicate that it has motivated some policy decisions made by the accounting profession and the SEC. The announced or proposed decisions on the following topics are among those for which support or opposition involves this perspective to some extent: (1) accounting for leases (see FASB [1975] and Hawkins [1975]), (2) income accounting for insurance companies (see Foster [1975]), (3) accounting for "extraordinary items" (see Gonedes [1975a]), and (4) the inclusion of interim results in footnotes to annual reports (see Coopers and Lybrand [1975]). If the indicated perspective is not

25. See, for example, Wallich and Wallich [1974], which deals with changes from FIFO to LIFO.

26. See, for example, Spacek [1959] and Chambers [1974].

descriptively valid, then perhaps attention and resources are being diverted from more important issues—ones that might enhance the information content of accounting numbers.

Issues such as the above are among those motivating work on external accounting and capital market equilibrium.[27] In this work, the notion of capital market efficiency has played a critical role—in the design of empirical studies and in the development of relevant theoretical propositions. Some of these propostions are considered below. Initially, we use the conventional capital market efficiency conditions, as given in expressions (2.1) and (2.2).

6.3 *Implications for External Accounting: First Pass*

Begin by considering some of the elements of I_t—the set of all available information as of time t. In particular, consider the types of events represented by accounting numbers available at time t, which consititute a subset of I_t.

Presumably, the accounting numbers issued by any firm reflect (to some extent) events that impinged upon a firm's operations and thus affected its performance, as measured by accounting numbers. Such events include: (1) those that occur within the factor-input markets in which the firm transacts and (2) those that occur within the firm's output markets. These kinds of events may be specific to a particular industry or they may be economy-wide events. Also, some of the events that influence a firm's operations may be specific to that firm.

The set of information available at time t also contains other sources of information on economy-wide and industry-wide events, as well as on firm-specific events. Some alternative sources on economy- and industry-wide events include: industrial production reports, reports on industrial prices, reports on stabilization policies (e.g., reports on the policies of the Federal Reserve Board), and forecasts issued by trade associations, among other things. All of these kinds of items are competitive sources of information vis-à-vis accounting numbers because both they and accounting numbers reflect the same kinds of events, e.g., economy-wide and industry-wide events.

Additional potentially competing sources of information, vis-à-vis accounting numbers, include statements made by corporate officials regarding their firms' operations, releases issued by brokerage firms, releases issued by market-newsletter services, the contents of filings with the Securities and Exchange Commission (which do not include only accounting numbers) and, more generally, all results of information-production undertaken by capital market agents on personal account. In general, if these—or any other—sources reflect something that, *ex ante*, is pertinent to evaluating a firm, then their information content will, in an efficient market, be fully reflected in equilibrium prices.

Asserting that there are competing sources of information vis-à-vis accounting numbers implies something about the market for information. Specifically, it implies that there are substitute sources of information. As in any other market, the existence of substitutes weakens or eliminates any potential for a monopolistic position by one source.

One implication of the preceding remarks is that—in a conventionally defined

27. A detailed review of this kind of work is provided in Gonedes and Dopuch [1974].

efficient capital market—agents will not blindly accept and use only accounting numbers in establishing firms' values. In other words, there are alternatives to accounting numbers, viewed as sources of information. Hence, the market is not constrained to using accounting numbers. If the alternative sources of information suggest that accounting numbers are "deficient" indicators of events pertinent to assessing firms' values, then the accounting numbers will not be blindly used by capital market agents. In short, in a conventionally defined efficient capital market, there appears to be no basis for expecting a mechanical relationship between reported accounting numbers and firms' equilibrium values. In such a capital market, those numbers will affect equilibrium prices and adjustments thereof only to the extent that they convey information pertinent to assessing firms' values.

6.4 *Implications for External Accounting of the Information Market's Structure*

The above discussion is conditional upon the conventional statement of the capital market efficiency conditions, as given in expressions (2.1) and (2.2). But we argued that those conditions incorporate conditions on the market for information as well as the capital market. With an explicit treatment of the market for information, one can think of various plausible counterarguments vis-à-vis our previous conclusions. Not unexpectedly, these counterarguments turn on some sort of friction or imperfection in the market for information.

For example, one might argue: (1) that reported accounting numbers are, in some sense, "deficient" as sources of information for assessing firms' values and (2) that only a restricted group of persons (e.g., those trained in accounting, firms' managements, etc.) have the opportunities for detecting those deficiencies. The deficiencies may exist because of outright attempts to produce distorted information or simply because of the accepted rules and regulations of external accounting.[28] In effect, this situation involves discriminatory opportunities for information-production. It is one in which there are no adequate substitute sources of information, because of the discriminatory opportunities. Depending upon the structure of the market for information, such situations may arise. And they cannot be undone because of capital market efficiency; see Section 4.

It is important to recognize, however, that monopolistic situations such as the above may not persist. If one is to persist, then the select group(s) of persons capable of producing the information supportive of accounting numbers' deficiencies must be able to retain a monopoly position in the market for information. That implies that there will never be opportunities to produce substitute sources of information, due to agents' actions on personal account or public regulatory actions. In short, the persistence of such situations seems to require an extreme form of monopoly in the market for information. This appears to be one of the implicit assumptions made in some arguments about the effects of accounting numbers. For example, Chambers [1974; p 49] states:

> An efficient market, in the fullest sense, would, by the prices established in it, secure the support of enterprises or projects of companies which have demonstrated earning capacity superior to that of other

28. Some incentives for producing distorted information—capital market efficiency notwithstanding—are discussed in Gonedes, Dopuch, and Penman [1975].

companies. But if earnings reports are differentially distorted by the asset valuation and the income calculation rules adopted by different companies... the stock market *cannot discriminate between the more and the less efficient companies.* [emphasis added]

Clearly, this argument assumes that there are no substitute sources of information vis-à-vis accounting numbers.

When viewed in this light, it is easy to envisage factors acting against the existence or at least the persistence of such a situation. For example, the availability of the substitute sources of information mentioned above may work against some situations of the type described. Also, if training in accounting is really the critical issue, then there will be incentives for agents to acquire the requisite human capital—which is an input for information-production in the present scenario. This too works against the kind of monopoly position described above. Thirdly, the "nonmonopolistic" agents may themselves engage in collusive acts, on private account or via governmental bodies, that weaken or destroy the monopolistic position(s). The proposals for more disclosures about banks' portfolios (see SEC [October 1, 1974] and Coldwell [1975]) and about the financial affairs of municipalities that make public offerings (see Sommer [1975]) can be viewed as results of such collusive acts via governmental bodies. In short, the existence of a monopoly leads to economic rents. Therefore, it induces rent-seeking behavior, which works against preservation of a monopolistic position and, thus, towards the dissipation of rents.[29]

Another counterargument challenging our original conclusions turns on the extent to which capital market agents are "conditioned." A concise statement of this argument was provided by Sterling [1970; p. 453]:

Accounting reports have been issued for a long time, and their issuance has been accompanied by a rather impressive ceremony performed by the managers and accountants who issue them. The receivers are likely to have gained the impression that they ought to react, and have noted that others react, and thereby have become conditioned to react.

Clearly, if this argument is to make any sense, there must be at least one agent who can recognize that one or more other agents are "conditioned." That implies that at least one agent has information-production opportunities not available—on the same terms of trade—to other agents. That is, it implies a monopolistic position in the market for information. Consequently, the preceding discussion on such monopolistic positions applies here as well; depending upon the structure of the market for information, the indicated situation may arise. But, taken as it stands, this second counterargument is also inadequate because it does not recognize the effects of counter-vailing forces in the market for information. In other words, it fails to explain how such a position can be preserved. Indeed, it does not even explain how it could ever arise. Some agents are said to react because they observe other agents reacting to accounting numbers. The counterargument never explains how those other agents came to react in the first place.

The point of the above discussion is two-fold and simple: (1) an efficient capital market will not suffice to eliminate discriminatory costs of or opportunities for

29. Recent analyses of rent-seeking behavior, including its implications for private and social costs, are provided by Krueger [1974] and Posner [1975].

information-production and (2) asserting that such instances of discrimination may or do arise is, by itself, inadequate because it ignores all of the forces that work against the existence or preservation of that discrimination. In short, it appears that a complete understanding of the connection between external accounting and capital market equilibrium requires theoretical and empirical analyses dealing with the market for information and the capital market, rather than with only the latter. In this regard, a substantial amount of work remains to be done.

7. Summary

This paper explored several aspects of information-production and capital market equilibrium that seem to have been ignored in the available literature. It was argued that the prevalent use of a definition of capital market efficiency imposing strong conditions on the information market seems to have disguised the importance of explicitly analyzing the market for information. One consequence is that many assertions about what capital market efficiency implies—about, e.g., "superior" portfolio performance and the allocation of resources to information-production—appear to be misleading, because they do not deal with the relevant market. Moreover, it is usually not recognized that some evidence interpreted as being inconsistent with capital market efficiency is best viewed as pertaining to the market for information rather than the capital market. More generally, failure to explicitly consider the market for information may induce unwarranted inferences about the capital market. Finally, it was argued that, in general, the notion of capital market efficiency does not, taken by itself, provide a basis for fully understanding the connection between external accounting and capital market equilibrium, or any other potential source of information and capital market equilibrium.

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Post-Earnings-Announcement Drift: Delayed Price Response or Risk Premium?

VICTOR L. BERNARD* AND JACOB K. THOMAS†

1. Introduction

This study seeks to discriminate between competing explanations of "post-earnings-announcement drift." Ball and Brown [1968] were the first to note that even after earnings are announced, estimated cumulative "abnormal" returns continue to drift up for "good news" firms and down for "bad news" firms. Foster, Olsen, and Shevlin [1984] (henceforth FOS) are among the many who have replicated the phenomenon.[1] FOS estimate that over the 60 trading days subsequent to an earnings announcement, a long position in stocks with unexpected earnings in the highest decile, combined with a short position in stocks in the lowest decile, yields an annualized "abnormal" return of about 25%, before transactions costs.

Competing explanations for post-earnings-announcement drift fall into two categories. One class of explanations suggests that at least a portion of the price response to new information is delayed. The delay

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[1] Among the others are Watts [1978] and Rendleman, Jones, and Latane [1982].

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might occur either because traders fail to assimilate available information, or because certain costs (such as the costs of transacting or the opportunity costs of implementing and monitoring a trading strategy) exceed gains from immediate exploitation of information for a sufficiently large number of traders. A second class of explanations suggests that, because the capital-asset-pricing model (*CAPM*) used to calculate abnormal returns is either incomplete or misestimated, researchers fail to adjust raw returns fully for risk. As a result, the so-called abnormal returns are nothing more than fair compensation for bearing risk that is priced but not captured by the *CAPM* estimated by researchers. In the case of post-earnings-announcement drift, this explanation requires that firms with unexpectedly high (low) earnings become more (less) risky on some unrecognized dimension.[2]

Several of the results in this paper are difficult to reconcile with plausible explanations based on incomplete risk adjustment. However, they are consistent with a delayed response to information.

What is less clear is why a delayed price response would occur. While abnormal returns to trading on postannouncement drift may be within the transactions costs for small individual investors, a transactions-cost-based explanation raises several difficult unanswered questions. Moreover, one of our tests suggests an alternative explanation for a delay: that prices are affected by investors who fail to recognize fully the implications of current earnings for future earnings.

Section 2 summarizes the current state of understanding of post-earnings-announcement drift and presents arguments for delayed price response and *CAPM* misspecification as explanations for the drift. Section 3 describes the sample and some of the methods used in our empirical tests. The tests themselves are summarized in section 4. A discussion of the evidence and some conclusions are presented in section 5.

2. *Post-Earnings-Announcement Drift: The Nature of the Phenomenon*

The postannouncement drift documented by FOS is duplicated in our figure 1. The figure shows the cumulative abnormal returns (*CARs*) for ten portfolios with different earnings news. To generate the *CAR* plots, FOS used a statistical earnings forecast to estimate unexpected earnings for a sample of NYSE and AMEX firms. The unexpected earnings, scaled by the standard deviation of prior forecast errors, were then compared to the cross-sectional distribution of scaled unexpected earnings for the prior quarter. Based on their standing relative to that distribution, firms were assigned to one of ten portfolios. Finally, the abnormal (size-

[2] Finally, a third explanation—bias resulting from research design problems other than *CAPM* misspecification—is always possible. However, FOS do much to dismiss this possibility. Our study also dismisses some research design problems as potential explanations for the drift.

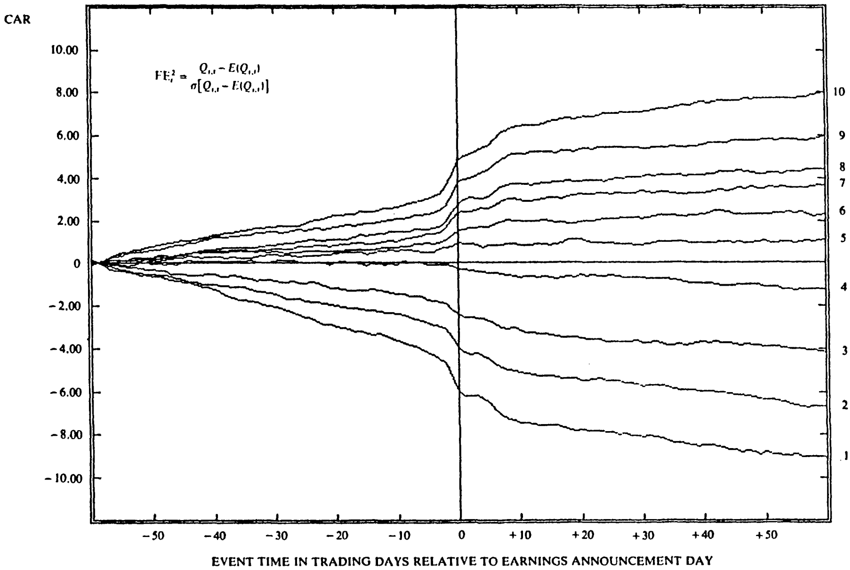

FIG. 1.—Cumulative abnormal returns for FOS earnings-based model (*EBM*) tests. Earnings announcements are assigned to deciles based on standing of standardized unexpected earnings (*SUE*) relative to prior-quarter *SUE* distribution. Portfolio 10 includes firms with the highest *SUE* ranking. Based on data from 1974–81. Cumulative abnormal returns are the sums over 120 trading days surrounding the earnings announcement, of the difference between daily returns and returns for NYSE firms in the same size decile. *SUE* represents forecast error from a first-order autoregressive earnings expectations model (in seasonal differences) scaled by its estimation-period standard deviation. (Reprinted, by permission of the publisher, from G. Foster, C. Olsen, and T. Shevlin, "Earnings Releases, Anomolies, and the Behavior of Security Returns," *The Accounting Review* [October 1984]: 589.)

adjusted) returns on those ten portfolios were plotted over the 120 trading days surrounding the earnings announcement date.

In figure 1, the estimated post-earnings-announcement abnormal returns vary monotonically with the *SUE* deciles. A long position in portfolio 10 (that with the highest unexpected earnings), combined with a short position in portfolio 1 (that with the lowest), yields an estimated abnormal return of 6.31% over the 60 trading days after the earnings announcement, or about 25% on an annualized basis. The issue we now address is whether this estimated abnormal return reflects an incomplete adjustment for risk or a delayed price response.

2.1 THE CASE FOR CAPM MISSPECIFICATION

Ball [1988] argues that there is good reason to believe stock markets to be efficient on a priori grounds, because such markets are "paradigm examples of competition." Some years earlier Ball [1978] argued that even in an efficient market, trading strategies based on earnings numbers might *appear* to generate abnormal returns, because of misspecifications in the *CAPM* used to measure the abnormal returns. There is some evidence consistent with this explanation in Ball, Kothari, and Watts [1988] (henceforth BKW) and FOS [1984].

BKW suggest that betas shift upward (downward) for firms with high (low) unexpected earnings. Since some prior studies assumed for purposes of estimation that betas were stationary, this caused an upward (downward) bias in estimated abnormal returns. To overcome this bias, BKW use an estimation approach that permits betas to shift annually. In so doing BKW find that the postannouncement drift is no longer significant.

The question is whether BKW's failure to detect a significant drift in the year after annual earnings announcement extends to other sample firms and shorter postannouncement periods. Since (as will be shown later) most of the drift occurs within three months of the earnings announcement, quarterly return periods should provide a more powerful test. In addition, BKW's sample includes primarily large firms, and FOS [1984] have shown that the absolute magnitude of the drift is inversely related to firm size. We examine whether beta shifts can explain much of postannouncement drift in a design that uses quarterly data and a sample that is not dominated by large firms.[3]

A second source of evidence consistent with *CAPM* misspecification is the major result in FOS [1984]. FOS contrast two alternative approaches to analyzing the postannouncement behavior of stock returns. The first is that used to generate figure 1: the earnings-based model (*EBM*) approach. The second approach assigns firms to portfolios on the basis of firms' estimated abnormal stock returns over the 60 days prior to and including the earnings announcement day.[4] This is labeled the *SRM* (security-return model) approach. The essential result of the *SRM* tests is that there is no indication of post-earnings-announcement drift. Thus, postannouncement drift was observed only under the first (*EBM*) approach.

The results of the *SRM* tests in FOS have been interpreted by some as indicating that postannouncement drift reflects some problem in risk measurement. For example: "Using the (SRM) method of forming portfolios yields no unusual return behavior following the earnings announce-

[3] We have learned in private conversations with BKW that our results motivated them to extend their tests to quarterly data. In contrast to their earlier results, their tests based on quarterly data indicate significant postannouncement drift, even after adjusting for beta shifts.

[4] FOS also examined tests based on abnormal returns over the two-day window ending on the earnings announcement day and obtained similar results. We do not focus on these short-window tests, however, because in addition to the issues discussed below, they are affected by a bias that would tend to obscure part of the drift. Specifically, when stock returns are ranked over an interval as short as two days, good (bad) news stocks tend to be those that closed on the second day at the ask (bid). Subsequent movement to an average price between the ask and the bid causes an artificial "return reversal" that offsets a portion of any drift.

ment and suggests again that the results of previous studies are caused by a misspecified pricing model" (Dyckman and Morse [1986, p. 58]).

Although the same conclusion was not drawn by FOS, it is understandable that readers of FOS could draw such an inference. FOS explain that the *EBM* tests are vulnerable to certain problems in risk adjustment discussed by Ball [1978]; the *SRM* tests were motivated as one approach to mitigate these problems. Given that the drift vanishes in the *SRM* tests, the results could suggest that the drift in the *EBM* tests reflects a premium for some unidentified risk.

However, Bernard and Thomas [1989] suggest that any such inference is unwarranted. The reason is that the FOS results are consistent not only with certain explanations under which the drift represents a risk premium but also with certain other explanations where the drift is a delayed price response. Specifically, they show that if (1) there exists some delay in the response to earnings news, and (2) the fraction of the *total* response that is *delayed* varies sufficiently across firms, then it is possible simultaneously to detect a drift in the *EBM* tests but not detect a drift in the *SRM* tests.[5] As a result, Bernard and Thomas suggest that a more appropriate interpretation of FOS's *SRM* test is that, rather than discriminating between *CAPM* misspecification and delayed price response, it imposes restrictions on the nature of *CAPM* misspecifications, and on the delayed price response, that could explain the drift. Hence the overall results from FOS still leave open the question of what causes postannouncement drift.

2.2 THE CASE FOR A DELAYED PRICE RESPONSE

That post-earnings-announcement drift could represent a delayed response to information has been viewed as plausible by some academics. For example, Lev and Ohlson [1982, p. 284] describe the evidence of post-earnings-announcement drift as the "most damaging to the naive and unwavering belief in market efficiency." However, it is difficult to explain why the market would fail to respond immediately to earnings information.

One possibility is that transactions costs inhibit a complete and immediate response to earnings news. Examples of such costs include the bid–ask spread, commissions (for some investors), the costs of selling short, and the costs of implementing and monitoring a strategy (including opportunity costs). We turn to a detailed discussion of this possibility later in the paper.

A second possibility is that market prices are influenced by investors who fail to appreciate the full implications of earnings information. That is, some investors may fail to form an unbiased expectation of future

[5] The analysis also requires a third (mild) assumption, that there is no positive serial correlation in the component of stock returns not associated with earnings news.

earnings immediately upon revelation of current earnings, with some portion of the response not occurring until analysts' forecasts are revised or future earnings are realized.[6] Although this possibility departs dramatically from most academics' view of market efficiency, there presently is little evidence on this specific issue. Kormendi and Lipe [1987] and Freeman and Tse [1989] indicate that responses to current earnings reflect at least *some* of the implications for future earnings, but that does not necessarily imply that the immediate response is *complete*. This and other competing explanations are the focus of our empirical tests in section 4.

3. *Sample and Estimation Procedures*

3.1 SAMPLE SELECTION

Our sample includes 84,792 firm-quarters of data for NYSE/AMEX firms for 1974–86. We also conduct some supplementary tests based on 15,457 firm-quarters of data for over-the-counter stocks on the NASDAQ system for 1974–85. Criteria for inclusion in the sample are the same as those used by FOS, who studied NYSE/AMEX firms for the period 1974–81. We require that the firm be listed on the *CRSP* daily files, and that the firm's earnings before extraordinary items and discontinued operations be available for at least ten consecutive quarters on *Compustat*. Our NYSE/AMEX sample includes only firms that appeared on any of the *Compustat* files released from 1982 through 1987.[7] Since firms included in earlier files but dropped from *Compustat* before 1982 are excluded from the sample, there is a potential for a survivorship bias in the first half of our data set. However, FOS conducted tests which indicated that postannouncement drift is not sensitive to this form of bias. Moreover, our conclusions are insensitive to whether we include or exclude "nonsurvivors" dropped from the *Compustat* files between 1982 and 1987.

3.2 ESTIMATION PROCEDURES

3.2.1. Estimation of abnormal returns. For the NYSE/AMEX sample, cumulative abnormal returns are calculated using an approach like that of FOS. FOS use a companion portfolio approach designed to control for

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[6] Clearly, an efficient market may resolve uncertainty about the implications of a previously released earnings number when future earnings are released (Freeman and Tse [1989]). Nevertheless, regardless of how much uncertainty surrounds current earnings, stock prices in an efficient market should immediately reflect an unbiased expectation of future earnings. If information uncertainty is not "priced out," this implies no predictable postannouncement drift. If information uncertainty is priced out, this implies positive postannouncement drift for both good and bad earnings news, which is inconsistent with the data.

[7] The NASDAQ sample was selected from the 1987 *Compustat* file only.

the Banz-Reinganum size effect.[8] Under this approach, abnormal returns are calculated as follows:

$$AR_{jt} = R_{jt} - R_{pt} \tag{1}$$

where AR_{jt} = abnormal return for firm j, day t;
R_{jt} = raw return for firm j, day t;
R_{pt} = equally weighted mean return for day t on the NYSE/AMEX firm size decile that firm j is a member of at the beginning of the calendar year. Firm size is measured by the market value of common equity.

In our tests based on abnormal returns, we preserve comparability with FOS and sum abnormal returns over time to obtain cumulative abnormal returns (*CARs*). One problem with summing abnormal returns over time is that it implicitly assumes daily rebalancing and leads to an upward bias in the returns cumulated over long periods (Blume and Stambaugh [1983] and Roll [1983]). However, since this bias affects both the primary and the companion portfolios, there may be no bias in our estimated abnormal returns. In fact, we have conducted analyses that indicate that the difference between abnormal returns on extreme good news and bad news firms is similar, whether the returns are summed or compounded.[9] In addition, we describe in section 3.2.4 an alternative abnormal return calculation that is free from the bias described by Blume and Stambaugh [1983].

Observations were excluded from the analysis if the return for the earnings announcement day was missing on *CRSP*, or if the *CRSP* returns series did not encompass the 160 trading days surrounding the earnings announcement.

3.2.2. Estimation of standardized unexpected earnings (SUE). Procedures for estimating unexpected earnings were patterned after those used by FOS for the *EBM* Model 2. That is, earnings were forecasted by estimating the Foster [1977] model with historical data.[10] The difference

[8] This approach to measuring abnormal returns makes no attempt to control for systematic risk. Since our conclusions are based on comparisons of abnormal returns on high and low unexpected earnings portfolios, this introduces a bias if systematic risk differs between those two. We test for such a possibility in section 4.2.1.

[9] If anything, our use of summed returns may understate the extent of postannouncement drift. The indicated abnormal returns are about 10% larger when we employ the FOS approach but compound returns over time (using portfolios that are initially equal-weighted). Details are available upon request.

[10] The Foster model assumes that earnings follow a first-order autoregressive process in seasonal differences. FOS indicate [1984, p. 582] that they used a maximum of 20 observations to estimate the Foster model. We used a maximum of 24 observations. FOS indicate [1984, p. 581] that firms were included in the sample even if only ten consecutive quarters of data were available. We retained such firms also, but where fewer than 16 observations were available, we assumed that earnings followed a seasonal random walk. FOS indicate [1984, p. 582] that they obtained essentially the same results when this model was substituted for the Foster model.

between actual and forecasted earnings was then scaled by the standard deviation of forecast errors over the estimation period to obtain standardized unexpected earnings or *SUE*.

3.2.3. Portfolio assignment. Holthausen [1983] and FOS describe a bias that is introduced when firms are assigned to portfolios. When those assignments are based on rankings of unexpected earnings within the distribution for *all* firms, including some that have *not yet announced* earnings for the quarter, there is a hindsight bias that tends to magnify the drift. Like FOS, we overcome that bias by assigning firms to portfolios on the basis of their standings relative to the distribution of unexpected earnings in the *prior* quarter.

3.2.4. Alternative abnormal return calculation: continuously balanced SUE strategy. Abnormal returns are typically viewed as returns in excess of some benchmark, such as the market model. The FOS size-control portfolio approach yields abnormal returns that can be interpreted in this way. However, in the case of the FOS approach, an alternative interpretation is also possible. Because FOS always offset a position in a given firm with the position in a size-control portfolio, the resulting abnormal returns represent the return on a zero-investment trading strategy. The advantage of this interpretation is that, if the offsetting positions are of equivalent risk, any nonzero expected return on the zero-investment portfolio contradicts the implications of market efficiency (at least before considering transactions or other costs).

The difficulty with this interpretation is that the FOS strategy may be difficult to implement as it stands. The strategy requires an investor to take new positions in size-control portfolios every day, with each control portfolio containing hundreds of stocks. Thus, results based on this approach leave open the question of whether similar returns could be generated by an easily implemented, zero-investment strategy.

To assess the sensitivity of our results to this issue, we replicated some of our tests based on a zero-investment strategy that would be easier to implement. Since it involves having the same amount invested in good news and bad news firms at all points in time, we label this strategy the "continuously balanced" *SUE* strategy. (To differentiate it, we sometimes label the FOS approach the "FOS control portfolio" *SUE* strategy.)

The continuously balanced *SUE* strategy works as follows. On a given trading day, we identify any firms that announced earnings, and where standardized unexpected earnings fall in the upper quintile (good news) or lower quintile (bad news) of the prior-quarter distribution. If both good news and bad news firms exist for that day, we assume a long position in the former and a short position in the latter. The long (short) positions are initially equally weighted across the available good (bad) news firms, with the total amount of the long position exactly offsetting the total amount of the short position. We then compute buy-and-hold (i.e., continuously compounded) returns on each of the stocks in the long and short position, over the 60 trading days subsequent to the earnings announcement.

On 14% of trading days, there were either no new good news or no bad news firms available, and so no match could be created. In such cases, we "wait" until a match becomes available. For example, if two good news firms announced earnings on day 1, but no bad news firms announced, we would wait until at least one bad news firm announced earnings. If the first available bad news firm announced on day 4, it would be matched with all good news firms announcing from days 1 through 4, and we would then compound returns from day 5 through day 64. In 97% of all cases, a match became available within two days.

To provide some control for the Banz-Reinganum size effect, this matching process was always conducted within groups of small, medium, and large firms. Small firms are those whose January 1 market value of equity was among the lowest four deciles of the NYSE/AMEX, whereas large firms are those among the highest three deciles. Using only three size groups increased the probability of finding matches of good news and bad news firms within a short period of time. Since we used only three size groups (versus ten in the FOS control portfolio approach), our control for size is not as precise. However, if we assume that smaller firms are as likely to announce bad news as good news, this introduces no bias in the results.[11]

The continuously balanced *SUE* strategy is much easier to implement than that used by FOS but would still be costly to the extent that short selling must be used. There would be no significant difficulty, however, for investors who already own the stocks that announce bad news.

4. *Empirical Results*

4.1 DESCRIPTIVE RESULTS

4.1.1. Magnitude of the drift. FOS [1984] provide estimates of the magnitude of post-earnings-announcement drift and show that the drift varies inversely with firm size. In this and the following section, we replicate those results and demonstrate that they persist over a longer time period. Unless otherwise specified, the results in this section are based on the procedures used by FOS, to maintain comparability; results based on the continuously balanced *SUE* strategy are reported only as supplement information.

Figure 2 presents *CAR* plots for the sample, after assigning firms to portfolios on the basis of standardized unexpected earnings. In contrast to the format used by FOS in figure 1, figure 2 separates *CAR* plots for

[11] If bad news firms are more likely to be small, due to price declines in anticipation of the earnings announcement (and vice versa for good news firms), then the Banz-Reinganum size effect would impart a *downward* bias in our estimated abnormal returns. That is, the bias would tend to offset any postannouncement drift.

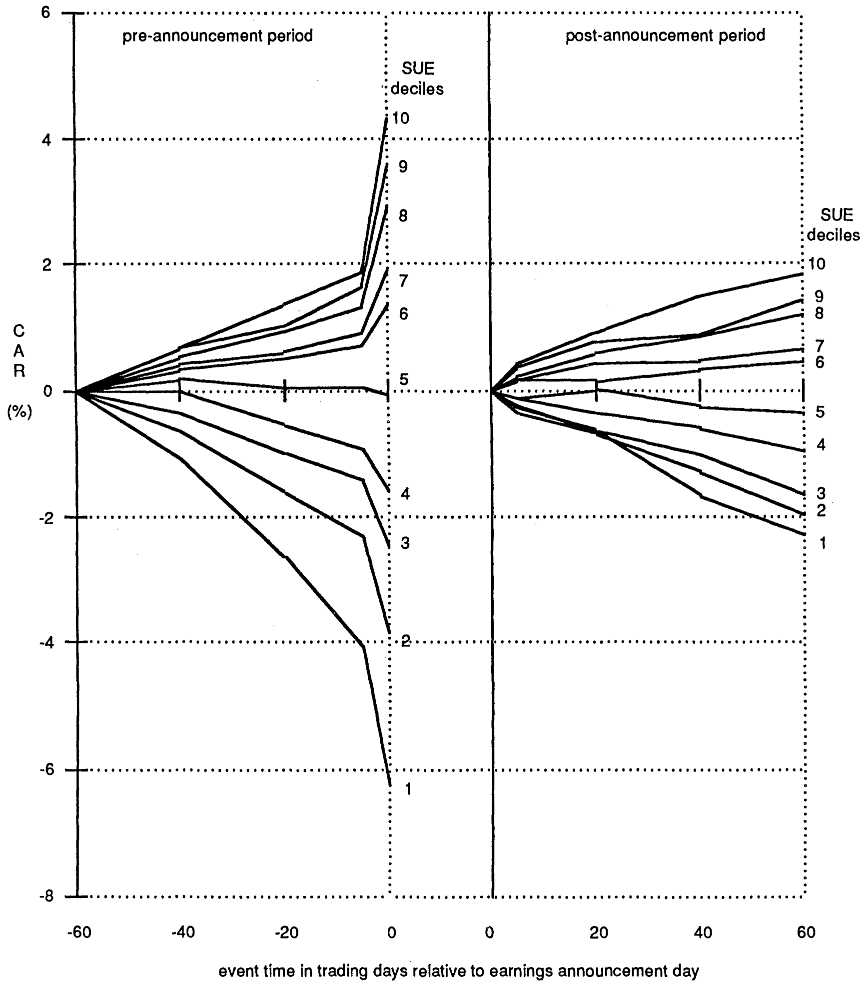

FIG. 2.—Cumulative abnormal returns (*CARs*) for *SUE* portfolios: all announcements. Earnings announcements are assigned to deciles based on standing of standardized unexpected earnings (*SUE*) relative to prior-quarter *SUE* distribution. Based on 84,792 announcements from 1974 to 1986. *CARs* are the sums over pre- and postannouncement holding periods (beginning day −59 and day 1, respectively) of the difference between daily returns and returns for NYSE/AMEX firms of the same size decile. *SUE* represents forecast errors from a first-order autoregressive earnings expectation model (in seasonal differences) scaled by its estimation-period standard deviation (see section 3.2 for details).

the pre- and postannouncement periods, to make the postannouncement abnormal returns easier to gauge. Our results for 1974–86 are similar to those obtained by FOS for 1974–81. That is, there is a pronounced post-earnings-announcement drift, increasing monotonically in unexpected earnings. A long position in the highest unexpected earnings decile and a short position in the lowest decile would have yielded an estimated abnormal return of approximately 4.2% over the 60 days subsequent to the earnings announcement, or about 18% on an annualized basis. (The annualized abnormal return on the continuously balanced *SUE* strategy is 17%.) For the 1974–81 period studied by FOS, we obtain an annualized return of 19%, which is less than the 25% implied by their results.[12]

4.1.2. Relation of drift to firm size. Figures 3 and 4 indicate how the drift varies by firm size, by presenting results for large and small firms.[13] As noted by FOS, the postannouncement drift is larger for smaller firms. Among small firms, a long position in the highest unexpected earnings decile and a short position in the lowest decile yielded an abnormal return of approximately 5.3% over the 60 days subsequent to the earnings announcement. Comparable abnormal returns for medium-sized firms (not shown) and large firms are 4.5% and 2.8%, respectively.

Results based on the continuously balanced *SUE* strategy are similar. For 60-day holding periods, mean abnormal returns for small, medium, and large firms are 5.1%, 4.3%, and 2.8%.

In regressions not reported here, we use the approach of FOS [1984, p. 595] to test the statistical significance of the postannouncement drift and the effect of firm size. Our results confirm that the magnitude of the drift is related to the magnitude of unexpected earnings, and that the absolute magnitude of the drift is inversely related to firm size, both at significance levels less than .01.

We do not present comparable plots of NASDAQ firms. However, the same phenomenon observed for NYSE/AMEX firms was observed for that sample. The magnitude of the drift for NASDAQ firms lies between that observed for small and medium-sized firms on the NYSE/AMEX. This is as expected, given that approximately 70% of our NASDAQ firms would be classified as small (relative to the NYSE/AMEX firms), 20% would be classified as medium, and 5% would be classified as large.

4.1.3. Longevity of the drift. Table 1 provides information about the longevity of the postannouncement drift for stocks ranked in the lowest and highest *SUE* decile, broken down by size and by subperiods extending two years beyond the earnings announcement date.

Most of the drift occurs during the first 60 trading days (about three months) subsequent to the earnings announcement, and there is little evidence of statistically significant drift beyond 180 trading days. If we assume all of the drift occurs within 480 days, then the fraction of the

[12] Differences between our results and those of FOS are most pronounced for small, good news firms. A possible explanation for the difference involves how control portfolios were constructed. It appears that FOS included only NYSE firms in their control portfolios [1984, p. 585], whereas we included both NYSE and AMEX firms.

[13] Firms were assigned to *SUE* deciles before segregation by size. The large firms are more heavily represented in the extreme deciles; in figure 3, *SUE* deciles 5 and 6 contain approximately 2,400 observations each, while *SUE* deciles 1 and 10 contain approximately 3,100 observations each. For small firms, the reverse relation holds; in figure 4, *SUE* deciles 5 and 6 contain approximately 3,400 observations each, while *SUE* deciles 1 and 10 contain approximately 2,700 observations each.

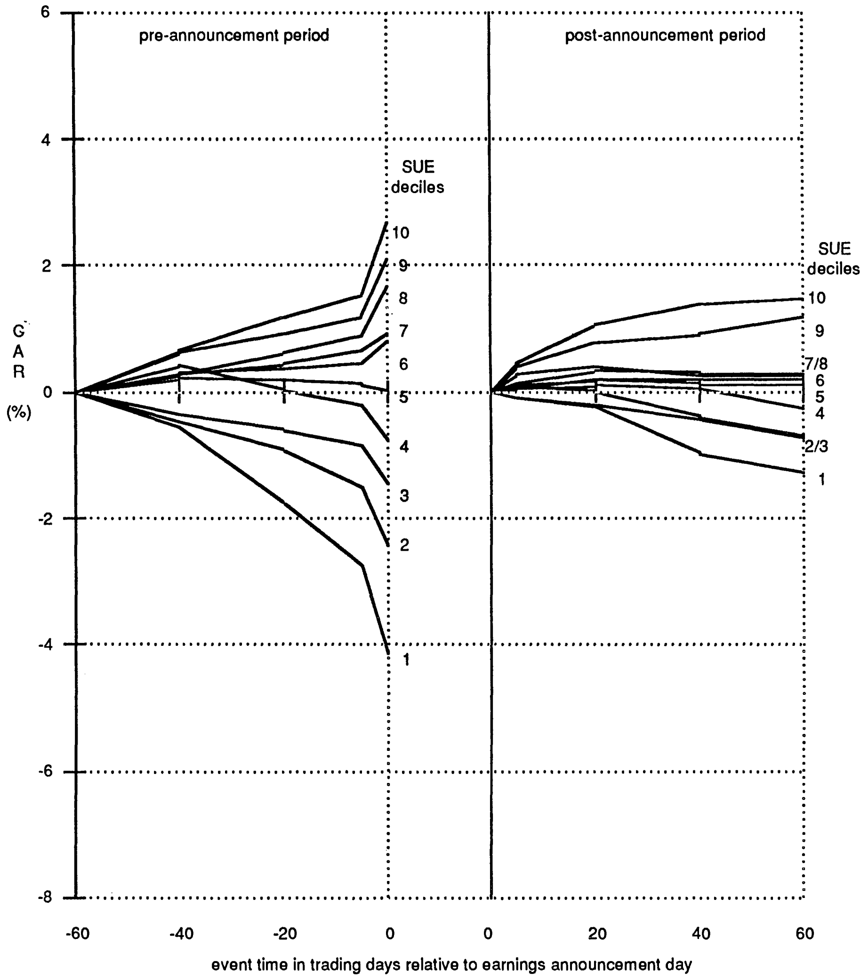

FIG. 3.—Cumulative abnormal returns (*CARs*) for *SUE* portfolios: large firms only. Earnings announcements are assigned to deciles based on standing of standardized unexpected earnings (*SUE*) relative to prior-quarter *SUE* distribution. Based on 27,584 announcements from 1974 to 1986. Large firms are in size deciles 8 to 10, based on January 1 market values of equity for all NYSE and AMEX firms. *CARs* are the sums over pre- and postannouncement holding periods (beginning day −59 and day 1, respectively) of the difference between daily returns and returns for NYSE-AMEX firms of the same size decile. *SUE* represents forecast errors from a first-order autoregressive earnings expectation model (in seasonal differences) scaled by its estimation-period standard deviation (see section 3.2 for details).

drift experienced within 60 days is 53%, 58%, and 76% for small, medium, and large firms, respectively. Approximately 100% of the drift occurs within nine months for small firms and within six months for large firms. This result is consistent with the findings of Watts [1978], who found a

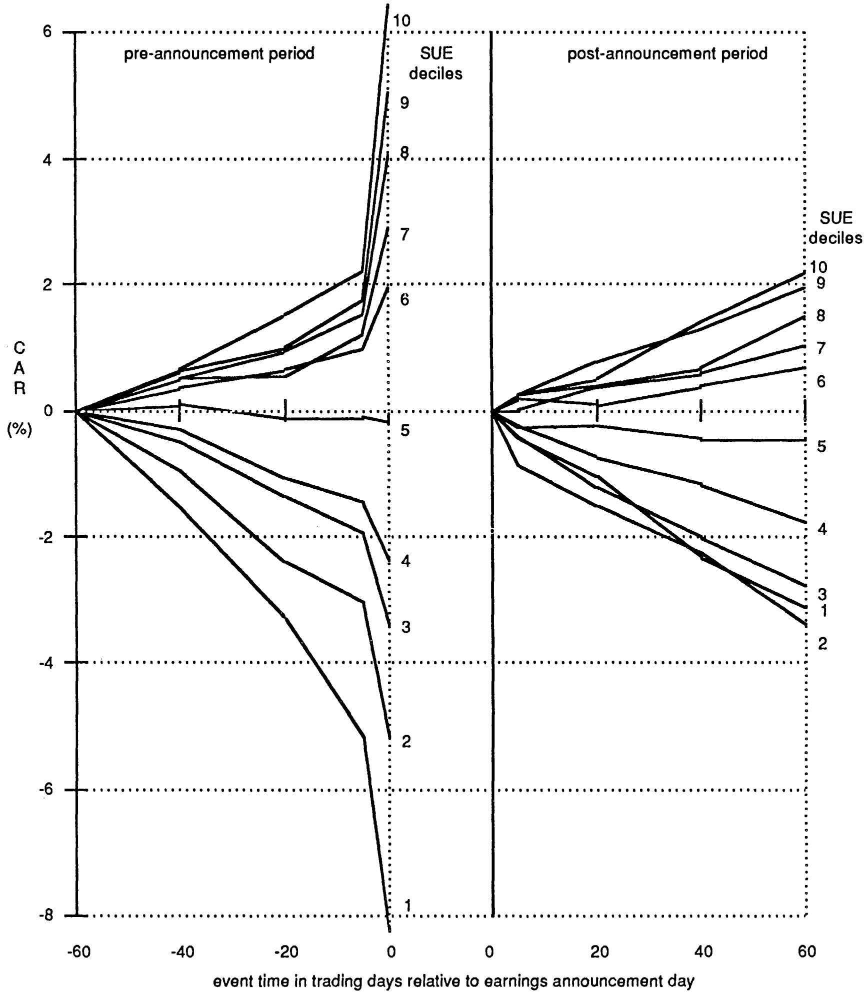

FIG. 4.—Cumulative abnormal returns (*CARs*) for *SUE* portfolios: small firms only. Earnings announcements are assigned to deciles based on standing of standardized unexpected earnings (*SUE*) relative to prior-quarter *SUE* distribution. Based on 29,796 announcements from 1974 to 1986. Small firms are in size deciles 1 to 4, based on January 1 market values of equity for all NYSE and AMEX firms. *CARs* are the sums over pre- and postannouncement holding periods (beginning day −59 and day 1, respectively) of the difference between daily returns and returns for NYSE-AMEX firms of the same size decile. *SUE* represents forecast errors from a first-order autoregressive earnings expectation model (in seasonal differences) scaled by its estimation-period standard deviation (see section 3.2 for details).

significant drift lasting six months in his sample consisting primarily of large firms.

A disproportionately large amount of the 60-day drift occurs within 5 days of the earnings announcement. If the drift were constant over the

TABLE 1

Longevity of Post-Earnings-Announcement Drift

Cumulative abnormal returns (CAR) for high and low standardized unexpected earnings (SUE) portfolios[1]

(Those with SUE ranked in the highest and lowest deciles)

Holding Period (Trading Days, Relative to Announcement)	Small Firms			Medium Firms			Large Firms		
	High *SUE*	Low *SUE*	Diff. (Hi-Lo)	High *SUE*	Low *SUE*	Diff. (Hi-Lo)	High *SUE*	Low *SUE*	Diff. (Hi-Lo)
				Cumulative Abnormal Returns (%)					
−59 to 0	6.42*	−8.27*	14.70*	4.15*	−6.81*	10.96*	2.71*	−4.13*	6.84*
1 to 60	2.19*	−3.13*	5.32*	1.93*	−2.58*	4.51*	1.45*	−1.29*	2.74*
61 to 120	0.38	−2.24*	2.62*	0.33	−2.22*	2.55*	0.51**	−0.76*	1.27*
121 to 180	0.03	−1.93*	1.95*	0.18	−1.61*	1.79*	−0.20	−0.66*	0.45
181 to 240	0.20	−0.38	0.58	−0.40	−0.58***	0.18	−0.45**	−0.44***	−0.01
241 to 300	−1.22*	0.56	−1.77*	−0.88*	0.16	−1.04**	−0.62*	0.23	−0.85*
301 to 360	−0.54	−0.96*	0.42	−0.36	−0.71**	0.35	−0.64*	−0.16	−0.48
361 to 420	−0.27	−0.33	0.06	−0.18	−0.37	0.18	−0.55*	−0.71*	0.17
421 to 480	0.29	−0.51	0.80	−0.43	0.37	−0.80***	−0.42**	−0.73*	0.31
				Postannouncement Drift (Cumulative Abnormal Returns, %)					
1 to 60			5.32*			4.51*			2.74*
1 to 120			7.95*			7.06*			4.02*
1 to 180			9.90*			8.85*			4.47*
1 to 480			9.99*			7.72*			3.61*
				Postannouncement Drift (as a Fraction of 480-Day Drift)					
1 to 60			0.53			0.58			0.76
1 to 120			0.80			0.91			1.11
1 to 180			0.99			1.15			1.24
1 to 480			1.00			1.00			1.00

[1] *CARs* are the sums over specified holding periods of the difference between daily returns and returns for NYSE-AMEX firms of the same size decile. *SUE* represents forecast errors from a first-order autoregressive earnings expectation model (in seasonal differences) scaled by its estimation-period standard deviation (see section 3.2 for details). Small, medium, and large firms are in size deciles 1 to 4, 5 to 7, and 8 to 10, respectively, based on January 1 market value of equity for all NYSE and AMEX firms.
Significance levels for two-tailed tests of the hypotheses that abnormal returns equal zero are coded as follows:
* Significant at the 1% level.
** Significant at the 5% level.
*** Significant at the 10% level.

60-day interval, we would expect 8% of the drift to arise within 5 days. However, the actual percentage of the 60-day drift that occurs within 5 days (not shown in table 1) is 13%, 18%, and 20% of the 60-day drift for small, medium, and large firms, respectively.

Table 1 suggests that, if the drift is explained by an incomplete adjustment for risk, the risk must exist only temporarily and must persist longer for small firms than for large firms.

4.2 TESTS OF RISK PREMIUMS AS EXPLANATION FOR THE DRIFT

4.2.1. Shifts in betas as a potential explanation. We now present results from a battery of tests designed to assess the plausibility of incomplete risk adjustment as an explanation for postannouncement drift. We first consider BKW's [1988] suggestion that betas increase for firms with high unexpected earnings and decrease for firms with low unexpected earnings.

Beta shifts are obviously a concern in a design that estimates betas in one period and then uses those estimates in a different period. Such was the case in much of the early research on postannouncement drift. However, that is not a concern in the FOS design that we adopt, since this design does not rely on estimates of betas. Instead, we *assume* that betas for our long and short positions are equal during the postannouncement period. Under this assumption, the combined long and short positions have zero systematic risk. Thus, while we examine the BKW hypothesis that betas *shift* around the time of earnings announcements, our ultimate concern is with any differences in the *levels* of betas for high- and low-*SUE* firms in the postannouncement period.

Before turning to the tests, we should note that there are indications that failure to account for beta is unlikely to explain postannouncement drift. If mismeasured betas are the explanation, then the sign of the drift should vary according to whether the excess return on the market is positive or negative. Specifically, good news stocks, which would have to be riskier than assumed, should have positive estimated abnormal returns in up markets but negative estimated abnormal returns in down markets. The opposite should hold for bad news stocks. In contrast to this prediction, however, the postannouncement estimated abnormal returns for good news (highest *SUE* decile) stocks are actually positive in both up and down markets. Similarly, estimated abnormal returns for bad news stocks (lowest *SUE* decile) are actually negative in both up and down markets.[14]

Our tests are presented in table 2. Beta estimates were derived using

[14] For good news stocks, the estimated abnormal returns over days (1, 60) are 2.5% (1.1%) when the value-weighted market return is greater (less) than the risk-free rate. For bad news stocks, the estimated abnormal returns are −2.3% (−2.4%) when the value-weighted market return is greater (less) than the risk-free rate. We thank George Foster for suggesting this test.

TABLE 2

Beta Estimates by SUE Category, in Periods Surrounding Earnings Announcement[1]

SUE Decile (1 = low; 10 = high)	Preannouncement Period		Postannouncement Period			
	(−119, 60)	(−59, 0)	(1, 60)	(61, 120)	(121, 180)	(181, 240)
Beta estimates						
1	1.16	1.22	1.17	1.17	1.23	1.31
2	1.11	1.17	1.15	1.08	1.19	1.25
3	1.16	1.21	1.13	1.11	1.14	1.22
4	1.24	1.18	1.21	1.15	1.19	1.18
5	1.23	1.26	1.24	1.30	1.19	1.24
6	1.31	1.27	1.28	1.24	1.26	1.23
7	1.30	1.24	1.23	1.26	1.25	1.24
8	1.28	1.34	1.30	1.30	1.30	1.20
9	1.26	1.31	1.29	1.26	1.20	1.23
10	1.32	1.31	1.38	1.30	1.31	1.23
Rank correlation, *SUE* and beta	.83*	.84*	.90*	.77*	.66*	−.38
Jensen's alpha						
SUE = 1	−3.7%*	−5.3%*	−1.6%*	−0.8%*	−0.8%*	0.6%*
SUE = 10	3.4*	6.1*	3.0*	1.4*	0.7*	0.7*
Combined	7.1*	11.4*	4.6*	2.2*	1.5*	0.1

[1] For each 60-day window, we calculate compounded daily returns for individual stocks, the value-weighted *CRSP* index, and the treasury-bill rate. These data constitute a single observation in a regression of individual stock returns against market returns, both expressed in terms of differences from the treasury-bill rate. Such regressions are estimated within each *SUE* category. There are approximately 8,500 (overlapping and thus nonindependent) observations underlying estimates for the (−59, 0) and (1, 60) windows, and slightly fewer for other windows. The standard error for each estimate in the table is approximately 0.02. Cross-sectional dependence in the data may cause downward bias in the estimated standard error (Bernard [1987]).

* Significantly different from zero, .05 level (two-tailed test).

the BKW methodology for permitting betas to shift through time. For each of several 60-day windows surrounding the earnings announcement, we compounded total returns on individual stock (R_{jt}), treasury bills (R_{ft}),[15] and the valued-weighted *CRSP* index (R_{mt}). These three data points constitute a single observation for a regression based on the Sharpe-Lintner-Mossin *CAPM*:

$$R_{jt} - R_{ft} = a + b\ (R_{mt} - R_{ft}) + e_{jt}. \tag{2}$$

The regression was estimated by pooling all observations for a given *SUE* decile, within six 60-trading-day windows surrounding the earnings announcement date. This approach permits the betas to shift from one window to the next and to vary across *SUE* categories.

The estimates in table 2 show distinct evidence of the positive relation between *SUEs* and betas predicted by BKW [1988]. The rank correlation between beta and *SUE* is .83 in the (−119, −60) window, .84 in the (−59,

[15] The treasury-bill returns are derived on a daily basis from weekly returns calculated by Gautam Kaul for bills in their final week before maturity. Kaul's weekly returns were allocated to days assuming the same return for each day within the week.

0) window, .90 in the (1, 60) window, and .77 in the (61, 120) window. Also consistent with BKW, the relation first appears during the fiscal period in which the earnings are generated. That fiscal quarter would typically bridge the (−119, −60) window and the (−59, 0) window; there is no significant relation between *SUE* and beta in windows prior to day −119. Finally, and again consistent with BKW, the relation is temporary (it becomes insignificant beyond day 180).

Even though we find evidence of a positive relation between *SUE* and betas, it is much smaller than would be necessary to explain fully the magnitude of the drift. The difference between the excess returns ($R_{jt} - R_{ft}$) on *SUE* 10 firms and *SUE* 1 firms over days (1, 60) is 4.3%. (This is slightly larger than the 4.2% abnormal return reported in section 4.1.1, which was size-adjusted.) The corresponding mean excess market return ($R_{mt} - R_{ft}$) is 1.65%. Thus, if betas are to explain postannouncement drift, the difference between betas for the *SUE* 10 firms and *SUE* 1 firms would have to be 2.6 (= 4.3/1.65). In fact, the difference is only 0.21, or less than 10% as large as required.

The failure of betas to explain the magnitude of the drift can be confirmed by examining the "Jensen's alpha" in equation (2). If beta risk could fully explain the drift, then Jensen's alpha should be zero. However, in the 60-day postannouncement period, alpha is −1.6% for *SUE* portfolio 1, 3.0% for *SUE* portfolio 10, and 4.6% for a combined position (significant at the .0001 level). On an annualized basis, this represents an abnormal return of approximately 18%.[16]

We conclude that while there is some merit to the BKW claim that betas shift around earnings announcements, the magnitude of the shifts falls far short of the amounts necessary to explain the magnitude of the drift.[17]

4.2.2. Other commonly discussed asset-pricing factors as potential explanations: APT risk factors as potential explanations. In this section, we test for the possibility that trading strategies based on *SUEs* are risky on dimensions not captured by beta. The risk factors we consider are those found in the literature on arbitrage-pricing theory. Chen, Roll, and Ross [1986] provide evidence that risks associated with industrial production, changes in default risk premiums, and changes in term structure appeared to be priced. They found weaker evidence that risks associated with unanticipated inflation and changes in expected inflation also affected asset prices.

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[16] Results based on the equally weighted market index yield similar conclusions. The rank correlation between beta and *SUE* decile is weaker but still significant at the .05 level in the (−119, −60) window, the (−59, 0) window, and the (1, 60) window. The difference between betas for *SUE* 10 firms and *SUE* 1 firms in the (1, 60) window is 13% as large as required to explain the drift; Jensen's alpha indicates an annualized abnormal return of 16%.

[17] Subsequent to conducting these tests, we became aware of similar evidence in Mendenhall [1986].

In table 3, we regress calendar-quarter returns[18] on the FOS control portfolio *SUE* strategy (*CAR* for *SUE* decile 10 minus *CAR* for *SUE* decile 1) against quarterly measures of the five risk factors studied by Chen, Roll, and Ross.[19] In addition, we consider a regression that also includes the return on the NYSE index (net of the treasury-bill rate). Table 3 indicates whether a positive or negative correlation with a particular factor would indicate that the portfolio is "risky," as opposed to offering a "hedge" against risk. The evidence from Chen, Roll, and Ross suggests that assets with returns that are *positively* correlated with unanticipated growth in industrial production (*QP*) and unanticipated changes in the default risk premium (*UPR*) are risky and have correspondingly higher required returns, as do assets with returns that are *negatively* correlated with changes in expected inflation (*DEI*), unanticipated inflation (*UI*), and unanticipated changes in the term structure (*UTS*).

Table 3 provides no evidence that the returns on the *SUE* strategy are significantly correlated with any of the five risk factors proposed by Chen, Roll, and Ross. (Three of the five coefficients are both insignificant and have the "wrong" sign.) Moreover, the five factors as a group do not explain a significant fraction of the variance in the strategy's return.

If the right-hand-side variables in table 3 accurately measure ex post premiums on all risk factors that are priced, then the intercept in the regression provides a test of market efficiency. Given that the dependent variable is the return on a zero-investment portfolio, the intercept should be zero under the efficient markets hypothesis. However, the estimated intercepts indicate an abnormal return of 4% per quarter, with *t*-values of 8.63 and 8.70.

Results from the same tests based on the continuously balanced *SUE* strategy are similar to those in table 3.

Dividend yield as a potential explanation. We also examined changes in dividend yields on good news and bad news portfolios. If dividend yields affect asset pricing, as predicted by the Brennan [1970] "after-tax" *CAPM*, then they could conceivably explain post-earnings-announcement drift. But this would require a sufficiently large increase in the difference between dividend yields on good news and bad news stocks. Although we detect such a change, the magnitude (4/10 of 1% of price)

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[18] Generally, a position held for 60 trading days spans two calendar quarters. Thus, calculation of calendar-quarter returns requires determination of how much of the 60-day return was generated in each of the two quarters.

[19] The variables were measured using the procedures of Chen, Roll, and Ross [1986] as they would be applied to quarterly data, with the following exceptions. First, for convenience, we used the GNP deflator as our measure of inflation rather than the Consumer Price Index and used ASA-NBER forecasts as our measure of expected inflation. (Chen, Roll, and Ross used the Fama-Gibbons inflation forecasting model.) Second, our measure of the unanticipated default risk premium was the difference between the return on low-grade and high-grade corporate bonds rather than the difference between low-grade corporate and government bonds. See table 3 for further information.

TABLE 3

Sensitivity of Drift to Risk Factors Used in Studies of Arbitrage-Pricing Theory[1]
(Returns based on FOS control portfolio SUE strategy)

	Independent Variables								
	Intercept	$R_{mt}-R_{ft}$	*QP*	*DEI*	*UI*	*UPR*	*UTS*	*R*-Square	*F*-Test[2] of Significance of Variables Other Than $(R_{mt}-R_{ft})$
Sign of coefficient, if risky (as opposed to a hedge)		+	+	−	−	+	−		
Coefficient	.04	.04	−.19	−.57	.42	−.08	.03	.07	.75
T-value	(8.63)	(.60)	(−.97)	(−.37)	(.44)	(−.38)	(.03)		
Coefficient	.04	−	−.16	−.92	.37	−.01	.06	.06	.58
T-value	(8.70)		(−.84)	(−.66)	(.39)	(−.04)	(1.07)		

[1] Dependent variable is the calendar-quarter return on a zero-investment portfolio, where long (short) positions in extreme good news stocks (extreme bad news stocks) are offset by positions in a portfolio of NYSE-AMEX firms in the same size decile. The returns are regressed against the return on the value-weighted NYSE index (in risk premium form) and five factors identified by Chen, Roll, and Ross [1986] as potentially influencing asset prices.

Extreme good (bad) news is defined in terms of standardized unexpected earnings (*SUE*), relative to prior-quarter *SUE* distribution. Firms ranked in the highest (lowest) decile are considered extreme good (bad) news firms.

Independent variables are defined as follows:

$R_{mt} - R_{ft}$ = return on value-weighted NYSE index, less 90-day treasury-bill rate;
QP = quarterly growth rate in industrial production, lagged ahead one period;
DEI = change in expected inflation;
UI = unanticipated inflation;
UPR = unanticipated change in the default risk premium (return on high-yield bonds [under BBB], less return on AAA bonds);
UTS = unanticipated change in the term structure (return on long-term government bonds, less treasury-bill rate).

[2] $F(5, 43)$ is significant at the .05 level for values in excess of 2.44.

would imply a trivial impact on expected returns, given economically plausible dividend yield effects.

Our conclusion, then, is that the observed postannouncement drift cannot be explained as a risk premium needed to compensate investors for risk factors commonly discussed in the asset-pricing literature. In the following sections, we examine whether some other unidentified risk factor could plausibly explain the drift.

4.2.3. Consistent profitability of the strategy. In this section, we examine how frequently a zero-investment *SUE* trading strategy generates a negative return. If a zero-investment strategy yields a positive *mean* return because it is risky, that risk must periodically reveal itself in the form of losses.

Panels A and B of figure 5 present the abnormal returns on the two *SUE* strategies for each calendar quarter from 1974:III through 1986:IV. In panel A the returns are to the FOS control portfolio strategy, where we assume a long (short) position in the firms whose unexpected earnings are ranked in the highest (lowest) quintile.[20] The returns to the continuously balanced *SUE* strategy appear in panel B. In both panels, we began by calculating abnormal returns over 60-trading-day postannouncement windows and then determined how much of the 60-day return was generated within the two calendar quarters spanned by those 60 days.

The interesting feature of figure 5 is the consistency with which the zero-investment portfolios generate positive returns. The returns in panel A are positive in 46 of 50 quarters and in 13 of 13 years. In panel B, the returns are positive in 44 of 50 quarters and in 13 of 13 years. FOS present similar evidence in their figure 2 [1984, p. 594], which shows a positive abnormal return in 31 of 32 quarters.[21]

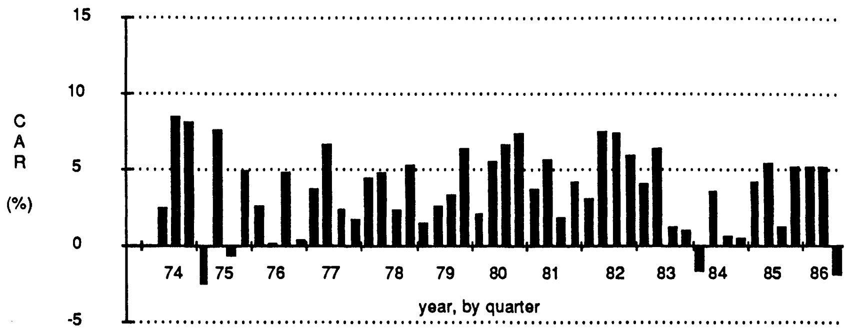
If the returns on a zero-investment portfolio represent compensation for risk, then losses should occur with an expected cost (in terms of utility) that is equal to the expected value of the risk premium. However, for the overall sample, returns of nearly 200% (before compounding) have been generated over the 50 quarters, with negative returns in only 4 or 6 quarters. These negative returns sum to less than 7%.

To better appreciate how surprising the consistency is, consider the behavior of the ex post risk premium for beta. Fama and MacBeth [1973] present returns on zero-investment, unit-beta portfolios for the period 1935–68. That portfolio generated a mean annualized return of about 10%. But among the 134 quarters represented there, returns on this portfolio were negative 39% of the time. In contrast, the mean annualized

[20] Although deciles are used elsewhere when results are presented for the FOS strategy, we use quintiles here to make panel A (based on the FOS strategy) and panel B (based on the continuously balanced *SUE* strategy) more comparable. Results for panel A are similar when deciles are used.

[21] However, FOS do not discuss the implications of this result for distinguishing among alternative explanations for the drift.

Panel A: FOS control portfolio SUE strategy



Panel B: Continuously balanced SUE strategy

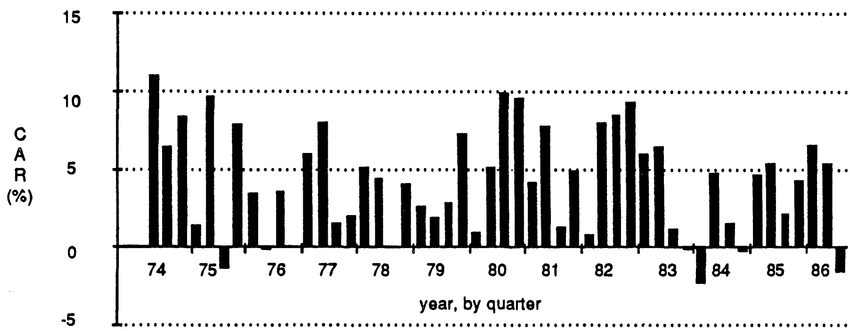


FIG. 5.—Cumulative abnormal returns (*CARs*) from *SUE* strategies, by calendar quarter. In both panels, long (short) positions are assumed in the highest (lowest) quintiles of standardized unexpected earnings (*SUE*) and held for 60 trading days. *CARs* are assigned to calendar quarters based on the portion of the 60-day *CAR* generated within that calendar quarter. *SUE* represents forecast errors from a first-order autoregressive earnings expectation model (in seasonal differences) scaled by its estimation-period standard deviation (see section 3.2 for details). In panel A, *CARs* are the combined abnormal returns from a long position in the highest *SUE* quintile and a short position in the lowest *SUE* quintile. Abnormal returns are the sums over the 60 trading days after the announcement of the difference between daily returns and returns for NYSE-AMEX firms of the same size decile. In panel B, continuous balancing requires that each $1 long position in the highest *SUE* quintile is always offset by a short position in similar-sized stocks (small, medium, or large) in the lowest *SUE* quintile. Balancing in this way sometimes requires waiting after earnings announcements until an offsetting "match" is available. *CARs*, computed over the 60 trading days after matching, are a combination of the compounded (buy and hold) returns for the long and short positions.

return on the zero-investment portfolio described in figure 5 is higher (18%) and yet is negative only 8% or 12% of the time.

Some readers of prior drafts have questioned whether the consistent profitability depicted in figure 5 could reflect some problem in the benchmark we use to measure abnormal returns. But if our benchmark fails to control for some risk that is priced in the market, then the results are even more surprising.[22] For example, if we have failed to control for systematic risk and our combined long and short position has a positive beta, the abnormal return on the strategy should be negative when the overall market return is negative. Over the 50-quarter horizon, the equally weighted NYSE index declined 16 times, and yet the abnormal return on the strategy in panel A was positive in 13 of those 16 quarters (11 of 16 quarters for panel B).

In summary, we are able to reconcile our evidence with *CAPM* misspecification (i.e., failure to control fully for risk) only if at least one of the following conditions hold: (1) the infrequency of losses in the 1974–86 period is extremely unusual, relative to what would be observed in a longer time period; (2) the risk premium earned on the *SUE* strategies represents compensation for the risk of infrequent but catastrophic losses, none of which was observed within this 13-year time span; (3) the disutility of the losses we observe is commensurate with the utility of the gains, because the losses occur during periods when a $1 decline in wealth is 28 times more important than the average $1 increase in wealth. (Cumulative gains are 28 times larger than cumulative losses.)

We find conditions (1) and (3) implausible and note that there is no evidence to support condition (2).

4.2.4. Raw returns on bad news firms. The large estimated negative *abnormal* postannouncement returns for firms with extreme negative unexpected earnings suggests that the *total* (*raw*) postannouncement returns for those firms could be less than the risk-free rate or even negative. Although such predictably low raw returns on risky assets are not ruled out by most modern capital-asset-pricing models, they are expected only under special conditions that many would find implausible as applied to a broad cross-section of stocks. Essentially, the stocks would have to offer some hedge, the value of which exceeds the cost of any other risk to which the asset is exposed.

Table 4 summarizes the total returns, compounded over various periods, for bad news stocks which ranked in the lowest decile of the unexpected earnings distribution. The bottom panel shows that the total annualized returns on the bad news stocks (averaged over firms of all sizes) were 1.5%, 12.6%, and 10.4% for periods ending 5, 20, and 40

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[22] The results could conceivably be explained by a failure to control for some factor that causes returns to increase (decrease) for good (bad) news firms in *all* periods, regardless of macroeconomic conditions. However, the only asset-pricing models we know of that could possibly include such a factor are the Brennan [1970] "after-tax" *CAPM* (which includes a dividend yield effect) and the Amihud and Mendelson [1986] *CAPM*, which includes a term linked to the bid–ask spread. Earlier (section 4.2.2) we dismissed Brennan's dividend yield effect as an explanation. The Amihud-Mendelson *CAPM* could explain the result only if an announcement of good news (bad news) caused a long-run increase (decrease) in the proportional bid–ask spread. But one would expect the opposite given that the proportional bid–ask spread varies inversely with price, and that good news (bad news) firms tend to experience price increases (decreases).

TABLE 4

Total (Raw) Returns on "Bad News" (Lowest SUE decile) Portfolios[1]

Holding Period (Trading Days, Relative to Announcement)	Small Firms		Medium Firms		Large Firms	
	Raw Return	Cum. Raw Return	Raw Return	Cum. Raw Return	Raw Return	Cum. Raw Return
Preannouncement period						
(−79, 0)	−1.8%*	−1.8%*	−.4%	−.4%	2.6%*	2.6%*
Postannouncement period						
(1, 5)	−.14	−.14	.00	.00	.23	.23
(6, 20)	.89*	.75*	.85*	.85*	1.19*	1.42*
(21, 40)	1.31*	2.05*	.46	1.31*	.24	1.66*
(41, 60)	2.36*	4.42*	1.87*	3.18*	1.85*	3.51*
(61, 80)	1.32*	5.74*	.78*	3.95*	1.07*	4.59*
Annualized postannouncement raw return						
(1, 5)		−7.0		0.0		11.5
(1, 20)		9.4*		10.6*		17.8*
(1, 40)		12.8*		8.2*		10.2*
(1, 60)		18.4*		13.2*		14.6*
(1, 80)		17.9*		12.3*		14.3*
Comparable annualized raw returns for "good news" (highest decile *SUE*) portfolio						
(1, 5)		32.5%*		41.6%*		35.5%*
(1, 20)		26.6*		33.7*		27.5*
(1, 40)		29.7*		28.0*		22.3*
(1, 60)		32.9*		27.8*		21.4*
(1, 80)		30.5*		26.9*		20.8*
Mean annualized returns across all firm size categories						
		Low *SUE*		High *SUE*		
(1, 5)		1.5%		36.5%*		
(1, 20)		12.6*		29.3*		
(1, 40)		10.4*		26.7*		
(1, 60)		15.4*		27.4*		
(1, 80)		14.8*		26.1*		

[1] *SUE* represents forecast error from a first-order autoregressive earnings expectations model (in seasonal differences) scaled by its estimation-period standard deviation. Firms are assigned to *SUE* deciles based on the standing of their *SUE* relative to the prior-quarter *SUE* distribution.

* Significantly different from zero, .05 level (two-tailed test).

trading days subsequent to the earnings announcement.[23] Total annualized returns for good news firms were 36.5%, 29.3%, and 26.7% for the same periods. These returns were generated during 1974–86, when the average annualized return on treasury bills one week from maturity was

[23] The standard errors of the mean annualized raw returns over the intervals (1, 5), (1, 20), and (1, 40) are all less than 1%, across all categories in table 4. These standard errors

8.5% and the return on the equally weighted NYSE index was approximately 22% (13% for the value-weighted index).

The total annualized returns for *small* bad news stocks over the 5 days after the earnings announcement were not only less than the average treasury-bill rate, they were actually negative (although not significantly different from zero). The total returns for medium firms over the same 5-day window were zero and remained less than the average T-bill rate over the 40 days subsequent to the announcement. All other total returns are in excess of the average T-bill rate. However, for two months following the announcement, the difference was small. For the overall sample, the 40-trading-day return was only 10.4%, or 1.9% higher than the average T-bill rate.[24] In contrast, the 26.7% postannouncement return for the good news firms exceeded the average T-bill rate by 18.2%.

In order to reconcile this evidence with *CAPM* misspecification, one must believe either (1) that betas on the bad news stocks are near zero (and negative for small and medium stocks shortly after the announcement), or (2) that the value of these stocks as hedges against some unidentified risk causes their cash flows to be discounted at rates less than treasury-bill rates during the 5-day postannouncement period, and at rates nearly that low for two months thereafter. Condition (1) is inconsistent with evidence in table 2, and we find it implausible that condition (2) could apply to as broad a spectrum of stocks as those in the bad news portfolios.

4.3 TESTS OF TRANSACTIONS COSTS AS EXPLANATION FOR DRIFT

Since much of the above evidence is inconsistent with explanations based on incomplete adjustment for risk, we now turn to the possibility that the drift could represent a delayed price response. One possibility is that the drift occurs because transactions costs create sufficient impediments to trading to prevent a complete and immediate response to earnings announcements.

The abnormal returns reported in this paper appear to be within round-trip transactions costs for the small individual investor. When transactions costs are defined to include both bid–ask spreads and commissions, they are about 4% and 2% for small and large stocks,

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were calculated by scaling the standard deviation of raw returns underlying the mean (before annualizing) by the square root of the sample size, and then multiplying by the square root of the factor used to annualize the returns. To the extent the data overlap in calendar time and are cross-sectionally dependent, the standard errors are understated.

[24] A comparison of raw returns to the average treasury-bill rate is imprecise, in that it assumes the event periods are evenly distributed in calendar time. We also calculated the difference between raw returns and contemporaneous returns on treasury bills. For the overall sample, the difference was negative for the first 5 days of the postannouncement period (−7.0%) and positive for the first 40 days (2.1%).

respectively (Stoll and Whaley [1983]).[25] To calculate the cost of the *SUE* strategy, one must double these amounts to reflect the costs of a combined long and short position. Then, taking into account that the *SUE* strategy involves (on average) a 78% turnover in portfolio content each quarter, the implied cost would be about 6% (3%) per quarter for small and large stocks, respectively. These amounts are approximately equal to that 60-day abnormal returns in table 1.

In this section, we consider how the data might behave if transactions costs explain postannouncement drift, and then test for the existence of that behavior.

4.3.1. Is the drift "constrained" by an upper bound? Our first test was inspired by Ball [1978, p. 110], who argued that, ". . .if the 'slow' market reaction is explained in terms of transactions costs (or costs of 'professionals' operating in the market), then *small* deviations from expectations are those which imply market disequilibrium. Large deviations presumably attract more investors and are promptly incorporated in prices because (under this hypothesis) the net gain, after costs, is higher. The consistent interpretation of this hypothesis is that the excess returns persist up to, but not beyond, the level of marginal transactions and information processing costs."

Under Ball's depiction, a postannouncement drift would be observed only when the implied excess returns are small. Alternatively, the drift may be observed for all levels of implied excess returns but would never exceed a threshold (equal to the cost of exploiting the information), regardless of the magnitude of unexpected earnings.[26] That is, regardless of whether the *total* stock price response implied by an earnings announcement is 2%, 5%, or 20%, the price might move immediately to within (say) 2% of the implied level. At that point, incentives to exploit the earnings information would be eliminated for many traders, and the remainder of the response would occur only with some delay. In such a market, the postannouncement drift would increase as unexpected earnings increase, but only to some upper bound; beyond that bound, the drift would remain constant, regardless of the magnitude of unexpected earnings.

Ball [1978, p. 110] notes that existing evidence does not appear consistent with this characterization: ". . .the evidence. . .is that extreme-rank earnings and dividend changes are associated with *larger* estimated abnormal returns, contrary to the 'transactions cost' and 'private cost' explanations." However, we consider here whether we (and prior re-

[25] These amounts are based on data from the post-1975 era of negotiated commissions and are calculated by grouping Stoll and Whaley's deciles into three categories to conform to our definitions of small, medium, and large.

[26] Although we initially inferred that Ball's depiction was consistent with the second alternative, he has indicated to us that he intended to imply the first.

searchers) have failed to observe an upper bound because we have not yet examined sufficiently extreme values of unexpected earnings.[27] Our approach is to divide our sample into progressively smaller portfolios, based on rankings of unexpected earnings. That is, we first divide the sample into halves, then thirds, quintiles, deciles, and so on, until finally we divide the sample into 100 portfolios, based on rankings of unexpected earnings. At each of these steps, we calculate the abnormal return from a long position in the portfolio with the highest unexpected earnings, and a short position in the portfolio with the lowest unexpected earnings. Thus, at each step, the values of unexpected earnings in our portfolios become more extreme. If postannouncement drift is caused by a cost that impedes trading, we should observe that, at a point bounded by that cost, the drift should cease to increase, even though unexpected earnings continue to increase.

The results are presented in panel A of figure 6. We find that the drift (over 60 days) grows larger, up to the point where the difference between *SUEs* for extreme portfolios is equal to six. (This is the point at which the sample is split into deciles, which is as fine a decomposition as any prior study has used.) Beyond that point, the drift does not increase. Note that the upper bound for the drift is about 4%, or 2% per position. That amount is within the bounds of transactions costs for the average firm (based on Stoll and Whaley [1983]), where such costs include both commissions and the bid–ask spread. Figure 6, panel B shows that the drift is bounded at approximately 5%, 4.3%, and 3% for small, medium, and large firms, respectively. This is consistent with Stoll and Whaley's [1983] evidence that transactions costs vary inversely with firm size; when their sample is segregated into thirds, transactions costs are 3.9%, 2.6%, and 2.0% for small, medium, and large firms. When these amounts are doubled to account for a combined long and short position, they exceed the bounds implied by figure 6, panel B.

One potential alternative explanation for the result is that the more extreme values of unexpected earnings simply reflect estimation error. That is, beyond some upper bound, any additional increases in our measures of unexpected earnings represent nothing more than noise. However, the data indicate that this is not the case. Figure 6, panel A also presents the preannouncement abnormal returns for portfolios with varying levels of unexpected earnings. Note that even though the postannouncement drift reaches a maximum when *SUE* difference equals 6, the preannouncement drift continues to increase to the point where *SUE* difference equals 14. Thus, increases in unexpected earnings (at least to that point) have stock price impacts and are not purely the result of noise.

Note also that the results of this test cast additional doubt on arguments based on *CAPM* misspecification. In order to accommodate these

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[27] We are grateful to Jim Noel, who suggested the tests in this section.

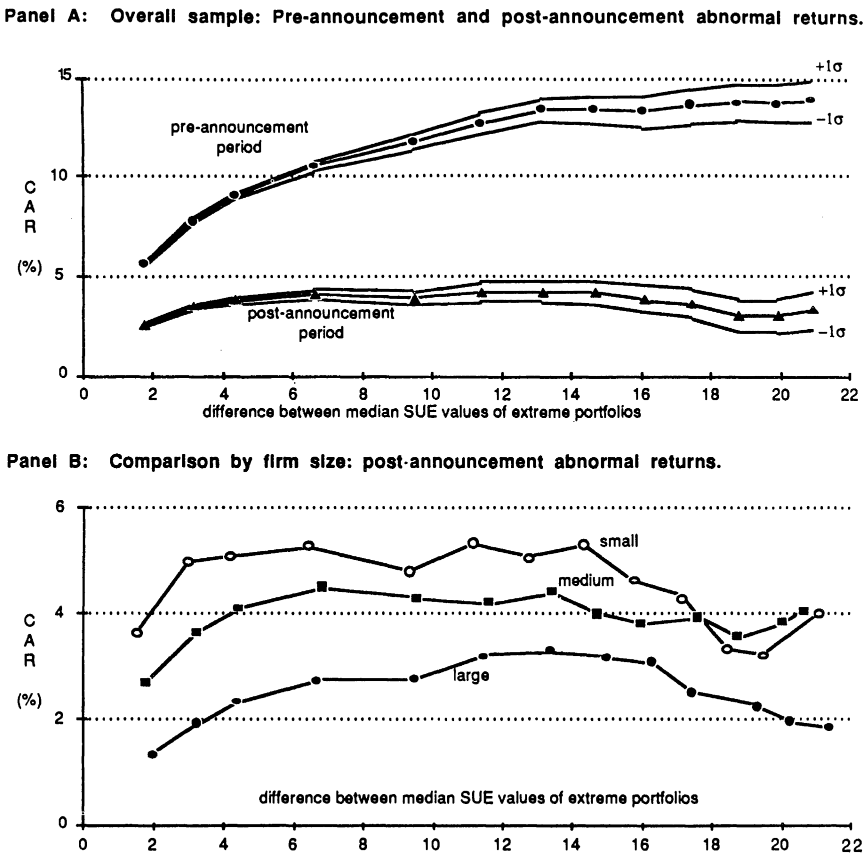

FIG. 6.—Test of an explanation for the drift, based on costs that impede trading. The plot presents the difference in drifts or cumulative abnormal returns (*CARs*) over 60 days after earnings announcements, between the most positive and most negative *SUE* (standardized unexpected earnings) portfolios, constructed by splitting the sample into 2, 3, 5, 10, 20, . . ., 100 portfolios based on *SUE*. The hypothesis predicts that, if the drift is caused by costs that impede trading, the postannouncement drift should remain less than those costs, regardless of the *SUE* difference between extreme portfolios. Thus, as differences between *SUEs* of extreme portfolios increase (represented by movement toward the right of the graph), the postannouncement *CARs* should level out, despite increases in the preannouncement *CARs*. *CARs* are the sums over 60-trading-day pre- and postannouncement holding periods of the difference between daily returns and returns for NYSE-AMEX firms of the same size decile. *SUE* represents forecast errors from a first-order autoregressive earnings expectation model (in seasonal differences) scaled by its estimation-period standard deviation (see section 3.2 for details). Small, medium, and large firms are in size deciles 1 to 4, 5 to 7, and 8 to 10, respectively, based on January 1 market values of equity for all NYSE and AMEX firms.

results, the misspecification argument would have to introduce a "kink" in the relation between unexpected earnings and risk. That is, unexpected earnings would have to proxy for an omitted risk factor up to some point, but then additional increases in unexpected earnings could no longer be correlated with increases in risk.

4.3.2. Are abnormal returns for short positions greater than those for long positions? If the costs of trading do play some role in explaining postannouncement drift, then we might expect the abnormal returns to short positions in bad news firms to exceed those for long positions in good news firms, to compensate for restrictions on short sales.

When we calculate abnormal returns using the FOS approach, our data appear consistent with this hypothesis. The estimated abnormal returns to short positions in bad news firms are larger, and last longer, than the estimated abnormal returns on good news firms. Across all size groups, the abnormal return to the short position over 60 and 180 postannouncement days is 2.3% and 5.5%, respectively, compared to 2.0% and 2.6% for the long position. However, recall that the FOS calculation of abnormal returns involves *summing* daily returns. As indicated in section 3.2.2, summing returns can introduce noise in the calculations which can be eliminated by compounding the returns. While summing and compounding yielded similar results for the *combination* of long positions in good news and short positions in bad news stocks in all of the previous tests, comparisons *between* the returns to the long and short positions *are* sensitive to the choice between summing and compounding.

Using compounded returns in the FOS size-control portfolio strategy, the differences between postannouncement abnormal returns to long positions in good news stocks and to short positions in bad news stocks are small. The abnormal return to the short position over 60 and 180 postannouncement days is 1.9% and 4.4%, respectively, compared to 2.8% and 5.4% for the long position.

In summary, we have some results which indicate that there is an upper bound on the postannouncement drift, which is consistent with a transactions-cost-based explanation. On the other hand, we find weaker results that restrictions on short sales cause the returns to the short position to exceed the returns to the long position.

Even if certain features of the data are consistent with a transactions-cost-based explanation for the drift, the explanation raises several difficult questions, which we discuss in section 5.

4.4 TESTS OF WHETHER PRICES FAIL TO REFLECT FULL IMPLICATIONS OF CURRENT EARNINGS FOR FUTURE EARNINGS

We now briefly consider one last possibility that could lead to a delayed response to earnings information. Specifically, we consider whether market prices fail to reflect the full implications of current quarterly earnings for future quarterly earnings. Although we initially doubted the viability of this hypothesis, we were motivated to test it based on discussions with a large insurance company that sells information necessary to trade on postannouncement drift.

It is well known that seasonally differenced quarterly earnings tend to be positively correlated from one quarter to the next (Foster [1977] and

Freeman and Tse [1989]). As a result, when earnings in quarter t are up, relative to the comparable quarter of the prior year, an efficient market would generate a higher expectation for earnings of quarter $t + 1$ than otherwise. After factoring in the implications of quarter t earnings, the expectation for quarter $t + 1$ would be unbiased and the *mean* reaction to the announcement of quarter $t + 1$ earnings would be zero.

Suppose though that the market fails to recognize the full extent of the serial correlation in seasonally differenced quarterly earnings. That is, the market fails adequately to revise its expectations for quarter $t + 1$ earnings upon receipt of the news for quarter t. The full implications of quarter t earnings might not be assimilated until analysts subsequently revise and publish forecasts or (in the extreme) until earnings for quarter $t + 1$ are announced. In that extreme case, the market would tend to be "pleasantly surprised" when earnings for quarter $t + 1$ are up relative to the prior year (and vice versa), even though the increase could have been predicted based on quarter t earnings.[28]

Table 5 provides results from our test of this possibility. We identify firms in extreme deciles, based on the *SUE* from quarter t. We then examine the average reaction to the announcement of quarter $t + 1$ earnings (measured over days (−4, 0) relative to that announcement). Note that the portfolios held over those five trading days are completely identified on the basis of information available approximately three months earlier; the returns to those portfolios should, on average, reflect no "surprise" under the hypothesis that stock prices fully reflect publicly available information.

Table 5 indicates that one *can* predict the average reaction to quarter $t + 1$ earnings, based on the *SUE* for quarter t. When extreme good news arrives in quarter t, the market tends to be "pleasantly surprised" again in quarter $t + 1$, producing average abnormal returns at the second announcement of 1.3%, 0.7%, and 0.3% for small, medium, and large firms, respectively. When extreme bad news arrives in quarter t, the market tends to be "disappointed" again in quarter $t + 1$, with average abnormal returns at the second announcement being −0.8%, −0.7%, and −0.4% for small, medium, and large firms, respectively.

On the basis of our prior tests, one would expect to observe *some* predictable abnormal returns surrounding the next earnings announcement. However, if the drift documented previously were "smooth" over time, abnormal returns as large as those in table 5 would *not* be expected. Since the five trading days examined in table 5 constitute an event period

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[28] Some readers have suggested that such behavior is to be expected, because even statistical models that attempt to take the serial correlation in earnings into account generate estimates of unexpected earnings that are themselves serially correlated (see FOS [1984, table 1]). However, note that this is a characteristic of the estimates of unexpected earnings from an imperfect (inefficient) statistical model, not a characteristic of "actual" unexpected earnings in an efficient market. In an efficient market, unexpected earnings would not be serially correlated (by definition).

TABLE 5
Mean Stock Price Reactions to Quarter t+1 Earnings, for Firms Grouped on Quarter t SUE[1]

SUE Decile for Quarter t	Percentage Abnormal Return in [−4,0] Window Surrounding Earnings Announcement for Quarter $t+1$ (t-values in parentheses)		
	Small Firms	Medium Firms	Large Firms
10 (good)	1.32 (7.81)	.68 (5.84)	.31 (3.93)
1 (bad)	−.82 (−5.28)	−.65 (−5.26)	−.37 (−4.01)
Difference (*CAR* for long [short] position in *SUE* 10 [*SUE* 1] firm)	2.14	1.33	.68
As fraction of 60-day drift	40%	29%	25%

[1] Firms are grouped according to quarter t *SUE*, and abnormal returns are cumulated over the five-trading-day window [−4,0] surrounding the announcement of quarter $t+1$ earnings. If market prices fail to reflect the full implications of quarter t earnings for quarter $t+1$ earnings, then the reaction to quarter $t+1$ earnings should be predictable, based on quarter t *SUE*.

Abnormal returns are differences between daily returns and returns for NYSE firms in the same size decile. *SUE* represents forecast error from a first-order autoregressive earnings expectations model (in seasonal differences) scaled by its estimation-period standard deviation.

only 8% as large as the 60-trading-day period used in most of our tests, a smooth drift would cause abnormal returns in table 5 equal to 8% of the total drift observed over the 60-day period. However, the abnormal returns in table 5 are 40%, 29%, and 25% as large as the 60-day drift reported earlier for small, medium, and large firms, respectively. In other words, a disproportionately large fraction of postannouncement drift is concentrated in the few days preceding and including the next quarter's earnings announcement.

The results are consistent with a market that fails to recognize the full implications of current earnings for future earnings. At the same time, the results shed additional doubt on explanations for the drift based on research design flaws, including a failure to adjust fully for risk. It is difficult to imagine why extreme earnings would lead to risk shifts that tend to occur three months later and are coincident with the announcement of the next quarter's earnings.

The results in table 5 are related to, but distinct from, those reported by Freeman and Tse (henceforth FT) [1989], who advance a hypothesis for a "rational delayed reaction to earnings news." As FT explain, the reaction of an efficient market to quarter $t+1$ earnings can be conditional on earnings for quarter t. Given that earnings "innovations" (defined by FT as seasonal differences) are serially correlated, quarter $t+1$ innovations should be less surprising if they have the same sign as quarter t

innovations. For example, the reaction (abnormal return) to a quarter $t + 1$ *positive* innovation that follows a quarter t positive innovation (say, R_{pp}) should be smaller in absolute value than the reaction to a *negative* quarter $t + 1$ innovation that follows a positive quarter t innovation (say, R_{pn}); that is, $R_{pp} < -R_{pn}$.

FT supply evidence consistent with $R_{pp} < -R_{pn}$, indicating at least some degree of "rationality" in the market. However, there is a stronger condition implied by market efficiency. Specifically, if the probability of a like-sign innovation is π, then $\pi(R_{pp}) + (1 - \pi)(R_{pn}) = 0$; that is, the weighted average abnormal return for all firms with positive innovations in quarter t should be zero. If this condition does not hold, one could simply hold *all* firms with a positive innovation in quarter t and expect to earn positive abnormal returns in quarter $t + 1$. Evidence presented throughout this paper (including table 5), in certain of FT's tests, and in prior research (e.g., FOS [1984]) indicates this stronger condition is violated.

FT also present evidence that at least part of the drift following the announcement of quarter t earnings can be recharacterized as a response to the predictable portion of quarter $t + 1$ earnings. (Of course, this raises the question of why the market is responding to something that could have been predicted in a prior quarter.) That evidence is consistent with the results in our table 5 and with earlier evidence documented by Rendleman, Jones, and Latane [1987]. What table 5 demonstrates beyond FT and the prior research is that much of the response to the predictable portion of quarter $t + 1$ earnings does not occur until the five days surrounding the announcement of those earnings.

5. *Discussion and Conclusions*

Much of the evidence presented here casts doubt on *CAPM* misspecification as an explanation for post-earnings-announcement drift. In section 5.1, we summarize implications of the evidence for various forms of misspecification. Section 5.2 then reviews the plausibility of alternative explanations.

5.1 IMPLICATIONS OF THE EVIDENCE FOR CAPM MISSPECIFICATION

CAPM misspecification can assume several different forms. They can be divided into (1) risk mismeasurement and (2) other misspecifications. In turn, risk mismeasurement can include (a) misestimation of systematic risk and (b) exclusion of risk factors other than systematic risk.

5.1.1.a. Risk mismeasurement: misestimation of beta. Our evidence fails to support the BKW [1988] suggestion that beta shifts might explain a large fraction of post-earnings-announcement drift. The key results are as follows. (1) Estimated beta shifts were only about 8% as large as would be necessary to explain fully the magnitude of the drift (section 4.2.1).

(2) The BKW hypothesis suggests that a strategy based on postannouncement drift (long in good and short in bad news firms) would have a positive beta, thus performing poorly in bear markets. However, the *SUE* strategy yielded consistently positive returns in both bull and bear markets (sections 4.2.1 and 4.2.3).

5.1.1.b. Risk mismeasurement: exclusion of risk factors other than systematic risk. Our results are also inconsistent with this potential explanation for post-earnings-announcement drift. (1) We find no evidence that an *SUE* trading strategy is risky along any of the five dimensions identified by Chen, Roll, and Ross [1986] as important factors in asset pricing (section 4.2.2). (2) If the *SUE* strategies are risky on some unidentified dimension, then there is little evidence of that risk surfacing in the form of losses whose cost (in terms of utility) could plausibly be commensurate with the value of the supposed risk premium (section 4.2.3). The consistent profitability of the *SUE* strategies raises the question, "Where's the risk?" (3) According to capital-asset-pricing theory, expected total returns on risky assets can be less than risk-free returns only under special conditions that appear implausible in this context. However, subsequent to earnings announcements, bad news firms had mean *total* returns that were less than T-bill yields during the first week, and only slightly greater than T-bill yields during the first two months (section 4.2.4). (4) The drift is initially increasing in unexpected earnings but appears to reach an upper bound beyond which the drift remains constant as unexpected earnings rise (section 4.3.1). In order to reconcile this result with *CAPM* misspecification, one would have to believe that unexpected earnings proxy for an unidentified risk factor only to some point, with further increases in unexpected earnings being uncorrelated with the unidentified risk. (5) A disproportionate amount of the drift is concentrated around the following quarter's earnings announcement (section 4.4). It is difficult to imagine the reasons risk would tend to shift with a three-month delay, and why the risk shift would be most extreme at a point that coincides with the subsequent earnings announcement.

5.1.2. Other forms of CAPM misspecification. CAPM misspecification could also involve a failure to allow for market imperfections such as taxes. If the difference between ordinary and capital gains tax rates affects pricing, then a "dividend yield effect" would exist in stock returns. However, as indicated in section 4.2.2, differences in dividend yields between the high and low unexpected earnings firms are so small that they are unlikely to explain any significant fraction of the drift.

5.2 DELAYED PRICE RESPONSE AS AN EXPLANATION

Since arguments based on *CAPM* misspecification cannot plausibly be reconciled with our data, we turned to alternative explanations which view the drift as a delayed price response.

5.2.1. Transactions costs as an explanation. If transactions costs explain postannouncement drift, then the drift should not exceed transactions cost bounds, even for the most extreme values of unexpected earnings. Section 4.3.1 did indeed indicate that the drift appears to be "constrained" by an upper bound that is approximately equal to round-trip transactions costs for the individual investor. Moreover, the bound varies across firm size in the same way transactions costs do.[29] On the other hand, we did not find strong evidence that abnormal returns to short positions in bad news stocks exceed the abnormal returns to long positions in good news stocks, as would be predicted if restrictions on short sales play a role in causing the drift (section 4.3.2).

Although some of our results in section 4.3.1 may support a transactions-cost-based explanation, this explanation still raises several difficult questions. First, why does trading continue throughout the postannouncement period? If a price response is delayed because transactions costs discourage traders from entering the market, then no trading should occur. Alternatively, if a trade ultimately does occur, it should occur at a price that fully reflects available information. Personally, we are unable to explain why investors are willing to trade even while the price appears not to reflect fully the available earnings information. A related question is, why don't specialists or other market makers move the price to the "appropriate" level upon the first trade after the earnings announcement?

There are also other questions which undermine the viability of a transactions-cost argument. For example, why is the drift not eliminated by traders who face no commissions and can bypass the specialist's bid–ask spread (thus facing trivial transactions costs); or why would transaction costs necessarily cause underreaction to new information, as opposed to simply introducing noise in prices? Finally, if transactions costs cause the drift, why is so much of it concentrated around the next quarter's earnings announcement?

5.2.2. Failure of market to recognize fully the implications of current earnings for future earnings. The finding of section 4.4—that much of the drift is concentrated around the next quarter's earnings announcement—is difficult to explain except as a reflection of market prices that fail to recognize fully the extent of serial correlation in seasonally differenced quarterly earnings. Although the result is surprising, it is consistent with Foster's [1977] evidence that estimates of unexpected earnings which ignore such serial correlation (i.e., those based on a

[29] If indeed trading costs (including direct transactions costs and other costs of implementation) do explain post-earnings-announcement drift, then we should observe drifts for other information events as well. It is interesting to note that drifts are observed after a variety of events, including, for example, 13-D filings to announce the acquisition of at least 5% of a firm's stock (Larcker and Lys [1987]), repurchase tender offers (Lakonishok and Vermalean [1988]), dividend announcements (Charest [1978]), bond rating downgrades (Holthausen and Leftwich [1986]), and earnings forecast revisions by managers (McNichols [1989]) and analysts (Brown, Foster, and Noreen [1985]).

seasonal random walk model) are more highly correlated with stock returns than proxies that do reflect the serial correlation.

Our only result that is not consistent with incomplete updating of earnings expectations is the one from section 4.3.1, which indicated the drift appears to have an upper bound (section 4.3.1). That is, if market prices fail to reflect fully the implications of current earnings for future earnings, then we would expect the drift to be always increasing in the magnitude of the current unexpected earnings rather than having some upper bound.

One possibility that could reconcile the two results is that market prices fail to reflect the full implications of current earnings for future earnings, but once such a discrepancy exceeds a certain threshold, there are sufficient incentives for speculators to trade until it is reduced. But again, this leaves unanswered the question of why some investors are willing to trade at the "wrong" price in the meantime. However, the coexistence of some traders who are either uninformed or unsure about whether the price fully reflects past earnings information, and informed speculators who can exploit the others only at some cost, may be the only explanation that is simultaneously consistent with (1) the rational use of "recent earnings surprise" as a buy/sell signal among several institutions and investment houses, and (2) the persistence of the drift, despite this activity. Whether this or another explanation can resolve the enigma is left for future research.

5.3 CONCLUSIONS

In this study we have attempted to discriminate between two alternative explanations for post-earnings-announcement drift: a failure to adjust abnormal returns fully for risk and a delay in the response to earnings reports.

We conclude that much of our evidence cannot plausibly be reconciled with arguments built on risk mismeasurement but is consistent with a delayed price response.

Although these results support a dismissal of an important category of explanations for postannouncement drift, they also raise some difficult unanswered questions. The nagging general question is what kind of equilibrium would support market prices that only partially reflect information as widely disseminated and freely available as earnings. A more specific question (also raised by Freeman and Tse [1989]) is why the market would appear to react with surprise to earnings information that is predictable, based on earnings for the prior quarter. A similar question is suggested by the findings of Ou and Penman [1989*a*; 1989*b*], who conclude that market prices fail to reflect detailed financial statement information that is useful in predicting future earnings reversals, and by Dietrich [1984] and Hand [forthcoming], who find reactions to (possibly "cosmetic") accounting gains that are predictable, based on previously published information.

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CAPITAL MARKETS RESEARCH AND THE GOODWILL DEBATE

The goodwill accounting controversy concerns two central questions:

- What measurement rules are appropriate to determine the asset value (if any) carried on the balance sheet and the annual amortisation expense recorded in the profit-and-loss statement?
- Do Australian accounting requirements concerning goodwill place Australian businesses at a competitive disadvantage in the international sphere?

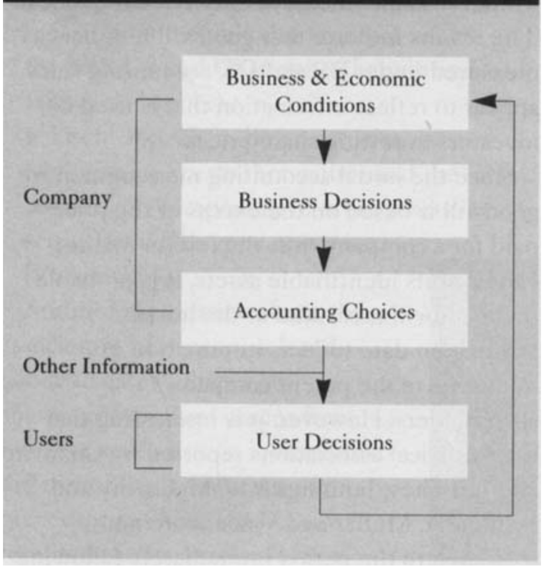
The first is a technical accounting question concerning how best to reflect the economic reality associated with goodwill in financial statements, while the second relates to potential economic consequences associated with restricting companies' choices of goodwill accounting measurement approaches. The intensity and nature of recent public debate reveals a high level of interest relating to both questions.

This paper reviews capital markets research relating to these two questions. The range of interests represented in the goodwill debate and the level of dispute suggest that definitive answers are out of reach. However, it is possible to describe what research has been undertaken, and what light it has cast on the questions of accounting measurement and economic consequences.

Prior to reviewing the relevant research literature it is important to describe carefully what capital markets research entails, and

This paper provides a review of capital markets research relevant to the goodwill accounting debate. Results indicate that the reported goodwill asset under United States GAAP is associated with share values, but there is no clear evidence of a similar association for goodwill amortisation. Similarly, there is no clear evidence of a competitive disadvantage associated with the requirement to amortise goodwill.

FIGURE 1: SIMPLE FRAMEWORK FOR CAPITAL MARKET RESEARCH



discuss how it can inform the debate on goodwill accounting. I devote the next section to this task. The subsequent literature review is not exhaustive. Nevertheless, the papers I discuss present the main results available to date relevant to the goodwill debate. I conclude with comments on some areas where additional research might assist the debate.

THE NATURE OF CAPITAL MARKETS RESEARCH

Capital markets represent a large area of research in the academic accounting literature. It involves investigating the association between accounting numbers (or decisions) and capital market activity. For example, a large body of research has explored the extent to which corporate releases of earnings information affect stockmarket prices, trading volume and volatility.[1]

Capital markets research relies on several assumptions underlying the link between information and the behaviour of capital market participants. Without these assumptions, it is not possible to interpret the research findings beyond simple statistical associations. Of particular importance is the idea that observable characteristics of capital markets (such as share prices and trading volume) might be used to gauge investors' perceptions of the business and economic conditions facing a company. This idea is explained in Figure 1, which shows business and economic conditions faced by a company feeding into management decisions, which in turn are reflected in accounting and other disclosures of the company. This and other information is used by various parties (investors, regulators, employees, etc.) in their particular decision settings, and potentially feeds back to affect business and economic circumstances facing the company. Since observable market activities such as prices and trading volume result from the decisions of one class of users — investors — it is presumed that they will reflect investors' perceptions of business and economic conditions, and perhaps of accounting numbers used by companies to communicate to investors.

Particularly important for interpreting capital market research relating to accounting measurement questions (such as goodwill accounting measurement issues) is an understanding of two links:

- how business and economic conditions are reflected in accounting numbers and choices; and
- how business and economic conditions are linked to observable characteristics of market activity.

In Figure 1, these two links relate to the connections between business and economic conditions, company decisions and users' decisions.

The extent to which these links need to be developed can range from a relatively loose statement of association to the need for a precise model of economic behaviour, depending on the research question being addressed. For instance, a relevant question relating to the goodwill debate might be to what extent the goodwill asset number disclosed in companies' balance sheets is associated with investor perceptions of underlying business prospects. This would involve specifying what aspects of business and economic conditions the accounting number purported to measure (eg, future economic rents from a recent takeover, with greater rents associated with larger measured goodwill numbers), and how those conditions are expected to be reflected in share prices (eg, greater perceived economic rents lead to higher share prices). With these two links in place the association between share prices and accounting goodwill numbers could serve as an indicator of the extent to which goodwill accounting measurements reflect information of potential value to investors. Without these links the meaning of any observed association is unclear.

A final link — completing the connection between the consequences of users' decisions and business conditions facing a company — becomes important when capital markets research is used to address the economic consequences of accounting choices. This is because the objective of such research is to use observed market activity (eg, prices) to infer something about the consequences of an accounting choice for a company's economic environment. Finally, note that in this research setting the first link — how accounting numbers reflect business conditions — is often less important. Rather, the focus is on how the accounting numbers are used.

A further point is worth noting. Since capital markets research focuses on only one group (investors) of users of accounting information, it cannot provide answers to prescriptive questions such as how goodwill amortisation should be measured. As Malcolm Miller's accompanying discussion clearly reflects, various constituencies will often view such questions differently, presumably because each experiences different consequences. In such circumstances, capital markets research can be used to inform the debate but cannot resolve it.

RESEARCH RELATING TO ACCOUNTING GOODWILL MEASUREMENT

Two issues relating to accounting goodwill measurement have been addressed by capital markets research:

- Is the asset value for goodwill disclosed in companies' balance sheets positively associated with share market value?
- Is the goodwill amortisation expense associated with market values or share returns?

Accounting measurement of the goodwill asset

Chauvin and Hirschey (1994), Jennings *et al* (1995), McCarthy and Schneider (1994), Muller (1994) and Vincent (1994) all directly investigate the association between disclosed goodwill asset values and companies' market values. Each performs regressions of company market values on reported goodwill asset numbers (and additional potential explanatory variables) and report that the association is positive and significant (using a variety of statistical tests). Chauvin and Hirschey, Jennings et al, McCarthy and Schneider and Vincent base their analyses on US firms; Muller's sample includes only UK companies.[2] The results indicate that goodwill numbers as measured under US and UK accounting rules appear to reflect information that is used by investors in setting share prices.[3]

Since the initial accounting measurement of goodwill is based on the excess of the price paid for a company over the fair (or market) values of its identifiable assets, it is probable that goodwill measured at the initial acquisition date reflects information of relevance to the parent company's shareholders. However, it is interesting that the statistical associations reported by Chauvin and Hirschey, Jennings *et al*, McCarthy and Schneider, Muller and Vincent are not restricted to the period immediately following corporate acquisitions. For example, Jennings *et al* use a reported goodwill number that potentially includes both recent and distant acquisitions. Moreover, Vincent performs separate associations for periods up to five years after an acquisition and reports that the association between market values and goodwill after amortisation remains significant over the five years. Thus it appears that even after amortisation over several years, the disclosed goodwill asset values reflect information of relevance to investors. (This is related to the research directly concerning goodwill amortisation discussed below.)

Each of the five papers also provides evidence comparing the association between market values and goodwill numbers, and the association between market values and other company assets. A summary of the relevant results indicates:

- There is no clear and consistent evidence that goodwill asset numbers are more or less strongly associated with sharemarket values than are tangible non-current assets included on a company's balance sheet. Chauvin and Hirschey, Jennings *et al*, and Muller provide conflicting results depending on the specification of their tests, while Vincent reports a stronger association for goodwill. McCarthy and Schneider provide marginal support for Vincent's results, but their results are not consistent over time.
- The association between goodwill and equity market values is apparent only for companies in non-manufacturing industries. Manufacturing firms exhibit no clear association. (Chauvin and Hirschey).

- The association between goodwill and equity market values appears weaker than the association between other separately measured intangibles and market values for both US and UK firms (Chauvin and Hirschey, Muller).
- There appears to be no association between equity market values and the revaluation component of other assets on acquisition of target companies (Vincent).[4]

Additional evidence about the association between disclosed goodwill asset values and sharemarket values comes from two recent studies on international differences in accounting procedures. These studies use required disclosures by foreign companies trading on US securities markets, reconciling results reported in domestic financial statements with what would be reported under US accepted accounting procedures. Amir, Harris and Venuti (1993) and Barth and Clinch (1995) use these disclosures to investigate how differences in accounting procedures are associated with share prices.[5] For a pooled sample of UK and Australian firms, Amir *et al* report that the difference in accounting for the goodwill asset under domestic accounting procedures and US accounting is positively associated with share prices. Barth and Clinch separately investigate samples from the UK and Australia and report similar results.

THE ABILITY OF REPORTED GOODWILL NUMBERS TO REFLECT ACQUISITION BENEFITS IS LIKELY TO BE RELATED TO THE NEGOTIATING STRENGTH OF ACQUIRING FIRMS.

The results for UK firms are particularly relevant since the difference between UK and US accounting rules simply represents the goodwill asset value that would appear on the balance sheet under US accounting procedures. This means that, for their sample of UK firms, market values appear to be associated with the goodwill asset even though the asset does not actually appear on the firms' (UK) balance sheets. The results of Barth and Clinch (1995) are therefore consistent with those of Jennings *et al* (1995), Muller (1994) and Vincent (1994). However, Barth and Clinch did report that the association between the goodwill asset (under US accounting procedures) and share prices was not as strong as for other net assets represented on the balance sheet. As noted, the evidence on this issue in the other papers is mixed.

An interesting aspect of existing research is its failure to explore the link between reported goodwill numbers and the underlying economic and business conditions they are presumed to reflect, and the implications for observed capital market associations. For example, the possibility that reported goodwill might represent a better measure of future economic benefits associated with corporate acquisitions for some firms than others has not been investigated. In particular, the ability of reported goodwill numbers to reflect acquisition benefits is likely to be related to the negotiating strength of acquiring firms. If acquiring firms are forced to pay fully for anticipated benefits in the acquisition price, then accounting goodwill may be a more reliable measure of future "intangible" benefits associated with the acquisition. In contrast, if acquiring firms have some bargaining power and are able to purchase target companies at "bargain" prices, the resulting goodwill measure will likely understate the value of future economic benefits. If bargaining power varies across companies and circumstances, we should expect the association between reported goodwill and share values to vary similarly across different companies and circumstances.[6] Existing capital market research does not investigate this possibility.

Accounting measurement of goodwill amortisation

With the exception of Chauvin and Hirschey (1994), McCarthy and Schneider (1994) and Muller (1994), the authors of each of the papers discussed above also investigated the association between the goodwill amortisation expense and share prices and/or returns. However, the results are less certain — there is no consistent association between reported goodwill amortisation and either share prices or returns. Jennings *et al* (1995) observe such an association for some of their tests but not for others. Similarly, Vincent (1994) reports no consistent association.[7]

In contrast, Barth and Clinch (1995) report a significant association between goodwill amortisation and share returns for their sample of UK firms. Amir, Harris and Venuti (1993) reported no association between share returns and the differences in goodwill amortisation expense across various countries, although it is difficult to interpret their results because they combine firms from several different countries with different goodwill accounting procedures.

Thus there is little (if any) firm evidence that goodwill amortisation expense used in the measurement of periodic profit reflects information that is used by investors in setting share prices and returns. In particular, it is not clear that higher amortisation expense is associated with lower share returns or prices. Moreover, the evidence which does support such an association (Barth and Clinch 1995) is based on a sample of UK firms where goodwill amortisation is not included in the calculation of profit reported in their domestic financial statements.

> IT IS NOT CLEAR THAT HIGHER AMORTISATION EXPENSE IS ASSOCIATED WITH LOWER SHARE RETURNS OR PRICES.

It is not clear why reported goodwill asset values are associated with share values while there is no clear association between reported amortisation expense and share returns. It is possible that goodwill amortisation is of less importance to investors than other components of net income and any association is difficult to observe through the experimental noise in existing research. Alternatively, goodwill may not be viewed as an amortisable asset by investors.

ECONOMIC CONSEQUENCES ASSOCIATED WITH GOODWILL ACCOUNTING

As noted by Miller (1995), a major part of Pacific Dunlop's concern with Australia's goodwill accounting standard is the claim that mandatory goodwill amortisation results in Australian companies facing a competitive disadvantage in the international arena. Although the precise nature of the competitive disadvantage is not specified, it mirrors similar claims in the US that mandatory amortisation of goodwill puts US companies at a disadvantage (against, primarily, UK firms) in the international corporate acquisition market. This argument has been repeated recently by the Australian company Gibson Chemical Industries when claiming to have passed up a potentially valuable acquisition because of the impact on future reported profits from amortising goodwill from the deal. (See "New blast at goodwill standard" in *The Age*, 20 October 1994, p. 26.)

Although not clearly articulated, the anti-competitiveness arguments appear to reflect a concern that mandated amortisation of goodwill translates into lower future reported profits and, eventually, into lower share prices. Since companies domiciled in several other countries (notably the UK) do not face this requirement (or face less restrictive amortisation periods), they do not face the potential drag on future reported profits and prices and can afford to bid a higher price for target companies than can Australian companies.

A crucial aspect of this argument is the perceived link between lower profits reported by companies required to amortise goodwill and subsequent lower share prices. As noted, this link has received no clear support in the capital markets literature. In most studies there has been no association between goodwill amortisation and share returns or prices. Moreover, the one study which reported such an association (Barth and Clinch 1995), used a sample of UK firms. That is, firms not required to amortise goodwill under their home country accounting principles exhibited an association between share returns and goodwill amortisation they would have been required to record under US accounting principles.

Nevertheless, the competitive disadvantage argument has received support from two studies which directly compared the takeover premiums paid by companies facing several different goodwill accounting environments. Choi and Lee (1991) compared takeover premiums — acquisition price less pre-acquisition market value of the target company — for acquirers from the UK (who are not required to amortise goodwill in the determination of periodic net profit) and US (who must amortise goodwill over a maximum of 40 years). They found that premiums paid by UK acquirers were higher than premiums paid by US acquirers. They also reported that the premiums paid by UK firms were more closely associated with a proxy for accounting goodwill than for US acquirers.[8] Their conclusion was that UK firms did pay higher amounts for corporate acquisitions, and that this was related to different goodwill accounting requirements in the two countries.

A potential weakness in the Choi and Lee study is that they did not explicitly specify and test the link between goodwill accounting and subsequent economic consequences. It is not clear why recognition and amortisation of goodwill encourages US acquirers to bid less than their UK counterparts. Choi and Lee refer to the possibility that managers of US acquirers might be concerned with the impact of goodwill amortisation on their compensation entitlements (through reduced reported profits), and so may be less willing to bid high for potential targets. Yet, they do not explicitly test this possibility. It is important because it is possible that other features of their research procedures could be influencing their results. In particular, differences between the environment faced by UK and US acquirers (eg, the tax treatment of acquired subsidiaries) unrelated to the goodwill accounting issues could affect the amount companies are willing to bid for targets. Without a clear specification of how goodwill accounting affects the acquiring companies, it is not possible to distinguish between the alternative explanations.

Similarly, it is difficult to unambiguously interpret a follow-up study by Lee and Choi (1992) which compared the acquisition premiums paid by a small sample of US, Japanese and German acquirers. They reported that premiums paid by both Japanese and German acquirers were larger than those paid by US acquirers. They also reported that the association between the merger premium paid and a proxy for accounting goodwill was stronger for German acquirers than for Japanese acquirers. (In fact, there was no clear evidence of an association for Japanese acquirers.) Since German accounting treatment of goodwill is more favourable than the treatment in Japan, they concluded that the difference in premiums paid resulted from goodwill accounting differences.

Some additional, although marginal, support is provided by Robinson and Shane (1990) who report that US companies who use the pooling method to account for corporate acquisitions tend to offer higher merger premiums than acquirers that use the purchase method.[9] Since the pooling of interests method involves no goodwill asset (nor subsequent amortisation expense) these results are similar to, though weaker than, Choi and Lee's (1991) results for UK versus US firms. Note, however, since pooling and purchase firms differ along other dimensions than simply their treatment of goodwill accounting, it is difficult to determine whether the goodwill accounting difference is driving their results.

In contrast to the studies by Choi and Lee, Lee and Choi and Robinson and Shane, several papers have investigated the behaviour of share prices of acquiring firms around the acquisition time period, based on the subsequent accounting approach employed. These papers include Hong, Kaplan, and Mandelker (1978) and Davis (1990). Both papers report that companies that use the purchase method of accounting for acquisitions (ie, recognise and subsequently amortise goodwill) appear to earn higher share returns over the acquisition period than do pooling firms (ie, with no goodwill). That is, firms using the accounting method that subsequently depresses reported profits outperform companies that do not. Because the bulk of the higher returns are earned before the acquisition (and before knowledge of the accounting choice becomes public) it is difficult to attribute this difference to the accounting choice. However, the results do provide a contrast to research indicating higher premiums paid by pooling (or UK) acquirers.

In summary, the results from capital markets research relating to goodwill accounting driven economic consequences are equivocal. Because no clear explanation of the link between the accounting choice and effects on business and economic conditions facing companies is provided, the results are, at best, suggestive.

ADDITIONAL COMMENTS AND CONCLUSION

Briefly, the major results from capital markets research relevant to the goodwill debate are:

- the goodwill accounting asset as disclosed on balance sheets is associated with share market values;
- there is no reliable evidence of an association between reported goodwill amortisation and share prices and returns; and
- there is some evidence of an association between merger premiums paid by acquiring firms and the subsequent accounting treatment of goodwill, but methodological concerns caution against concluding that goodwill accounting is the cause.

The conclusions are modest, and, as suggested in the introduction, do not provide final answers to the goodwill debate. Nevertheless, they do shed light on some aspects of the debate.

Several directions remain open for future capital markets research, with the potential to increase our understanding of how goodwill accounting choices affect market participants. First, existing research concerning goodwill measurement issues employs actual goodwill numbers reported by firms. Alternative measurement (and amortisation) procedures have not been considered. For example, Philip Brown's accompanying paper compares the impact of several alternative amortisation methods on reported amortisation expense (and as a consequence, reported income numbers). It would be interesting to extend this research to a large sample of firms and compare the extent to which alternative goodwill measurements associate with share prices and returns. Potentially, we would learn which measurement approach most closely reflects investors' perceptions.[10] Moreover, the extent to which investors accept alternative measurement approaches such as the recently controversial reverse-sum-of-years'-digits method might be revealed. Some evidence along these lines is available in existing research.

A further extension might use the observed relation between goodwill and future earning capacity to determine empirically an appropriate measurement approach (perhaps for individual companies or industries).[11] The resulting measurements could then be compared with alternative amortisation approaches (eg, straight-line, reverse-sum-of-years'-digits) and associated with share prices and returns. The potential here is to inform us of how well existing measurement approaches appear to capture the business and economic conditions they purport to reflect, and how well they portray (or omit) information relevant to investors.

A final direction for research relates to the economic consequences associated with goodwill accounting. As discussed, existing research is less than adequate in specifying how goodwill accounting measurements affect firms' economic environments. Without such a link, apparent effects on merger premiums and the like cannot confidently be attributed to accounting procedures. Research is needed which clearly spells out how goodwill accounting interacts with the economic environment facing firms, and which provides evidence of this link, explaining differences in observable characteristics of the environment.[12] Until such evidence becomes available, claims concerning the economic consequences of goodwill accounting measurements will be difficult to evaluate.

Greg Clinch is an associate professor at the Australian Graduate School of Management. *He thanks Phil Brown, Malcolm Miller and Justin Wood for comments on earlier drafts.*

NOTES

1 For excellent reviews of various capital market research streams in the accounting literature see Brown (1994), Beaver (1986), and Watts and Zimmerman (1986).

2 Since most UK firms immediately write off goodwill against reserves on acquisition, Muller (1994) used the amount of goodwill written off as his measure of the goodwill "asset" for UK firms. Thus, in the case of Muller's sample, the goodwill asset used in his regressions did not actually appear on the companies' published balance sheets except for a small number of firms who did not follow the immediate write-off approach.

3 The results cannot indicate whether the disclosed goodwill measurements were the

actual means of providing relevant information to investors since there are other potential sources of information relating to the value (or otherwise) of corporate acquisitions. The statistical association simply indicates that some information of use to investors is also reflected by the reported goodwill asset.

4 On acquisition, the acquired company's net assets are revalued to fair value with any remaining increment of price paid over net assets defined as goodwill. Vincent (1994) investigates the association with share market values of both goodwill and the revaluation increment of net assets.

5 Other similar studies, which do not consider goodwill accounting, include Pope and Rees (1992), and Bandyopadhyay, Hanna and Richardson (1994).

6 Related research indicates that, on average, acquiring firms do not appear to experience substantial share price increases in the period surrounding an acquisition. This suggests acquirers have little ability to obtain "bargain" acquisitions. Nevertheless, the evidence also indicates that in some circumstances acquirers do exhibit substantial share-price appreciation over the acquisition period. (See Jensen and Ruback (1983) for a review of related literature.)

7 Jennings *et al* (1995) indicate that US firms do not always disclose goodwill amortisation separately, nor sufficient data to reliably estimate it. In those cases they used amortisation amounts obtained directly from the company via a survey instrument (but not available to investors). Since Duvall *et al* (1992) provide evidence suggesting that investors find it difficult to estimate goodwill amortisation when it is not explicitly disclosed, it is possible this influences the reported (lack of) association between goodwill amortisation and equity market values. However, Vincent (1994) employs only sample companies for which she could determine goodwill amortisation from information disclosed in the financial statements.

8 A proxy for accounting goodwill was required because of difficulties in obtaining reported goodwill numbers relating to specific acquisitions. The proxy employed was the difference between the market value of the offer and the book value of net assets acquired.

9 The pooling method is available only in certain restrictive circumstances (primarily relating to form of payment) and results in the assets and liabilities of both entities being combined at existing carrying values, with no goodwill recognised. The purchase method (required in Australia) results in the target's net assets being restated to fair value, with any remaining difference from price paid recognised as goodwill.

10 Some existing research provides evidence along these lines. For example, the papers by Muller (1994) and Barth and Clinch (1995) based on samples of UK companies suggest that goodwill is viewed as an asset by investors despite the immediate write-off adopted by most UK firms. Similarly, Barth and Clinch (1995) report additional results suggesting goodwill amortisation under US procedures (over a maximum of 40 years) is viewed as too low by investors.

11 This type of approach has been used to determine appropriate capitalisation and amortisation rates for intangible assets related to research and development and advertising expenditures. See, for example, Peles (1970), Ben-Zion (1978), Hirschey and Weygandt (1985), Shevlin (1991), and Lev and Sougiannis (1994).

12 Conceivably the interaction between goodwill accounting and firms' economic environment could draw on contracting or other arguments as in Crawford (1986), Robinson and Shane (1990), and others. Observable characteristics that might form the basis of empirical evidence might include merger premiums (as in Choi and Lee 1991), or even differential share price movements at times when mandated goodwill accounting rules change.

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How naive is the stock market's use of earnings information?

Ray Ball*[,a], Eli Bartov[b]

[a]*William E. Simon Graduate School of Business Administration, University of Rochester, Rochester, NY 14627, USA*

[b]*Stern School of Business, New York University, New York, NY 10012, USA*

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Abstract

Rendleman, Jones, and Latané (1987) and Bernard and Thomas (1990) hypothesize and report evidence that investors use a 'naive' seasonal random walk model, at least in part, for quarterly earnings. We show that the market acts as if it: (1) *does not* use a simple seasonal random walk model; (2) *does* exploit serial correlation at lags 1–4 in seasonally-differenced quarterly earnings; (3) *does* use the correct signs in exploiting serial correlation at each lag; but (4) *underestimates* the magnitude of serial correlation by approximately 50% on average. We discuss the consistency of alternative hypotheses with our evidence.

Key words: Anomalies; Capital markets; Time series forecasts

JEL classification: G14; M41

* Corresponding author.

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1. Introduction

Rendleman et al. (1987) hypothesize, and report confirming evidence, that investors are unaware that firms' seasonally-differenced quarterly earnings are serially correlated. Consequently, investors do not fully exploit the information in past earnings changes, and make or imply inferior predictions of future earnings changes. Bernard and Thomas (1990) hypothesize that, due to the unexploited information, abnormal returns at earnings announcements can be predicted from past earnings. They report evidence that is seemingly immune to problems in measuring expected returns and that is startlingly consistent with this hypothesis.

While this evidence is consistent with the market not fully exploiting the information in past earnings changes, it neither explicitly nor implicitly reveals the extent to which the market *does* utilize past earnings information. Furthermore, interpretation of the evidence is clouded by inconsistent and ambiguous conclusions. For example, Bernard and Thomas (1990, p. 338) are careful to conclude that 'while prices may *partially* reflect [the information in past earnings concerning future earnings], they evidently do not reflect *all* available information'. However, it is unclear what 'partially' means in this context: is it knowledge of some but not all of the attributes of an optimal earnings expectation model (seasonals, random walks, drifts, serial correlation), incomplete knowledge of the parameter values of an optimal model, or some combination of these? In an attempt to clarify the issue, we investigate the expectation model that is implied by the market's reaction to seasonally-differenced quarterly earnings.

Using the Bernard and Thomas (1990) data, we show that the market does not act as if using a naive earnings expectation model. The price reaction to current earnings is consistent with investors being aware of both the existence and the sign pattern of serial correlation in seasonally-differenced quarterly earnings. The market acts as if aware of the sign of the serial correlation at each of the four lags in question, and for each of the three Bernard and Thomas size groups (i.e., in twelve of twelve instances). However, we also show that the market acts as if it underestimates the magnitude of the serial correlation, by approximately 50%.

Showing that the market acts as if aware of serial correlation does not contradict the empirical anomaly reported by Rendleman et al. (1987) and Bernard and Thomas (1990). Nevertheless, the result helps to clarify the anomaly and provides new clues concerning its source. Using the correct form of the time-series model for quarterly earnings, but with seemingly-incorrect parameters, is qualitatively different from using a totally incorrect model. The result rules out the 'naive expectations model' hypothesis. It directs attention instead to possible sources of bias in investors' assessments of serial correlation, or alternatively to biases in researchers' assessments of the ability of earnings to predict abnormal returns.[1]

2. The 'naive expectations model' hypothesis

The ability of current earnings information to predict future abnormal returns, known as 'post earnings announcement drift', has attracted considerable attention since it appeared in Ball and Brown (1968). The literature is surveyed in Ball (1992) and Bernard (1993).

Rendleman et al. (1987, pp. 142–143) hypothesize that at least part of this 'drift' is due to investors misunderstanding the time-series behavior of earnings:

> If investors fail to recognize the correlation that exists in *SUE*s [standardized unexpected earnings] over time, stock prices are unlikely to adjust to their equilibrium values at the time earnings are announced. However, over subsequent holding periods, excess returns should be realized as stock prices adjust to next quarter's *SUE*s, which are highly correlated with those of the current quarter.

SUE is defined as change in earnings relative to the equivalent quarter last year, detrended and scaled by standard deviation. Their hypothesis thus is that investors use a seasonal version of the Ball and Brown (1968) 'naive model', namely a seasonal random walk model.[2] Investors are assumed unaware of exploitable serial correlation in the model's forecast errors. In contrast, the existence of serial correlation in seasonally-differenced quarterly earnings has been known *to researchers* for two decades.[3] If investors are more naive than researchers in forming earnings expectations, then it is possible for researchers to earn abnormal returns by trading under more sophisticated models. Rendleman et al. (1987) report evidence that this is possible.

Bernard and Thomas (1990) provide a more direct and thorough test of this hypothesis. They focus on abnormal returns at the time of earnings

[1]The latter could be due to earnings-related survival biases (Brown, Goetzmann, and Ross, 1995; Brown and Pope, 1995) or to earnings proxying for errors in estimating abnormal returns (Ball, 1978, 1992), for example.

[2]Following normal practice, we refer to this variable as Standardized Unexpected Earnings (*SUE*). This is a misleading term in our view. The earnings expectation assumes a seasonal random walk model for quarterly earnings, ignoring serial correlation in the seasonal differences. This is neither plausible (see Section 6), nor the optimal time-series model (Table 1), nor the model implicit in the actual market response to earnings (Table 3).

[3]See Watts (1975), Foster (1977), Griffin (1977), Brown and Rozeff (1979), Bernard and Thomas (1990), and Bartov (1992).

announcements, which they show can be predicted by a model that exploits the (+ , + , + , −) signs of the serial correlation, over four lags, in *SUE*s.[4] For example, they simulate trading strategies that are implemented at the time of an earnings announcement but are based on past earnings. Long positions are taken in the decile of the highest past-*SUE* stocks, and short positions are taken in the lowest past-*SUE* decile. The simulated strategy earns estimated abnormal returns of +1.32%, +0.70%, +0.04%, and −0.66% (*t*-statistics of +14.63, +8.46, +0.45, and −7.86; see their Table 2) when it is based on earnings announced 1–4 quarters previously, respectively. This implies a total of +2.72% abnormal return in the average quarter from trading on 'stale' earnings news.[5] Their full-sample regressions give similar results.

An attractive feature of the Bernard and Thomas (1990) research is that it develops and tests a refutable alternative to the efficient market hypothesis. If abnormal returns are not (1) observed at the time of subsequent quarters' earnings announcements and (2) a predictable function of past *SUE*, then the alternative is refuted. It clearly is not. Another attractive feature is that the results are seemingly robust to problems of measuring expected returns, because the estimated abnormal returns cover only three-day intervals (short enough to suggest 'small' expected returns) and are positive in all thirteen years studied (regular enough to suggest they are not returns for bearing some unmeasured risk).[6] Furthermore, the sample exceeds 80,000 earnings announcements, and the results are corroborated by Freeman and Tse (1989), Wiggins (1990), Abarbanell and Thomas (1992), Bartov (1992), Bae, Hughes, and Lee (1995), and Ball and Bartov (1995). These features of the research design, together with the novel and startling nature of the results, help explain the considerable impact that Bernard and Thomas (1990) has had on thinking about the relation between earnings and stock prices.

Nevertheless, there is some confusion as to the implications of this evidence. Rendleman et al. (1987, pp. 142–143) conclude that investors use a simple seasonal random-walk model, without incorporating serial correlation in *SUE*. Bernard and Thomas (1990, p. 307) reach much the same conclusion:

> A stock market in which prices are influenced by traders who anchor on a comparison of year-to-year changes in quarterly earnings, much like the financial press does in its coverage of earnings announcements (e.g., the Wall Street Journal's Digest of Earnings Reports), represents a disturbing departure from what would be predicted by existing models of efficient markets.

[4]The correlation at lag 3 is small, so this pattern sometimes is described as (+ , + , 0, −). In Table 1 it is significantly positive for all size groups, so we describe the pattern as (+ , + , + , −).

[5]Calculated as 1.32 + 0.70 + 0.04 + 0.66, reversing the sign at lag 4 to exploit the negative correlation.

[6]Expected returns increase with the return interval, so the problem of earnings proxying for expected returns (Ball, 1978, 1992) becomes larger in magnitude over longer intervals.

These interpretations credit investors with awareness of the fundamental random-walk property of earnings, but have them misapplying the model to seasonal (quarterly) earnings. In a review of the evidence, Bernard et al. (1993, p. 54) state a stronger conclusion:

> the market fails to appreciate fully even the most basic properties of the evolution of earnings.

Other statements are carefully qualified. For example (Bernard and Thomas, 1990, p. 307, emphasis added):

> What we study here is the possibility that market prices can be modeled *partially* as reflections of naive expectations.

But even these conclusions are ambiguous, in several senses. First, one could obtain the impression that the market is *totally* unaware of the serial correlation in a seasonal random-walk model's prediction errors. This cannot be clarified from the regressions reported by Bernard and Thomas (1990), which neither estimate nor imply an estimate of the extent to which the market acts as if aware of the serial correlation. That is not their purpose. Second, it is not clear whether 'partially' in this context refers to partial knowledge of components of the correct forecasting model (random walks, drifts, seasonals, existence of serial correlation, signs of the correlation at each lag) or to partial knowledge of parameter values in the correct model. Third, if it refers to partial parameter knowledge, does this mean systematically underestimating parameters for all stocks, systematically overestimating, or making random parameter estimation errors across time and/or stocks? To clarify the issue, we therefore offer some direct evidence.

3. A direct test of the 'naive expectations model' hypothesis

We investigate the expectation model implicit in the price reaction to current earnings, using a regression of form:

$$CAR_0 = k + a_0 SUE_0 + a_1 SUE_{-1} + a_2 SUE_{-2} + a_3 SUE_{-3} + a_4 SUE_{-4} + u_0. \tag{1}$$

The first independent variable (current SUE) is announced during the 'event window' in which the dependent variable (CAR) is observed. The other independent variables (lagged SUEs) measure components of the expectation of current SUE. We use the estimated coefficients on lagged SUEs, in a regression controlling for current SUE, to infer the extent to which investors incorporate the information in the prior four quarters' earnings when forming earnings expectations. This section outlines the rationale for making such an inference.

Prior research (see Fn. 3) shows that SUE_0 can be approximated as a linear function of lagged SUEs:

$$SUE_0 = b_0 + b_1 SUE_{-1} + b_2 SUE_{-2} + b_3 SUE_{-3} + b_4 SUE_{-4} + \varepsilon_0, \quad (2)$$

where $b_1, b_2, b_3 > 0$, $b_4 < 0$, and ε_0 is the white-noise current earnings innovation. The question is the extent to which the market acts as if aware of the form of (2) and the magnitudes of the coefficients b_1 through b_4. To address this question, we compare the values of the coefficients estimated from earnings data in (2) with those implied by the market's use of past earnings information in (1).

Consider initially the case where the market is fully informed about the process generating SUE, including the magnitude of its parameters, and makes full use of the information in past earnings. That is, assume the market acts as if Eq. (2) best describes the time-series process of earnings. In this case, the price response (CAR_0) is linear in the earnings innovation (ε_0) alone:

$$CAR_0 = \alpha + \beta\varepsilon_0 + \omega_0, \quad (3)$$

where $\beta > 0$ and ω_0 is white noise. It follows from Eqs. (2) and (3) that

$$\begin{aligned} CAR_0 = \alpha^* + \beta SUE_0 - b_1\beta SUE_{-1} - b_2\beta SUE_{-2} - b_3\beta SUE_{-3} \\ - b_4\beta SUE_{-4} + \omega_0, \quad (4) \end{aligned}$$

where $\alpha^* = \alpha - b_0\beta$. The fully-informed case therefore predicts both the signs and the magnitudes of the coefficients on lagged SUEs, *in a regression controlling for* SUE_0.

In a regression of form (1), if the market is fully informed about the earnings process, the predicted *signs* of the coefficients on lagged SUEs exhibit a $(-, -, -, +)$ sign pattern. The predicted pattern is reversed relative to the $(+, +, +, -)$ sign pattern in SUE's serial correlation in (2). The sign reversal occurs because abnormal return is an increasing function of the earnings innovation ε_0 $[= SUE_0 - E(SUE_0)]$, and thus is a decreasing function of $E(SUE_0)$. Note that the predicted signs of the coefficients on lagged SUEs also are reversed relative to those reported by Bernard and Thomas (1990, Table 5), whose regressions do not control for currently-announced SUE.

Furthermore, in a regression of form (1), the *magnitudes* as well as the signs of the coefficients on past SUE can be predicted under the hypothesis that the market is fully informed about the earnings process. If the market has perfect information on both the form of the process generating SUE and the magnitudes of the serial correlation coefficients, then the predicted values of the coefficients on SUE_{-1}, SUE_{-2}, SUE_{-3} and SUE_{-4} are $-b_1\beta$, $-b_2\beta$, $-b_3\beta$, and $-b_4\beta$, respectively. β can be estimated as a_0, the coefficient on current SUE in (1), and b_1 through b_4 can be estimated as the partial correlation coefficients on lagged earnings in regression (2).

Consider next the case where investors use a 'naive' seasonal random walk model, totally unaware of the serial correlation in *SUE*. (This is the original Rendleman et al. hypothesis.) Then, the predicted coefficients on lagged *SUE*s are zero. That is, CAR_0 is independent of SUE_{-1}, SUE_{-2}, SUE_{-3}, and SUE_{-4}, *when controlling for* SUE_0, because in this case investors react *only* to current earnings changes and ignore their predictability from past earnings changes.

Finally, consider the case where the market uses the correct expectations model, but systematically over-(under-)estimates the magnitude of serial correlation in *SUE*. Then, the predicted coefficients on lagged *SUE* are larger (smaller) in absolute value than predicted in the fully-informed case. Taken at face value, estimates of the coefficients on lagged *SUE* thus provide evidence on the markets assessment of the magnitude of serial correlation in *SUE*s.

4. Data

Data from their studies were kindly supplied by Bernard and Thomas. They require (1989, p. 6; 1990, Fn. 3) a minimum of nine earnings changes (ten quarters of earnings) to estimate the drift and standard deviation components of *SUE* plus four consecutive lagged *SUE*s for their (1990, Eq. 9) regression. We require one additional consecutive observation to control for current *SUE*.[7] Our sample comprises 70,728 quarterly earnings announcements made by NYSE–AMEX firms during 1974–86.

The variables in the Bernard and Thomas data set are earnings (*SUE*) and returns (*CAR*) by firm and quarter. *SUE* is seasonally-differenced quarterly earnings per share, detrended and scaled by its standard deviation estimated from prior observations, transformed to its cross-sectional decile rank, then scaled to range over the interval [0,1]. *CAR* is size-adjusted daily return cumulated over a three-day (− 2, 0) window, where 0 is the earnings announcement day.

5. Results

We first replicate prior results in our sample. We then show that the market incorporates lagged *SUE*s into its earnings expectation model, and reconcile this with prior results. Finally, we comment on the effects of size as a variable,

[7] Without this additional requirement, the sample comprises 76,034 observations. Requiring fifteen consecutive quarters of earnings data likely induces survival biases. Brown and Pope (1995) argue that requiring four subsequent quarters' earnings deletes firms that failed or were acquired over the following year from the sample, and that because these events are not independent of both future returns and current earnings, it induces a spurious dependence between current earnings and both future earnings and future returns. They suggest this explains in part the Bernard and Thomas (1989, 1990) results.

Table 1
Prediction of current *SUE* on the basis of lagged *SUE*s: Serial correlation in seasonally-differenced quarterly earnings

Model: $SUE_{i,t} = b_0 + \sum_{j=1}^{4} b_j SUE_{i,t-j}$

	b_0	b_1	b_2	b_3	b_4	Adj. R^2
Panel A: Full sample						
(n = 70728)	0.291	0.443	0.133	0.054	− 0.215	28.57%
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Panel B: By firm size						
Small firms	0.327	0.408	0.123	0.059	− 0.264	26.68%
(n = 24480)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Medium firms	0.276	0.454	0.142	0.055	− 0.208	29.99%
(n = 20894)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Large firms	0.277	0.462	0.130	0.044	− 0.183	29.39%
(n = 25354)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	

The definitions of all variables are identical to those in Bernard and Thomas (1990). $SUE_{i,t}$ is the forecast error of the ith firm for quarter t from a seasonal random walk with trend, scaled by its estimation-period standard deviation. *SUE* deciles are based on rankings within the calendar quarter of the announcement of quarter t earnings. In all regressions, the values of the *SUE* variables are replaced by their decile rankings and then scaled so that they range from 0 (for the lowest decile) to 1 (for the highest decile). Small, medium, and large firms are in size deciles 1 to 4, 5 to 7, and 8 to 10, respectively, based on January 1 market values of equity. *P*-values in parentheses.

including survivorship effects. Following Bernard and Thomas, we estimate all regressions from pooled cross-section and time-series data.

5.1. Replication of prior results

Tables 1 and 2 verify that prior results hold in our sample. Table 1 reports pooled regressions of *SUE* on its four lagged values. The coefficients are estimated partial serial correlations from a multiple regression as in Eq. (1). Their signs follow the familiar (+ , + , + , −) pattern. Results for small, medium and large firms are similar.

Table 2 closely replicates the Bernard and Thomas (1990, Table 5) pooled regression of three-day size-adjusted returns (CAR) on four lagged values of *SUE*.[8] In this regression, there is no control for the currently-announced *SUE*.

[8]One difference is that we use *SUE*s as explanatory variables whereas Bernard and Thomas use the errors from a Foster (1977) first-order autoregressive earnings expectation model (in seasonal differences). Since the *SUE*s and the errors from the Foster (1977) model are highly correlated, it is not surprising that we get similar results. Our coefficient on *SUE* at lag 3 is negative, though insignificant (see Fn. 4).

Table 2
Relation between return at current earnings announcement and lagged (past) quarterly earnings, Bernard and Thomas (1990) regression, no control for current earnings

Model: $CAR_{i,t} = k + \sum_{j=1}^{4} a_j SUE_{i,t-j}$

	k	a_1	a_2	a_3	a_4	Adj. R^2
Panel A: Full sample						
(n = 70728)	− 0.160	1.204	0.322	− 0.052	− 0.829	0.78%
	(0.00)	(0.00)	(0.00)	(0.51)	(0.00)	
Panel B: By firm size						
Small firms	− 0.047	1.790	0.368	0.149	− 1.323	0.91%
(n = 24480)	(0.66)	(0.00)	(0.04)	(0.40)	(0.00)	
Medium firms	− 0.384	1.226	0.462	− 0.188	− 0.654	0.97%
(n = 20894)	(0.00)	(0.00)	(0.00)	(0.15)	(0.00)	
Large firms	− 0.207	0.719	0.194	− 0.098	− 0.426	0.63%
(n = 25354)	(0.00)	(0.00)	(0.02)	(0.25)	(0.00)	

The definitions of all variables are identical to those in Bernard and Thomas (1990). $CAR_{i,t}$ is the sum of daily abnormal returns in the three days − 2 to 0 relative to the earnings announcement date (day 0) of firm i in quarter t. Daily abnormal returns are the differences between daily returns of firm i and the returns for NYSE–AMEX firms of the same size decile, based on January 1 market values of equity. $SUE_{i,t}$ is the forecast error of the ith firm for quarter t from a seasonal random walk with trend, scaled by its estimation-period standard deviation. *SUE* deciles are based on rankings within the calendar quarter of the announcement of quarter t earnings. In all regressions, the values of the *SUE* variables are replaced by their decile rankings and then scaled so that they range from 0 (for the lowest decile) to 1 (for the highest decile). Small, medium, and large firms are in size decilies 1 to 4, 5 to 7, and 8 to 10, respectively, based on January 1 market values of equity. All parameter estimates are multiplied by 100. P-values in parentheses.

The absolute values of the coefficients on the four earnings lags sum to 2.44%, compared with the 2.59% they report. This sum can be interpreted as the regression estimate of the abnormal return from exploiting serial correlation.

5.2. *Incorporation of lagged SUEs into earnings expectations*

Table 3 reports the relation between lagged earnings and returns at the current earnings announcement, controlling for current earnings. The evidence rejects the hypothesis that investors use a naive seasonal random-walk expectations model for quarterly earnings. In an F-test for the incremental effect of the four lagged *SUE* variables, relative to a regression of returns on current *SUE* alone, the F-statistic of 78.32 is significant at the 0.001 level. Lagged *SUEs* contribute significantly to the explanatory power of the regression of returns on

Table 3
Relation between return at current earnings announcement and lagged (past) quarterly earnings, controlling for current earnings

Model: $CAR_{i,t} = k + \sum_{j=1}^{4} a_j SUE_{i,t-j}$

	k	a_0	a_1	a_2	a_3	a_4	Adj. R^2
Panel A: Full sample							
(n = 70728)	− 1.592	4.924	− 0.981	− 0.333	− 0.319	0.231	7.09%
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
F test: $a_{-1} = a_{-2} = a_{-3} = a_{-4} = 0$, $F(4, 63177) = 78.32$, p-value = 0.000							
Panel B: By firm size							
Small firms	− 2.727	8.191	− 1.557	− 0.645	− 0.340	0.843	10.08%
(n = 24480)	(0.00)	(0.00)	(0.00)	(0.00)	(0.04)	(0.00)	
Medium firms	− 1.622	4.481	− 0.811	− 0.176	− 0.435	0.281	7.42%
(n = 20894)	(0.00)	(0.00)	(0.00)	(0.16)	(0.00)	(0.02)	
Large firms	− 0.947	2.667	− 0.512	− 0.153	− 0.218	0.062	5.17%
(n = 25354)	(0.00)	(0.00)	(0.00)	(0.07)	(0.00)	(0.42)	

The definitions of all variables are identical to those in Bernard and Thomas (1990). $CAR_{i,t}$ is the sum of daily abnormal returns in the three days − 2 to 0 relative to the earnings announcement date (day 0) of firm i in quarter t. Daily abnormal returns are the differences between daily returns of firm i and the returns for NYSE–AMEX firms of the same size decile, based on January 1 market values of equity. $SUE_{i,t}$ is the forecast error of the ith firm for quarter t from a seasonal random walk with trend, scaled by its estimation-period standard deviation. *SUE* deciles are based on rankings within the calendar quarter of the announcement of quarter t earnings. In all regressions, the values of the *SUE* variables are replaced by their decile rankings and then scaled so that they range from 0 (for the lowest decile) to 1 (for the highest decile). Small, medium, and large firms are in size deciles 1 to 4, 5 to 7, and 8 to 10, respectively, based on January 1 market values of equity. All parameter estimates are multiplied by 100. P-values in parentheses.

current *SUE*, contrary to the hypothesis that investors ignore past earnings changes in forming expectations of current earnings.

Further, the coefficients on the four lagged *SUE* variables all have the predicted reversed (− , − , − , +) signs. Each is significant at the 1% level (t-statistics are − 12.86, − 4.34, − 4.17, and + 3.24). Each changes sign from the Bernard and Thomas (1990) regression, which does not control for current *SUE*. When the sample is stratified by firm size, twelve of the twelve signs (four lags for each of the three size groups) are consistent with investors being aware of the signs of the serial correlation in seasonally-differenced earnings. Thus, the evidence is consistent with investors being aware of both the *existence* and the *signs* of serial correlation for *all* of the four lags.

The *magnitudes* of the coefficients are consistent with the market systematically underestimating serial correlation in *SUE*s. For example, if investors fully incorporated the partial correlation between SUE_0 and SUE_{-1} in their expectation of SUE_0, then the coefficient on SUE_{-1} in Table 3 would be -2.181 ($-b_1\beta$, estimated as $-0.443 * 4.924$). The actual estimate is -0.981, which is 45% of the predicted value. Likewise, the coefficients for all four lagged *SUE*s are consistent with prices incorporating 45%, 50%, 119%, and 22% of the serial correlation at lags 1–4 respectively, in earnings expectations. Considering all lags together, the price response to current and past earnings is consistent with an approximately 50% underestimation of the magnitude of serial correlation in seasonally-differenced quarterly earnings.

Table 4 expresses these results in terms of point estimates of average partial correlations in *SUE*. For the full sample, the market acts as if using coefficients

Table 4
Serial correlation in seasonally-differenced quarterly earnings: Comparison of time-series estimates with estimates implied by market reaction to earnings

		Time-series estimate	Implied market estimate	Proportion
Panel A: Full sample				
Lag 1		0.443	0.199	45%
2		0.133	0.067	50
3		0.054	0.064	119
4		−0.215	−0.047	22
Panel B: By firm size				
Lag 1	Small firms	0.408	0.190	47%
2		0.123	0.078	63
3		0.059	0.041	69
4		−0.204	−0.102	50
Lag 1	Medium firms	0.454	0.181	40%
2		0.142	0.039	27
3		0.055	0.097	176
4		−0.208	−0.062	30
Lag 1	Large firms	0.461	0.192	42%
2		0.130	0.057	44
3		0.044	0.081	184
4		−0.183	−0.023	13

All correlations are point-estimates of partial correlations from pooled regressions. Time-series estimates are regression slopes (b_1, b_2, b_3, b_4) from Table 1. Implied market estimates are ratios of regression slopes for lagged *SUE* relative to regression slopes for current *SUE* (a_1/a_0, a_2/a_0, a_3/a_0, a_4/a_0) from Table 3. Proportion is implied market estimate as a percentage of time-series estimate. Small, medium, and large firms are in size deciles 1 to 4, 5 to 7, and 8 to 10, respectively, based on January 1 market values of equity.

of + 0.20, + 0.07, + 0.06 and − 0.05 at lags 1–4, compared with the equivalent time-series estimates of + 0.44, + 0.13, + 0.05, and − 0.22 from Table 1. Overall, the evidence is consistent with the market being aware of the existence and sign pattern of serial correlation, but underestimating its magnitude (i.e., underestimating the sizes of the correlation coefficients).

5.3. Reconciliation with prior results

The regressions reported in Tables 2 and 3 have a common dependent variable, abnormal return at the time of the current earnings announcement, but they have different objectives and thus different independent variables. The Table 2 replication of the Bernard and Thomas (1990) regression does not control for current earnings, and shows that the market does not fully exploit past earnings information. Conversely, the Table 3 regression controls for current earnings, and shows that the market does not fully ignore past earnings information.

The two approaches are easily reconciled, because the Bernard and Thomas (1990, Table 5) regression, as replicated in our Table 2, is a direct implication of the regressions reported in our Tables 1 and 3.[9] Table 3 shows that the price reaction to current and lagged earnings for the average firm/quarter is

$$CAR_0 = -1.592 + 4.924 * SUE_0 - 0.981 * SUE_{-1} - 0.333 * SUE_{-2} - 0.319 * SUE_{-3} + 0.231 * SUE_{-4} + \omega_0 .$$

Table 1 shows that

$$SUE_0 = 0.291 + 0.443 * SUE_{-1} + 0.133 * SUE_{-2} + 0.054 * SUE_{-3} - 0.215 * SUE_{-4} + \varepsilon_0 .$$

where ε_0 is independent of lagged *SUE*s by construction. By simple substitution, these two equations imply

$$CAR_0 = -0.159 + 1.200 * SUE_{-1} + 0.321 * SUE_{-2} - 0.053 * SUE_{-3} - 0.827 * SUE_{-4} + \varepsilon'_0 ,$$

where $\varepsilon'_0 = 4.924 * \varepsilon_0 + \omega_0$ is independent of the four lagged *SUE*s. With rounding error, this is the central Bernard and Thomas result, as replicated in our Table 2.

[9]However, the reverse is not possible, which is the principal reason that the Bernard and Thomas (1990) results do not imply an estimate of the extent to which the market *does* seem aware of serial correlation. A subsidiary reason is that they appear to report simple, not partial, serial correlation coefficients in their equivalent of our Table 1.

5.4. Size effects

It is well-known that the relation between earnings and stock prices is a function of size (Atiase, 1985; Freeman, 1987). Thus, in Bernard and Thomas (1990, Table 6) and in our results (Tables 2 and 3), the coefficients on *SUE*s and the regression R^2s decrease with the size grouping.[10] Two other results are more of interest. First, in Table 4 the closeness of the serial correlation implied by the market's reaction to earnings to the time-series estimate decreases with size. This is particularly the case at lags 1, 2 ,and 4 (lag 3 contains little information about future earnings). Second, the sample selection bias is particularly severe for small firms: while they are sampled from the bottom 40% of firms, they comprise only 34.6% of the firm/years in the sample. In contrast, medium and large firms are sampled from only 30% of the population, but comprise 29.5% and 35.8% of the firm/years, respectively.

6. Interpretation of results

As noted earlier, an attractive feature of Rendleman et al. (1987) and Bernard and Thomas (1990) is that a refutable hypothesis is proposed and tested as an alternative to market efficiency. In this section, we discuss what the alternative theory must look like to accommodate our finding that investors act as if aware of the existence and sign pattern of serial correlation in seasonally-differenced quarterly earnings, but also as if underestimating its magnitude.

Bernard and Thomas (1990, p. 307) refer to 'the possibility that market prices can be modeled partially as reflections of naive expectations'. If 'partial' is interpreted as meaning systematic underestimation of serial correlation magnitudes, to be consistent with our results, then this alternative hypothesis requires investors to be: (1) aware of random walks in earnings; (2) aware of seasonals in earnings; (3) aware of both the existence and the (+ , + , + , −) sign pattern of the correlation in seasonally-differenced earnings across adjacent calendar quarters; but (4) unaware that they systematically underestimate the correlation. We discuss each attribute in turn.

1. Aware of random walks in earnings. The alternative hypothesis has investors employing a random-walk model for quarterly earnings. One does not employ seasonal random-walk expectation models for (say) the daily temperature; one typically bases forecasts on the average historical temperature for the day, not the temperature on the same day last year, thereby seasonally adjusting a mean-reverting process. In the case of *annual* earnings, a random walk would

[10] The statistics are estimated from a single pooled regression for each size group, and thus reflect within-group dispersion.

be a well-informed choice (Ball and Watts, 1972), and there is evidence of its widespread use. For example, the practice of calculating P/E as the ratio of price to the most recent annual earnings observation is consistent with random walks in earnings, but not with other basic time-series models. A mean-reverting process would imply calculating the ratio of price to an average of past years' earnings. Common practice was approximately consistent with the actual time-series behavior of annual earnings well before Ball and Watts (1972) reported that annual earnings do approximate a random walk. Further evidence is provided by the literature on the magnitude of stock-price responses to reported earnings. A random-walk model implies that the amount of price change is a multiple of the amount of change in earnings per share, whereas a mean-reverting process implies that earnings and price changes are approximately the same in magnitude (Ball and Watts, 1972, pp. 665–666). Kothari and Sloan (1992) report that the price response to earnings is a multiple of earnings, consistent with awareness of random-walk earnings processes.[11]

2. *Aware of seasonal.* Quarterly earnings exhibit obvious seasonal behavior. The alternative hypothesis assumes investors allow for seasonals when forming earnings expectations.

3. *Aware of existence and form of serial correlation.* The original hypothesis of Rendleman et al. (1987), that investors use a 'naive' seasonal random-walk expectation model for quarterly earnings, assumes that investors regard the evolution of earnings in each of the four fiscal quarters as independent of its evolution in the other three quarters. Each quarter's earnings is assumed to take its own random walk, evolving as the accumulation of past earnings innovations *in that fiscal quarter alone.* The levels of the four quarterly series diverge over time, as each random-walk accumulates its own annual innovations. The firm effectively is viewed as four separate entities with four separate earnings processes, which in our view is an implausible model of investor behavior ('naive' or otherwise).[12] To accommodate our findings, this model must be modified to allow investors who, while presumably unaware of the language of serial correlation, nevertheless *act as if* aware of the (+ + + −) error pattern in the model's forecasts.

[11]For a random walk, price change is a $(1 + 1/r)$ multiple of earnings change, where r is the interest rate. Kothari and Sloan (1992) estimate the mean multiple as 5.45 and argue that the appropriate $(1 + 1/r)$ is approximately 7–8.

[12]For example, at lag 1 the model assumes that change in a quarter's earnings (relative to the previous year) implies *absolutely nothing* about the next quarter's earnings (relative to the previous year). A precipitous fall in 1995.Q2 sales relative to 1994.Q2 is ignored in forming expectations for 1995.Q3 earnings. The inherent implausibility of the seasonal random walk model is one reason for our view that the *SUE* variable is misnamed.

4. But systematically underestimate the magnitude of dependence. For the 'partially naive investors' hypothesis to explain our results, investors in general must systematically underestimate the magnitude of the serial correlation in a seasonal random-walk model's prediction errors. Why not *over*estimate systematically? Or have unbiased but inefficient assessments of the magnitude (underestimation for some firms and some investors, but overestimation for other firms and investors)? What theory predicts systematic underestimation, for firms and investors in general, consistently over time (at least, in every year studied by Bernard and Thomas, 1990)?

One theory is that investors systematically *over*react to news, and thus prices exhibit subsequent corrections.[13] In his review of the relevant literature, Thaler (1993, p. xix) states:

> DeBondt and I were familiar with the work of Daniel Kahneman and Amos Tversky which showed that people have a tendency to make predictions that are not sufficiently regressive. That is, rather than being proper Bayesian decision makers, people tend to overweight recent information and underweight long-term tendencies (prior odds).

This theory is difficult to reconcile with post-earnings-announcement 'drift'. Thaler (1993, p. xix) acknowledges this when he refers to 'the apparent underreaction of stock prices to earnings announcements' as 'a seemingly contrary set of results'.[14]

Nor is it easy to reconcile the DeBondt and Thaler (1985, 1987) theory, that investors systematically overreact to the most recent information and then correct their mistakes, with evidence that investors systematically underestimate positive serial correlation at lags 1 and 2. Their theory implies price reversals, not continuations. Any reconciliation attempt would require a theory with three phases of investor behavior, in the following sequence: (1) underreaction to earnings information in the short term (approximately six months); (2) overreaction in the medium term; and then (3) long-term correction of the medium-term overreaction.

Bernard and Thomas (1990, p. 307) propose that investors 'anchor' on the earnings of the equivalent quarter in the previous year. 'Anchoring' is

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[13] See DeBondt and Thaler (1985, 1987), Chopra, Lakonishok, and Ritter (1992), Ball and Kothari (1989), Ball, Kothari, and Shanken (1995), and Kaul and Nimalendran (1990).

[14] Shiller's (e.g., 1981,1989) theory is that the market overreacts to information at the aggregate level, with the stock index therefore exhibiting excess volatility. Seemingly-unaware of the evidence on post-earnings-announcement drift, he concludes (1989, p. 426): 'price overreacts to current [index-level] dividends. ... . Price might also be described as overreacting to current earnings.' Bernard (1993, Ch.11) argues that price overreactions to information generally are logically consistent with price underreactions to quarterly earnings.

underreacting to recent information and overweighting older information.[15] As a theory of investor use of information generally, anchoring seems inconsistent with the theory and evidence of DeBondt and Thaler. Further, the theory does not explain why investors would 'anchor' on earnings reported as far back as four quarters ago, ignoring the intervening three quarters. Why don't investors anchor on the most recent quarter's earnings? Nor does the theory explain why investors use random-walk models, as distinct from anchoring on some average of past year's earnings.

In support of their hypothesis, Bernard and Thomas (1990, p. 307, cited in Section 2 above) state that anchoring on a comparison with earnings four quarters earlier is a feature of the financial press generally, and of the Digest of Earnings Reports in the *Wall Street Journal* in particular. We doubt that this institutional feature explains the results, for several reasons. First, there are many competing reporting institutions, and no single institution sets market prices. For example, *Value Line*'s digests commonly report the past four years of quarterly earnings, thus providing data for much more than the three lags in question and not anchoring on a single-quarter comparison. Second, even the *Wall Street Journal* does not restrict itself to a comparison with the equivalent quarter last year. Its practice is to report a comparison of total earnings in the company's fiscal year to date (YTD) with the equivalent YTD total last year, along with the comparison of earnings this quarter with the equivalent quarter last year.[16] Only in the company's first fiscal quarter of the year does this practice 'anchor' on earnings four quarters previously. Third, because the *Journal*'s YTD figure gives information about more lags in the later quarters of the fiscal year, we can test whether its reporting practices have any effect on the market's incorporation of lagged *SUE*s into prices. The *Journal*'s practice in the fourth fiscal quarter is to report a comparison of total fiscal-year earnings with the equivalent in the previous year, so the information in SUE_{-1}, SUE_{-2}, and SUE_{-3} is reported alongside SUE_0, thus providing a test of whether its practice in other quarters misleads investors to ignore serial correlation at those lags. Our results (unreported) imply otherwise: we find no discernable difference between the fourth quarter and other quarters in the market's use of lagged *SUE*s in forming expectations. We conclude that the data are inconsistent with this institutional version of the anchoring hypothesis.

Hand (1990) hypothesizes that 'unsophisticated' investors are more likely to invest in stocks with lower capitalization or a lower proportion of institutional investors (size and institutional following are highly correlated). This hypothesis

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[15]See Libby (1981).

[16]This is the practice for NYSE–AMEX stocks. For example, in the Digest of Earnings on 27 October 1995, 272 of 301 announcements had a comparison of year-to-date (YTD) earnings with the previous YTD. Of the 29 missing a YTD comparison, 23 were NASDAQ firms.

predicts that small stocks are most likely to behave as if investors are unaware of the serial correlation in their *SUE*s. However, we earlier noted the Table 4 result that the opposite tends to occur. The small-firm group incorporates the *largest* proportion of the serial correlation into its implied earnings expectation.

In our view, the evidence remains anomalous, that is difficult to reconcile with any refutable theory. To accommodate all of the results, including our evidence that the market acts as if aware of, but also as if underestimating, the serial correlation in seasonally-differenced quarterly earnings, the combination of hypothesized investor behaviors required seems likely to be *ad hoc*. Our results do not contradict the predictability of estimated abnormal returns at future earnings announcements (Bernard and Thomas, 1990). Our results do change the tenor of the anomaly, because they rule out theories in which investors act as if naively unaware of the principal attributes of earnings behavior. They direct attention toward possible biases in investors' assessments of serial correlation magnitudes, or alternatively to biases in researchers' assessments of the ability of earnings to predict abnormal returns (such as sample selection bias).

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THE ACCOUNTING VARIABLE AND STOCK PRICE DETERMINATION

Stanley C.W. Salvary*

ABSTRACT

Several tests have been conducted to determine which valuation model best fits stock price data. Given very little success, those studies suggest the need for a clear understanding of the market process of stock price determination. This paper advances the concepts of product costing and product pricing, which pertain to financial accounting valuation and the stock market price determination, respectively. This research effort presents a workable hypothesis of stock price determination.

I. Introduction

The most popular stock valuation models are the dividend model and the stock-returns model. Tests of stock pricing using these models are not found to be satisfactory [Scott, 1985; Kleidon, 1986; Shiller, 1990]. Theoretically, the variables used in these models to test for fit with stock price determination are inadequate descriptions of the variable which is the locus of stock price determination. Last, but not least, among the popular valuation models is the price/earnings model [Phillips and Ritchie, 1983, pp.160-161], which is primarily the inverse of a price yield model. While yields have to be compared with yields of similar risks, there is no inherent measure of risk implicit in the price/earnings model, thus this model lacks the theoretical base needed for an intrinsic valuation model. It is essentially a rule of thumb approach to stock valuation. While these models have contributed to our knowledge, more work is necessary to deal with the shortcomings of those models.

The works of Kleidon [1986], Kormendi and Lipe [1987], and Campbell and Shiller [1988] have strongly suggested that the accounting earnings variable represents fundamental value, and this variable has few competitors for this role. The findings of Kormendi and Lipe [1987] and Campbell and Shiller [1988] are reinforced by the

*Professor of Accounting, Canisius College, Buffalo, New York 14208

findings of Guo and Chang [1993], who found that: (1) accounting based returns were measures at the ordinal level which enabled ranking of firms by their security returns, and (2) the usefulness of such accounting information increased over the twenty years that were covered by the study. From both empirical and intuitive viewpoints, the studies cited above implicitly recognize the use of accounting information as a fundamental variable in stock price determination; presumably accounting information underlies the fundamental valuation approach employed in the capital market.[1] Nevertheless, the cited studies suggest that a more comprehensive theory is needed to explain the stock pricing mechanism. Accordingly, this research is motivated by the desire to provide a working hypothesis based upon the accounting variable that would enable a better understanding of the stock price mechanism.

The Accounting Variable: The accounting variable, which is presented in this paper, is based upon the works of Salvary [1985, 1989, 1992, 1997]. Those works have rejected historical cost and have established "estimated recoverable cost" (ERC) as the measurement property/attribute of financial accounting. Those studies have demonstrated by logical analysis and have provided a rigorous proof that ERC is based upon: (a) the essential characteristics of accounting phenomena (investments as a set) and (b) the measurement/valuation rules of financial accounting which have evolved up to the early part of the twentieth century. ERC, which is linked to investments and explicated by the capital budgeting model, provides the logic which explains the apparent diverse valuation rules of financial accounting [Salvary, 1992, p. 236]. ERC, which is a decision oriented property, is the amount of resource outlay that is justified by the rate of return which guides the investment decision; it is a measure of what money commitments would have been made, given current market conditions [Salvary, 1992, p. 266]. The accounting valuation rules, which have been identified, produce such a measure. With ERC as the measurement property, the term book value can now be appropriately replaced with the proper measurement term: residual cash commitment/residual value of committed finance. While some accounting rules have been identified as being incompatible with the ERC [Salvary, 1985, 1992, 1997], it is the inadvertent failure to recognize the proper measurement property and the derivation of the emergent valuation rules which has resulted in the elimination of the use of the "lower of cost and market" valuation for marketable equity securities with Statement of Financial Accounting Standards (SFAS) 115: Accounting for Certain Investments in Debt and Equity Securities [FASB, 1993].

In this paper, a strong theoretical link is established between financial accounting valuation and stock price determination. The financial accounting measurement process--the generation of financial accounting information--is depicted as a financial product costing process related to the production plans of firms operating in the commodity market. The financial product costing process is the measurement of current cash flows generated by a firm's production plan. It is accounting earnings (i.e., estimates of future earnings) and accounting residual value (i.e., current residual cash commitments--the estimated recoverable cost) as a unit that is priced in the capital market; hence, capital market valuation is a financial product pricing process. The financial product pricing process is the valuation of estimated future cash flows expected to be generated by a firm's production plan and any expected residual cash value. Thus, it is quite clear why the pricing process is distinguished from the costing process.

Working Hypothesis: Financial accounting valuation (with its underlying rationale the capital budgeting model) is the costing of a financial product (periodic returns generated by and residual resources committed to a production plan) in the commodity market. Capital market valuation (current value of an equity security - stock price determination) is the pricing of a financial product--the capitalization of expected market returns on and the terminal value of the equity security in the capital market. A difference exists between the two valuations and the magnitude of the difference is further influenced by changes in the interest rate and the effect of uncertainty on the surrogate variables used in the pricing model.

II. Research Issue

For a firm whose shares are traded in the securities market, the value (K) of its net assets (stockholders' equity) as reflected in its financial statements invariably differs from the aggregate current market value (S) of its equity securities as reflected by the market price in the securities market. Also, the value of that firm's net assets (K) presented in its financial statements differs from the aggregate replacement cost (RC) of that firm's assets. These values - market value and replacement cost - are signals which act as guides to actions for entry, use and exit decisions for an operating system; viz. the firm in its implementation of the production plan.[2] For example, the ratio of firms' net assets at current market value and net assets at replacement costs provides a meaningful decision variable: Tobin's q ratio. In this setting, financial accounting valuation would constitute information from an operating system; while, current market value and replacement cost are signals from a signaling system based upon expectations.[3]

In the static case for the initial commitment of money, Turnovsky [1970] has termed the difference, between capital market valuation (S) and financial accounting valuation (K), the 'net present value'--an all encompassing term, which is not limited to, but includes, monopoly rents. Turnovsky [1970] maintains that the market value of the firm's equity (S) is described by the following equation:

$$S = (\pi - rD)(i)^{-1},$$

and the net present value (N) is captured by equation (1):

(1) $N = (\pi - rD)(i)^{-1} - K = S - K$

- K = Equity Book Value or Equity Money Capital Invested in the Firm
- i = Stockholders' Required Rate of Return on Equity
- r = Market Rate of Interest on Debt
- π = Expected Operating Income Stream Generated by the Firm
- D = Book Value of the Firm's Debt

Vickers [1970; 1968] has stressed that the underlying value of financial assets (VFA) in the capital market is dependent upon the "intensity in the use of money capital" (x): VFA = h(x); whereas, the value of real assets (VRA) in the commodity market depends upon "taste, technology and employment conditions" (u): VRA = j(u). This situation establishes a clear basis for two distinct valuations which are necessary for an efficient functioning of the interdependent capital and commodities markets: the market for financial assets and the market for real assets. The importance of the interdependence is stressed by Greenberg, et al [1978, p. 241]. Arzac [1975], in advancing the work of Vickers and Turnovsky, maintained that the net present value of equity is independent of the financial structure of the firm. Though intuitively appealing, no explicit reason is given why the difference between market value of an equity security (S) and financial accounting value (K) should be the net present value (N), and not simply as monopoly rents. One reason is that the excess of market value over replacement cost is already termed monopoly rent, and this difference would be less than the difference between S and K.

In this paper, the model for stock price (S) determination as developed is based upon: (1) ERC–the measurement property of financial accounting, which provides for periodic earnings (Ep) and the residual cash commitment/residual value of committed finance (K) of the investment, and (2) an investment horizon (n) and a risk adjusted discount rate (i). The model is described below:

$$S_t = K_t + \Sigma E_{p^*}(1+i)^{-n},$$

where K_t is a residual value stated at present value, and E_{p^*} is expected future earnings which will be discounted by the appropriate discount rate. While it is clear from this perspective that $S_t \neq K_t$ except when $E_p = 0$, the analysis which follows will provide the full particulars for non-equivalence of S_t and K_t. This paper attempts to demonstrate that financial accounting valuation and capital market (finance) valuation differ in the magnitudes they produce because they are derived from/represent two different and distinct processes; these two valuations serve two distinct but interdependent markets (the commodity and capital markets). The difference between these two valuations is occasioned by: (a) the intertemporal inseparability in the commodity market of an investment base from its earnings stream, and (b) the intertemporal separability of market prices of the earnings stream (for the intertemporal transfer of savings) from the investment base due to continuous changes in the opportunity costs in the capital market.

Contribution to the Literature

In this two markets setting, the nature of each market, the roles of the participants in these markets, and the valuations necessary for the efficient functioning of these separate but interdependent markets are explored. The valuations are shown to be time dependent and participant oriented. Financial accounting valuation (measurement of current cash flows and current residual cash commitments) and capital market valuation (pricing of future cash flows and future residual cash commitments) are shown to be two different but interrelated processes. This finding provides a sufficient reason for the difference between S and K to be termed net present value (N) and not monopoly rents. In stock price formation, both N and K are components of S, where N is the earnings component and K is a residual (terminal) component. Changes in the interest rate (r) have a systematic effect on S and uncertainty affects expectations of the value of K, these factors prevent the difference between S and K from being arbitraged or insured. The analysis in this study shows that what is true for the static model is also true for the dynamic model. Essentially, this study complements the studies cited above.

III. Research Methodology

This paper is an analytical paper, which focuses on the time perspective and uncertainty facing the production/operating decision as differentiated from those of the savings decision. It establishes the validity of the distinction and the interdependence between the commodity and capital markets. The latter, which provides for liquidity of claims against future earnings, is shown to be a necessary adjunct of the former. A proof of one theorem, which is developed around the concepts of present value and net present value necessitated by the production (investment) decision, demonstrates that the capital market is a by-product of the commodity market.

This work examines the source of the difference between the two valuations: the net present value (N). To simplify the analysis, the firm: (1) has no debt; (2) operates by paying cash immediately for all goods and services; and (3) declares no dividends. In the absence of debt, Total Assets (C^*) = Total Stockholders' Equity (K). Given C^* = K, then equation (1) can be restated as:

(1a) $N_{st} = S_t - C^*_{st}$ (s = per share, t = index)

In an analysis which includes liabilities, $C^* - D = K$ would be used in place of $C^* = K$.

IV. Theoretical Framework

Any discussion of values and valuation models must not confuse the world of uncertainty with a world of certainty. The former gives rise to interrelationships--relationships among committed finance, market value, and replacement cost--but not identical existences. The differences among these items are necessary consequences of an uncertain world and the concept of the amount at risk would be equated with committed finance. Since the difference in interest rates is a reflection of difference in risk, then in the absence of risk there would be one rate. Thus, in a world of certainty, the risk-free rate of interest would be meaningless since the term risk would not exist.

In a world of certainty, while concepts such as replacement cost and market value would not exist, the concept of committed finance to a cash flow plan would exist. Having perfect knowledge, the world would experience steady state growth and the trading in risk would not be a factor. The capital market would not be a place for interpersonal trading of risk/return preferences. In reality, however, the world is an uncertain world characterized by limited and imperfect knowledge in which risk trading and the commodity and capital markets exist. To demonstrate the interdependence of the commodity and capital markets, two models are used: (a) production without a capital market; and (b) production with a capital market.

Production Without a Capital Market (The Producer's Present Value Model)

In a surplus oriented economy, production by the individual is in excess of personal requirements; the excess production is to enable the augmentation of one's wealth. This augmentation process is accomplished by selecting a specified combination of factors of production (an input value) to generate a certain amount of tradable items (an output value) which would maximize the net value--profit. The basic assumptions of the model are: (a) two producers - Producer A and Producer B; (b) two goods and services are produced - Good A (consumable goods) and Good B (all other goods and services); (c) two production periods: (d) the individual producer finances production; and (e) money serves only one function that of a unit of account. Each producer's output is distributed to the employees of that producer. The goods are then exchanged in a general trading store for the other producer's output. (Although the transactions will be undertaken by means of physical exchanges, reference is made to money prices to facilitate the exposition.) Exchange ratios constitute relative money prices which are determined by market demand and supply conditions. The rate of exchange for one unit of an individual's output is based on the prevailing money prices which have been established from the exchange ratios for the commodities produced in this economic community.

Each producer's decision is based upon the expected price of his/her output at time of trading. Given that production extends over two time periods, the decision to commit resources to production is guided by a decision model as depicted in equation (2.0):

$$(2.0) \quad C \leq C^* = \sum E_p(1+r^*)^{-2}$$

C = Resources to be Committed (Outlay Required)

C^* = Present Value of Investment (Discounted Benefits)/Total Assets

E_p = Profit/Earnings (Benefits from Disposal of Output)

r^* = A Hurdle Discount Rate (Desired Minimum Rate)

The commitment of resources (e.g., resources to be exchanged for the productive equipment) is based upon the recoverability of such resources. The stream of net benefits (E) is the difference between the resource outflows (excluding the cost of the productive equipment) and the resource inflows. While C (the "investment cost") is the actual outlay required to undertake the investment, C^* (the discounted stream of benefits) is an estimate of the recoverable amount of investment cost. (C^* = the estimated recoverable cost/total assets.) Therefore, C can be less than, equal to or greater than C^*. The decision rule (guiding the capital budgeting decision) states that if the sum of the discounted stream of benefits (C^*) is equal to or greater than the actual outlay required to undertake the investment (the resources to be committed - C), then undertake the investment.[4]

In equation (2.1), unlike equation (2.0) in which C^* is determined from the PV model, the internal rate of return (R) is the variable to be determined and the DCF model is used :

$$(2.1) \quad C = \sum E_p(1+R)^{-2}$$

The result R (internal rate of return) is compared to r^* (hurdle discount-rate). If $R \geq r^*$, then the investment is to be undertaken. However, when $R > r^*$, then $C < C^*$ and the internal rate of return (R) is substituted for the desired return (r^*) in the PV model. Thus, in the new calculation, the investment cost (C) is equal to the investment base (C^*).

In this setting, there is no intermediary; the producer and the financier are one. The planning horizon of the financier and the investment duration of the producer are identical. There exists only one market: the commodity market. Accordingly, there is only one valuation (C^* - financial accounting valuation). This valuation serves both the financing and the producing decisions. (As indicated earlier $C^* = K$; thus from this point on, K will be used and not C^*.) The foregoing discussion provides the necessary outline of the first model - the producer's present value model.

Production With A Capital Market (The Financier's Present Value Model)

In a money economy (an economy in which generally all goods and services are exchanged for money), a measure of nominal money input and of nominal money output provides an unambiguous measure of the change in money holdings. In this setting, money serves as a medium of exchange and as a store of uncertain value. What emerges now is the concept of capitalized value--the valuation of a sum or sums of money to be received at some future point in time, based upon demand and supply conditions for money reflecting changes in the risk-free interest rate and the inherent risk in the existing supply alternatives of future cash flows/earnings. Individuals who hoard money (a store of uncertain value) are now suppliers of money capital - financiers. Thus, the financier's role is explicit and distinct from that of the producer.

Now producers can sell, for immediate cash, a financial product--the future earnings from production and any residual value--to financiers. A new market comes into existence - the capital market. This market provides for the interpersonal transfer of cash for claims against future earnings. To accommodate this new process of intertemporal transfer--trading in the capital market--capital market valuation emerges as an adjunct to financial accounting valuation. Financial instruments (financial assets) are used to represent the claims to future earnings. The values of the financial instruments (assets) will and do differ over time from the initial valuation because of changes in the interest rates and relevant risks. This new valuation model captures the financier's discounting process; it is the financier's present value model: S.

Two distinct valuation models (a costing model and a pricing model) have emerged to serve the two interdependent (commodity and capital) markets. The Costing Model provides measures of: (a) the resources committed to the production plan (K), and (b) the effect of actual inputs and actual outputs--profit/earnings (E_p) generated in the past period. The valuation, which focuses on firm's production plans over time, serves the commodity market. The Pricing Model places a value on the future prospects of each firm's production and distribution plan for several years into the future. The value (S) in the capital market is placed on an aggregate of expected annual earnings (E_f which is a proxy for E_p) and a terminal nominal value (S*). This valuation process, which is a projection of possible effects of changes in financiers' beliefs about risks and liquidity, facilitates interpersonal and intertemporal transfers of current cash.

Financial Product Costing - Financial Accounting Measurement

Financial accounting measurement is the costing of units of each of several money flows. Such a unit of money-flow (output money-value less input money-value) generated in the commodity market emerges as a financial product--profit/earnings (E_p)[5] plus the residual value (K- the estimated recoverable cost) for sale in the capital market. In financial accounting, E_p is measured for a fiscal year (t) and K is measured at the end of the fiscal year. Hence, the combination of E_p (a periodic measure of a firm's performance) plus K (the residual value of committed finance) is a financial product whose cost is a function of the commodity market. $E_{pt} = P_t - TC_t$, where, P = Sales and TC = Total Cost.

Since there are alternative uses of money and a cost (interest) for the use of money, decisions in the commodity market are based on the concept of the rate of return (R^*) on money invested. R^* is a relative magnitude of a purely nominal money dimension which serves as a means to an efficient capital market. It is a guide to action in production and distribution decisions; for each and every year, the amount of profit/earnings (E_p) is translated into R^* as follows: $R^*_t = E_{pt}/K_{t-1}$. However, $E_{pt} = (K_{t-1} \times R^*_t)$ is a tautology.

Intertemporal Inseparability of Investment Base and Earnings

In equation (2.0) the hurdle discount rate (r^*) reflects the desired minimum rate of return (e.g., the cost of capital), and hence provision is made for earnings - the means of augmenting the initial resource input. Each investment is undertaken to generate an earnings stream. Each investment has an "investment cost" which is the outlay that is required to undertake the investment and an "investment base" which is the estimated recoverable amount of invested money - the estimated recoverable cost. (In this analysis, the terms "investment base," "money in use," "committed finance" and "estimated recoverable cost" are used interchangeably.) The "investment base" is the amount of resource outlay that is justified by the rate of return which guides the investment decision. If actual returns are less than expected returns for the given risk, then there has been an error in the planning stage, and the investment base has to be reduced to reflect the planning loss. However, the converse does not hold. If actual returns exceed expected returns, then the internal rate of return (R) was underestimated. In this case, there is no change in the investment base, only a note to the effect that a higher internal rate of return (R) exists. Accordingly, over the life of an investment, the earnings stream is inseparable from the investment base.

Financial Product Pricing - Capital Market Valuation

The market value (S) of an equity security (a financial asset) is based upon the sum of: (i) an estimate of expected return of investment (K_{st}), and (ii) an estimate of future earnings (E_p^*) relating to that financial asset. This price formation process is the pricing of a firm's financial product in the capital market. The measures provided by financial accounting for K_s and E_{ps} (which is modified for anticipated future conditions in order to estimate future earnings (E^*)) become informational input which enable a value to be assigned to accommodate personal intertemporal transfers of money capital. Equation (3) [Salvary, 1982] is offered as a plausible stock valuation model which characterizes the price formation process:

$$(3) \quad S_t = \sum_{n=1}^{k} E'_s \lambda^n + K_{stn} \lambda^n$$

where:

S	=	Present Value of Expected Future Cash Flows (Price of An Equity Security in the Capital Market)
K	=	Estimated Recoverable Cost of Investment attributable to Shareholders (Equity Book Value or Equity Money Capital Invested in the Firm)

E'	=	N-Year Moving Average of Earnings (E_p)
λ	=	$(1+R')(1+i)^{-1}$
R'	=	Firm's N-Year Moving Average of Rate of Return (R^*)
i	=	Risk Adjusted Discount Rate
n	=	Financier's Planning Horizon - Number of Periods ($n = 1,2,3, \ldots k$)
t	=	Index/Date (t, t+1, t+2, ...)
s	=	Per Share
$K_{stn}\lambda^n$	=	Residual value

The investor buys into the production plan by: (a) purchasing future earnings ($\Sigma E^*\lambda^n$) and (b) making a deposit of the per share value of the investment base's residual value ($K_{sm}\lambda^n$). The deposit is refundable subject to the inherent operating risk, in which case the amount can be greater or larger at the termination date of the investor's participation in the plan.

Another plausible model is the finite horizon valuation model (FHVM) [Phillips and Ritchie, 1983, p. 157]. A modified version of that model (with symbols modified to be comparable with those of equation (3)) is presented in equation (4):

$$(4)\ S_0 = E_0 l \sum_{t=1}^{T} (1+g)^t(1+i)^{-t} + E_0 M_c(1+g)^T(1+i)^{-T}$$

E_0	=	Current earnings per share
l	=	The dividend payout ratio in each holding period
g	=	Anticipated compound annual growth rate of earnings per share
M_c	=	Multiplier applied to earnings per share in the terminal year to determine the selling price

The differences between the two models (equations 3 and 4) are to be found in: (a) the use of a single period earnings as opposed to an n-period average earnings, (b) the use of the dividend payout ratio, and (c) the manner of determining the terminal value (stock price) at time of ownership discontinuation.

The FHVM model, which differs from the model presented in equation (3), is theoretically problematic due to the ad hoc treatment of M_c. Equation 3 is a sequential expectations adjustment model (SEAM); it reflects periodic adjustments based upon expectations related to the sequential release of accounting information.[6] This position obtains because the values of equity securities are tied to the multi-year production plans of the many firms that are operating in the commodity market. Invariably, each firm's product costs (K and E_p) are measured annually--on a period by period basis. At the end of each period, with the release of accounting information on each period, a sequential adjustment begins--the number of earnings period is reduced by one year, and the initial value of the investment (K_{t0}) is adjusted to reflect a new value K_{t+1}:

$$K_{t+1} = K_{t0} + E_p - D_c. \quad (D_c = \text{Cash Dividends})$$

Intertemporal Separability of Market Price from Investment Base

In the capital market, a surrogate (E_f) is used for E_p in the estimation of future earnings. E_f is the average (weighted by the probabilities in the probability distribution of E_f given heterogeneous expectations) of the individual estimates of future cash dividends (D_c) plus the change in the price of the equity security (ΔS)--$E_f = D_c + \Delta S$. However, the variables used to define E_f are inextricably linked to E_p, since dividend (D_c) is a function of E_p and ΔS is influenced by: (a) changes in retained earnings (E_p - D_c), (b) the interest rate (r), and (c) the level of liquidity (l*). Thus, $D_c = f(E_p)$ and $\Delta S = f^*(\{E_p - D_c\}, r, l^*)$. This surrogation renders the price of an equity security (S) intertemporally separable from the investment base (K).

To illustrate the foregoing point, assume that a production plan is for a three-year period. In the case of the costing/measurement model, the following holds:

$$K_{t0} = S_{t0},$$
$$K_{t1} = K_{t0} + E_{p1},$$
$$K_{t2} = K_{t1} + E_{p2}, \text{ and}$$
$$K_{t3} = K_{t2} + E_{p3}.$$

However, S_{t1}, S_{t2}, and S_{t3} cannot be defined in the same fashion as given for K_{t1}, K_{t2}, and K_{t3}, because S is some function of i, n, E_f, and K. In the case of the pricing/valuation model, the following holds for S_{t1}, S_{t2}, and S_{t3}:

$$S_{t1} = \Sigma E_f(1+i)^{-3} + S^*_{t4\cdot}(1+i)^{-3},$$
$$S_{t2} = \Sigma E_f(1+i)^{-2} + S^*_{t4\cdot\cdot}(1+i)^{-2}, \text{ and}$$
$$S_{t3} = \Sigma E_f(1+i)^{-1} + S^*_{t4\cdots}(1+i)^{-1}.$$

In Diagram 1 (S^*_t is an approximation of K^*_t), an insight is provided into the differences between the costing/measurement and the pricing/valuation models. The costing model focuses on measuring past performance and the residual value committed finance, whereas the pricing model places a value on expected future earnings and expected residual value but it depends on the information from the costing model to arrive at the estimates of future performance and residual value. While the financial product costs (K and E_p) are relatively constant, the financial product's price (S) is highly variable. This condition holds since two elements (i and n) of the pricing/valuation model are highly sensitive to money market conditions and to personal expectations (the planning horizons of individuals - n). The discount rate, i, is highly sensitive to changes in the interest rate (r) which reflect the availability of money; and n, the financier's planning horizon, is highly sensitive to liquidity (l*) considerations.

V. Analysis

In the foregoing framework a link has been provided between the commodity market and the capital market and two separate but related functions are identified as being served by financial accounting and capital market valuations. Accounting information disseminated periodically reflects risk-return combinations of firms' financial products, which are priced in the capital market based upon the existing demand and supply conditions and liquidity conditions.

Interdependence of the Two Markets

In the two markets there are three participants (producers, financiers and consumers) - all of whom may not be involved in both markets (Diagram 2). The producer is confronted with two interdependent decisions: a production decision and a financing decision. In the capital market, the producer is on the demand side and the financier is on the supply side. In Diagram 2 market roles are identified; however, nothing prevents a consumer from being a financier or a producer, or any of the other related combinations.

The producer-financier relationship is motivated by the cost of capital consideration (the availability of capital); this condition is true even if the producer is also the financier. In the commodity market, the producer is on the supply side and the consumer is on the demand side. The consumer in great part determines what commodities will be produced. The financier is faced with selecting the preferred risk-return combination among financial assets. The consumer is faced with maximizing consumption (utility) given a budget constraint. Though all financiers are consumers, only some consumers are also financiers.

Axioms

The following four axioms are introduced for a money economy from which a theorem is derived. The emerging theorem (N = S - K) will be discussed later on.

(1) Producers incur the cost of (commit finance for) producing and distributing goods and services for the sake of profit. (Cost of producing and distributing includes the cost of financing the output up to the time of sale.)

(2) Profit is the gain from an undertaking. It is a function of uncertainty since it is conditioned by the ability to acquire (produce) goods and/or services at a total cost which is lower than the price anticipated to be derived from the subsequent delivery of the goods and/or services at some future point in time.

(3) Financiers supply money capital at a cost. This process gives rise to claims against the producers.

(4) The cost-of-capital is the cost for the use of money or credit, which is based solely on the length of time and the risk to which money or credit is made available.

Financing Production

Money in use (money committed to a plan) comes into existence because production, which is characterized as a process over time, has to be financed. If production was timeless (instantaneous), then production would not have to be financed; there would be only one market--the commodity market--and only one set of values--the measures (E_p and K) arrived at by financial accounting. However, production takes place over time, and to finance production the firm issues titles to claims (financial assets) against the firm which are traded in the capital market. The transfer of rights to future earnings and residual value from the firm's production plan is made possible by the capital market; accordingly, the liquidity of financial assets is ensured. Thus, the commodity market coordinates production; while the capital market coordinates finance.

Markets and Valuations: Coordinates and Momenta

It is postulated (Diagram 3) that S in the capital market and K in the commodity market constitute paired symbols, which are coordinates and momenta; each coordinate having a momentum paired with it. The coordinates and momenta emerge from the process of investment, which involves: (a) raising money-capital in the capital market by issuing financial instruments (the creation of financial assets); then (b) acquiring in the commodity market the necessary factors of production (real and strategic assets). Diagram 3 illustrates investments in a market economy as a manifold of four dimensions, which includes a time dimension (n - the financier's planning horizon). The investment consequences to the firm are captured by the financial accounting (product costing) model, which measures E_p and K as discrete values in one year time sequences. Essentially Diagram 3 is indicative of a field of attraction in economic space related to K, in which $S_\bullet$ represents all the points in the field.

Deducible from the diagram is a value function. Point events emerge representing the pricing process in the capital market (e.g., S_1,S_2). Line $S_\bullet$ epitomizes the market value model (financial product pricing). Equation (3) provides the model - the basis of the pricing mechanism - in which $S_t = g(K,E_p,i,n)_t$. However, in the capital market an operating proxy is used for equation (3): $S_t \approx \Sigma E_f(1+i)^{-n} + S^*_m(1+i)^{-n}$. By the definition given earlier, E_f for any value of n, when $0 < n < \infty$ will not be equal to E_p.

Production and its financing create a field of attraction in economic space analogous to a gravitational or magnetic field in physical space. This field consists of money in use (K) as the core, and current market value of title to claims (S) as the outer region of the field.[7] Once a production and distribution plan is started a particular stream of cash flows is set in motion, and this cash flow stream is always subject to valuation at the margin.

Periodic Measure vs Cumulative Valuation

As illustrated in Diagram 1, the capital market valuation is a cumulative valuation process, based upon the expectation of remaining future earnings, the risk adjusted discount rate for the same risk class, and the residual value of the investment. Since entrepreneurial undertaking is under conditions of uncertainty, it is rather rare that actual annual earnings will coincide with expected annual earnings. This condition is an inherent risk under conditions of uncertainty. However, with the issuance of the firm's annual financial report, the financier becomes knowledgeable of his/her model's prediction error.

While firms engage in continuous multi-project financing rather than discrete single-project financing, the several individual investment plans are viewed as a single investment package. Accordingly, financial assets are bought and sold at any point in time based upon the information available at the particular time pertaining to the firms' cash flows. Of necessity, the basis for measuring cash flows as they occur in stages is totally independent from the pricing of those cash flows. That is, ex post measurement is concerned with: how much is the current cash flow?[8] This question is independent of the question of ex ante pricing: How much is the future cash flows from the given money commitment worth given current and anticipated conditions?

At this juncture, the investment process is used to further reinforce what has been established above--the interdependence between the valuation of claims (S) and the measurement of estimated recoverable money commitments (K). Diagram 4 illustrates the investment process. The investment process is depicted in part as a money transfer function in which: (1) savers exchange money (M) in the capital market for the present value (S) of future cash flows, and (2) savings (money received - M) becomes money in use (K) in the commodity market.

As stated earlier, this analysis is limited to equity capital. The amount of money changing hands in this process is M, which is interchanged with S and then converted to K. $M = S$; $M = K$; hence, $S_t = K_t$. If $S_t = K_t$, then how is it that they do diverge in subsequent periods, in which case one of two conditions would obtain: (i) $S_{t+1} > K_{t+1}$, or (ii) $S_{t+1} < K_{t+1}$? The reason for this divergence is that immediately upon the transfer of M, uncertainty enters the picture and the psychology of the capital market takes over. The financier participates in the capital market to adjust his/her liquidity requirements. Exchanges in the secondary market occur to meet the liquidity needs of the financier.

Integration of Concepts and Emerging Theorem

In Diagram 3, a static instantaneous discounting process is represented by the points along S., where S. is a connection of an infinite number of point events because security price formation (S) is instantaneous and continuous. Savings (money) flow into the capital market in exchange for the present value (S_1,S_2, etc.) of financial assets. For example, S_1 is the assessed present value of a specific equity security at a particular point in time. Hence, all points, which form the line S., represent current market values (ΣE^* discounted at risk adjusted rate i for n periods). High liquidity requirements among financiers would depress the present values of future money flows in the secondary capital market. The reverse is true. The effect, of savers' desire for high liquidity, in the primary capital market would be the scarcity of the availability of money (capital), accompanied by a higher than usual cost for the then available money (capital).

Financial accounting valuation begins with the receipt and use of money by the firm. Line K. (the finance committed to a production plan). in Diagram 4 represents financial accounting valuation as an extemporaneous compounding process. A change in K occurs over time ($t \mid t=0,1,2,3.... \infty$). Each year when K is measured, E_p realized by the firm from its investment plan is measured. Capital market forces (i.e., interest rates and liquidity requirements) dictate returns on financial assets, whereas, the commodity market forces (and the capital market via cost of capital) dictate profits derived from real assets.

Diagram 5 illustrates the fact that the commodity market is affected by consumer demand, production technology, money-capital availability and the interest rate, and environmental uncertainty. To locate any point, in this field of attraction in economic space, a four coordinate system is used.

In Diagram 5, K, E_p, i, and n are four spatial directions and distances from the common origin. These variables are affected respectively by the production technology plane, the consumer taste and income level plane, the liquidity and financial capital intensity plane, and the level of uncertainty plane. These interactive forces produce the earlier-mentioned field of attraction in economic space, which is investment. This environmental setting leads to the determination of value within the field. Thus, in a money economy, the market price of an equity security cannot have meaning in the absence of money committed to a production plan. This condition holds since earnings

(E_p) and residual value (K), the critical items being valued, are derived from the money commitment to the production plan.

Value Determinacy

As argued earlier, K, E_p, i, and n in Diagram 4 constitute a manifold of four dimensions, and the line S. is a mapping function. As illustrated in Diagram 6, there is a unique point in line S. for a given set of values for K, E_p, i, and n. However, an infinite number of combinations of values for K, E_p, i, and n will produce S_1, S_2 or any point along S. Thus, $\Sigma n(K_1E_{p1})\alpha = \Sigma n'(K_1E_{p1})\alpha' = \Sigma n'(K_1E_{p1})\alpha' = \ldots$; where $\alpha = (1+i)^{-n}$. Evidently, heterogeneous expectations can and do produce price consensus (i.e., the same S_1 is arrived at for different values of K, E_p, i, and n given differing beliefs about the future). While, i and n (some factors which influence security prices) are investor specific, K and E_p, which are shaped by commodity market forces, are firm specific.

While there is no absolutely true E_p, there are comparable E_ps, and comparability is all that is necessary for proper security price formation. Despite the misuse of existing accounting methods which are incorrectly construed as alternatives, mandatory disclosure of significant accounting policies enables the financier to compare E_ps across firms. Since it is expected earnings (E^*), which is past experience as modified by future expectations that underlies current market value, then in the absence of K, S is indeterminate.

Interdependency of Valuations

Given investment as a field of attraction in economic space as analogous to a gravitational or magnetic field, when projections of market returns (E_f) are further away from the measurement of earnings from actual production (E_p), the field's intensity decreases as an exponential function of time (given the number of years in advance of the actual production). Invariably, the intensity of the field's attraction (the relationship between financial accounting value and current market value) will be reduced but it can never be terminated, even when E_f is significantly different from E_p and the time period (number of years) is very long. No matter how tenuous the link between market returns (E_f) and corporate profits (E_p) becomes in periods of capital market booms (highly speculative markets), they nevertheless are linked together.

What has been established is that S_j, the market price of firm j's equity security, is based upon: (1) specific K and E_p values, and (2) a multiplicity of i and n values. This latter condition is so, since i (a risky discount rate) as well as n (the planning horizon) are highly personalized due to heterogeneous beliefs about risk and time horizons among equity investors. Accordingly, a change in market price (ΔS) is determined by the change in the point of intersection of two intersecting planes: R^* - the rate of return duo-plane (K, E_p) in the commodity market, and d - the discount duo-plane (i, n) in the capital market. Line S. is the intersection of the two duo-planes; therefore, S. is the locus of all points in both planes. For any given moment in time the individual change in the price of a firm's security varies with ΔE_p; ΔS obeys the relation:

$$(5)\ \Delta S \quad = f(R^*)/d = \text{constant}$$

Also, for a given E_p, ΔS varies with the planning horizon (n), and the discount rate (i); accordingly, equation (6) holds:

$$(6)\ \Delta S \quad = f(d)/R^* = \text{constant}$$

Theorem and Proof

In this section, the intertemporal separability of capital market transfer-prices from the commodity market investment-base is developed fully. As stated earlier, the two markets are functionally connected by the producer (see Diagram 2) and, hence, are interdependent. This interdependence provides the rationale for the two valuations S and K in equation (1), since they relate not to one market but to two distinct markets. This condition leads not to one discounting process but to two discounting processes: (a) that of the financier (S) and (b) that of the producer (K).

Emergent Theorem

The emerging theorem (the net present value as defined by Turnovsky [1970]: N = S - K) can be inferred from Tobin's [1978, p. 423] position: the divergence of the discount rate [i], implicit in the market valuation of securities, from the marginal efficiency of capital (MEC) regulates investments by producers. This theorem links the valuation in the capital market with the valuation in the commodity market, and explains the difference between capital market value and committed finance.

When the firm uses the cost of capital approach for evaluating projects, the Net Present Value of the Investment (N) emerges. N serves as an initial screening device; only projects with positive Ns are considered. However, the firm's management uses its internal rate of return (R) as the discount rate to arrive at the money (K) it intends to commit to a production and distribution plan. The amount of money the financier (equity investor) transfers in exchange for a share of common equity is that financier's estimate of the present value of the future money flows from the security. The financier (equity investor) uses his/her risk adjusted discount rate (i) which provides for a return commensurate with the risk inherent in the firm. The financier's discounting process--pricing of the financial product - equation (3) as modified--is as follows:

$$(7)\ S_t = \sum_{n=1}^{k} (E_{fn})\alpha + S^{*}_{tn}\alpha$$

Financiers' planning horizon (n) underlying S_t are relatively small. In general, the equity financiers are looking for satisfactory returns (E_f) among competing alternatives and buying into a firm for a short period. This condition necessitates a terminal value/deposit ($S^{*}_{tn}\alpha$) on the part of the financiers; and in those situations where the firm is terminated $S^{*}_{tn}\alpha = K^{*}_{tn}$.

Firms are continually selling their plans in divisible shares in the capital markets at a value (S). As stated earlier, in the initial stage, $S_t = K_t$, when $t = 0$ and $i = R$. Also, in the long run, when the firm is terminated ($t = \infty$ and $R = i$), then $S_t = K_t$ Thus, in the two extreme situations $N = 0$. In the absence of these two situations, then $N =$ or > 0; and in a liquidity crisis period, N can be negative: $N < 0$. In the intervening periods, as long as $R > i$, $S > K$; in the reverse situation when $R < i$, then $S < K$. Also, the two differing views of earnings (E_f and E_p) provide the main reason why in periods of stock market booms S_t would be significantly larger than K_t. However, even when by chance $E_f = E_p$, the different discount rates (R versus i), which are used in the firm's and financier's models, would create a difference in valuation.

R (the firm's internal rate of return) is firm specific. It is different from i (the financier's rate of discount) because the financier's risk assessment is different from the firm's operating risk. The financier has to deal with the systematic risk inherent in the capital market. Thus, the financier uses r (interest rate) as the frame of reference to arrive at i to compensate for the level of risk associated with the market returns and the risk associated with the firm's operation. However, R includes r because r is an opportunity cost. If the firm is to maximize its profits, then R must be greater than r. The firm's (producer's) discounting process, in which case R > r, is as follows:

$$(8)\ K_t = \sum_{w=1}^{z} E_{pw}(1+R)^{-w}$$

Given that that K_t is the committed finance expected to be recovered in equation (8), it is clear that the difference between the two discounting processes would necessitate that $S_t \neq K_t$. As explained, E_f can be greater than, equal to, or less than E_p; therefore, the following properties (which are not exhaustive) hold in time periods $t > 0$ and $t < \infty$:

Property 1: $S>K$ for $(i,\ n)_f = (R,\ w)_p$, if $E_f>E_p$ for all E_f
Property 2: $S<K$ for $(i,\ n)_f = (R,\ w)_p$, if $E_f<E_p$ for all E_f
Property 3: $S>K$ for $(E,\ n)_f = (E,\ w)_p$, if $R>i$ for all R.
(When $i > R$ no investment will take place.)

In equations (7) and (8), for a firm with a short life span and no change in equity owners, where R and i would be equal, E_f and E_p would be identical; n and w also would be identical. However, in that case there is no trading of equity interest. In the absence of intertemporal trading of savings, while financial accounting valuation would persist, market value would have no significance. However, intertemporal trading of savings is a reality. Given an unlimited life of the firm, a firm's policy of retaining a portion of annual profit, and equity owner's search for better risk/return opportunities, the variables n and E_f *in equation (7) will differ from w and* E_p *in equation (8)* even though i and R may be equal. Due to differences in E_f and E_p ($E_f \neq E_p$), there will be a difference in the expected earnings. When E_f

$> E_p$, a prospective gain (δ)usually exists, where: $\delta = E_f - E_p$. Now, equation (7) can be restated as (9):

$$(9)\ S_t = (K_m)\alpha + \sum_{n=1}^{k} (E_{pn} + \delta_n)\alpha$$

Since price appreciation (a component of E_f) is affected by the liquidity requirements of financiers, then the discounted value of the prospective gain (δ) is the factor which the financier uses as the basis of comparison when alternative forms of savings with the same risks exist; naturally, the financier selects the alternative in the same risk class with the highest δ.

Evidently N, the difference between S_t (the sum of: a refundable deposit plus discounted future dividends plus equity security price appreciation) and K_π (the estimated recoverable cost from operations in the commodity market), which can be positive, negative or zero, would not exist in the absence of the two distinct markets. Accordingly, the origin and the relevance of financial accounting valuation as financial product costing and capital market valuation as financial product pricing are unequivocally established. As outlined, N is readily explainable as consisting of a monopoly power component (S - RC) based upon the earnings dichotomy (E_f vs E_p) and a valuation model earnings component (RC - K) based upon the rate of return/discount dichotomy (R vs i).

VI. Conclusion

Motivated by that implicit recognition of accounting information as a fundamental variable in stock price determination, this paper has explained how accounting information becomes part of the fundamental valuation approach employed in the capital market and offers a more comprehensive theory of the stock pricing mechanism. This research has provided: (1) a workable hypothesis of stock price determination amply supported by analysis, (2) a theoretical framework for understanding the issues raised by the empirical findings in the studies cited [Scott, 1985; Kormendi and Lipe, 1987; Campbell and Shiller,1988; Guo and Chang, 1993], and (3) support for the intuitively appealing propositions of Turnovsky [1970] and Arzac [1975].

In this paper, a strong theoretical link is established between financial accounting valuation and stock price determination. In this process, the interdependence of the commodity and capital markets was established via the properties of investment (a field of attraction in economic space analogous to a gravitational or magnetic field in physical space). The field approach enabled a mapping function. The derivation and proof of one theorem enabled a linking of the valuations (financial accounting and capital market) in the two markets and established the validity of the difference between the two valuations (S and K) as being appropriately termed net present value. The extent to which S and K will converge or diverge is dependent on the differences in: (1) expectations of accounting earnings (E_p) and market returns (E_r), and (2) the internal rate of return (R) and the market rate of discount (i). Future empirical tests should focus on the degree of convergence and divergence between S and K arising from those two factors.

The combination of the estimated recoverable amount of an invested sum of money in the business enterprise's productive assets and earnings of the business enterprise, which are measured in financial accounting, constitute a financial product having its origin in the commodity market. The empirical findings cited in this paper do support a strong relationship between accounting earnings and stock prices but solely based upon statistical goodness of fit. The explanation for this stalwart finding is due to the fact that the estimated recoverable cost is a sound measure of the residual cash commitment/residual value of committed finance, as long as proper accounting methods are used to measure the activities of the organization. Certain accounting methods (e.g., LIFO inventory valuation, bad debts estimates based on sales, and current value for marketable securities) merely introduce noise into the resulting accounting information and prevent the accounting measurement from being a proper measure of the estimated recoverable cost; those methods produce a distortion of the residual value of committed finance. The added drawback is that the data generated by those methods do not lend themselves to good forecasts.

Financial analysts have always appreciated appropriate disclosures and continue to show great concern for the quality of accounting measurements. Yet, it remains to be seen whether the accountants will make a more serious effort to ensure the quality of accounting measurements by selecting accounting methods which best depict the earnings process and residual value of committed finance. One can only hope that they will not continue to be indifferent in the selection of accounting methods.

ENDNOTES

1. There is quite an extensive body of research in support of the information content of financial accounting information (e.g., Ball and Brown [1968]; Beaver [1968]; Brown and Kennelly [1972]; Beaver, Clarke, and Wright [1979]; Patell and Wolfson [1979/1984]; Beaver, Lambert, and Ryan [1986]). Also, Ohlson [1992], in an elegant mathematical work, has related earnings and unexpected earnings to market returns.

2. For a discussion of this topic, see Salvary [1989, p. 52]

3. Lindenberg and Ross [1981] compare accounting data and market data to determine the extent, distribution, and history of monopoly rents in one sector (industrial) of the economy. Lindenberg and Ross [1981, p. 3] maintain that the excess of q over 1 is attributed to monopoly rents, and it is maintained that the "q value of the firm will provide an upper bound to its monopoly rents." While this line of reasoning is implicitly accepted, the focus in this paper is on an explanation of stock price which is conditioned by interperiod uncertainty on rates of return which produce interperiod variation of expectations by the suppliers of capital as implied by Thomadakis [1976, p. 161]. According to Thomadakis [1976, p. 161], "the random character of market rates of return will result from differentiated stochastic mechanisms whose relative weight will depend on the firm's monopoly power." The perceptions of monopoly rents on the part of the suppliers of finance affect the market returns which is accountable for the difference between S and RC - the firm's monopoly power.

4. In financial accounting, if $C > C^*$, then the estimated unrecoverable amount $(C - C^*)$, which is tantamount to the cost of an expired option, is written off so that only the estimated recoverable cost (C^*) remains as the investment base - money in use. While this loss $(C - C^*)$ can be insured, there is no benefit since the cost of the insurance would be essentially the amount of the loss. Concerning the recoverable cost as the measurement property observed in financial accounting measurement, see Salvary [1992; 1989; 1985].

5. E_p consists of two components [Salvary, 1992, p. 241]: (1) a current cash flow component (Ccf) (earnings realized in the form of cash - current cash returns) plus (2) a future cash flow component (Cff) (earnings realized in the form of credit - an accrual of estimated discounted future cash returns): $E_p = C_{cf} + C_{ff}$.

6. Since n and i are investor specific, this valuation model can only provide insights on either the average planning horizon or the average discount rate for a particular stock. Given assumptions about the average discount rate, the average planning horizon is determinable and vice versa.

7. For an analogy with physics whereby the recoverable cost (money committed to the production plan) is viewed as the nucleus and other valuations as electrons, see Salvary [1989, pp. 50-52].

8. A proxy for cash flow is the accounting measure of profit plus depreciation as reported in the income statement.

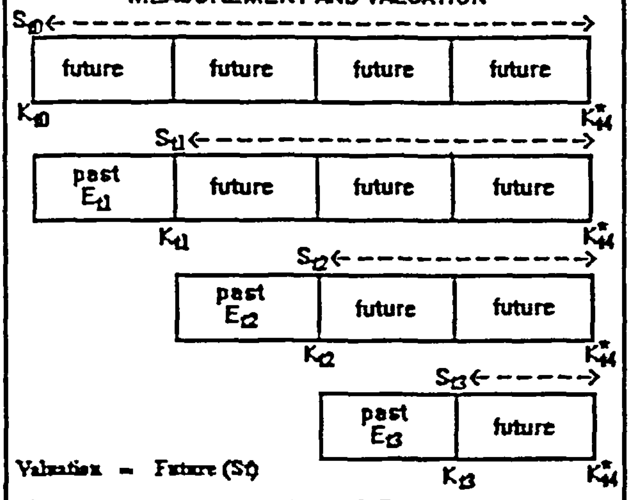


DIAGRAM 1
MEASUREMENT AND VALUATION

Valuation = Future (St)

Measurement = Current (Kt) and Past (Et)

DIAGRAM 2
Interdependency of the Two Markets

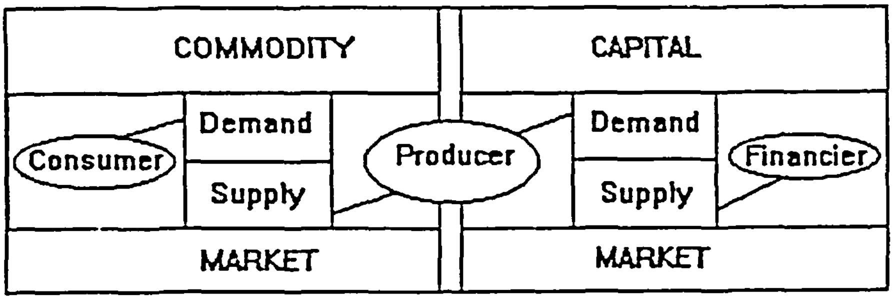


DIAGRAM 3
Markets and Valuation: Coordinates and Momenta

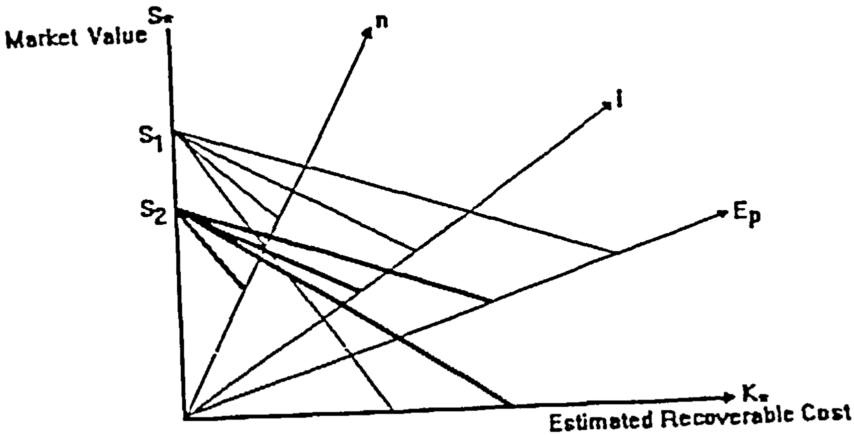


DIAGRAM 4
Money Transfer Function

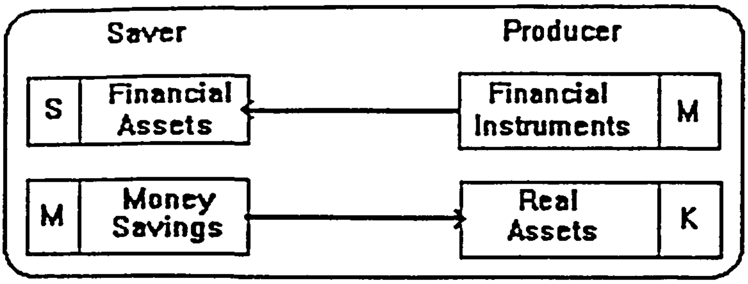


DIAGRAM 5
Investment Field: A Four Coordinate System

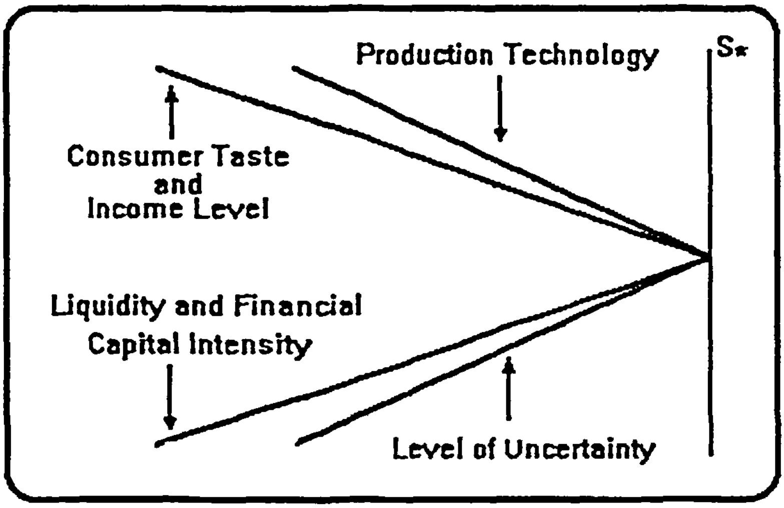
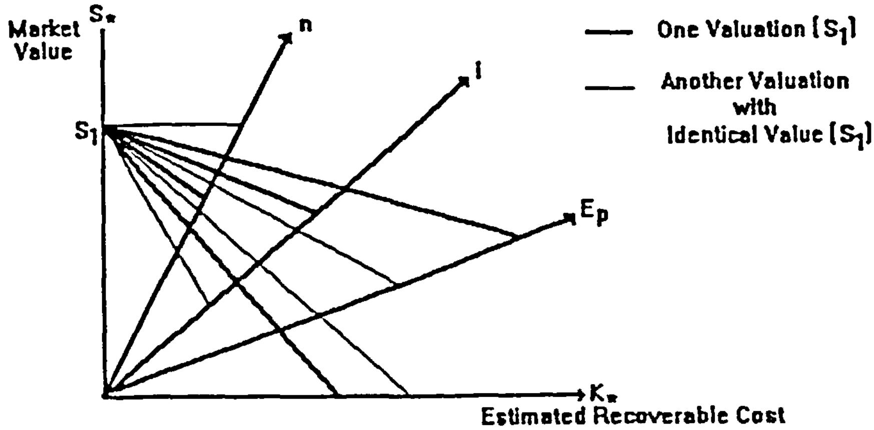


DIAGRAM 6
Value: Combinatory Possibilities



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Brand Values and Capital Market Valuation

MARY E. BARTH
Graduate School of Business, Stanford University

MICHAEL B. CLEMENT
College of Business Administration, University of Texas at Austin

GEORGE FOSTER
Graduate School of Business, Stanford University

RON KASZNIK
Graduate School of Business, Stanford University

Abstract. Brand value estimates are significantly positively related to prices and returns, incremental to accounting variables. Questionable brand value estimate reliability underlies lack of financial statement recognition for brands. Findings suggest estimates are relevant and sufficiently reliable to be reflected in share prices. Simultaneous equations estimation reveals inferences are unaffected by potential bias resulting from simultaneity between brand value estimates and equity market value. Brand value estimates are positively associated with advertising expense, operating margin, and market share. Yet, brand value estimates provide significant explanatory power for prices incremental to these variables, and to recognized brand assets and analysts earnings forecasts.

There is growing recognition that intangible assets are important determinants of firm value. Examples of intangible assets include brands, technology, customer loyalty, and the human capital and commitment of employees. U.S. Generally Accepted Accounting Principles (GAAP) do not consistently recognize such intangible assets as accounting assets. A major reason for not according these assets financial statement recognition is concern about whether their values are reliably estimable. This study tests hypotheses relating to whether brand values estimated and published by a well-respected financial magazine reflect valuation relevant information and are sufficiently reliable and timely to be reflected in share prices and returns.

In 1992, *FinancialWorld* (FW) began publishing an annual survey of brand values estimated using a methodology developed by an established brand valuation consulting firm, Interbrand, Ltd., and described in the Appendix. The inaugural survey published in 1992 reported fiscal year 1991 values for 42 brands. By 1997, the survey included over 330 brands, owned by firms in a variety of industries. The estimated values indicate that brands are large assets of many sample firms; the estimates represent approximately forty percent of market value of equity and recognized assets for the median sample firm.

This paper examines the association between FW's brand value estimates and equity share prices of firms owning the brands. We test the joint hypothesis that brand values are relevant to equity valuation of firms owning brands and FW's brand value estimates are sufficiently reliable to be associated with share prices and returns. To test this hypothesis, we estimate the association between the brand value estimates and share prices, controlling for equity book value and net income, and the association between year-to-year changes in brand value estimates and annual share returns, controlling for net income and changes in net income. Our sample extends from 1991 to 1996. We find consistent evidence that the brand value estimates are significantly associated with equity market values in both specifications, providing evidence in support of our hypothesis.

Estimates from a system of simultaneous equations provide evidence that our primary findings are not attributable to estimates of brand values being based on share prices. This analysis also reveals that, as predicted, the brand value estimates are significantly positively associated with advertising expense, brand operating margin, and brand market share. However, contrary to predictions, the estimates are not significantly positively related to sales growth. Additional analyses reveal that brand value estimates provide significant explanatory power for share prices incremental to advertising expense, operating margin, growth, and market share. Brand value estimates also are significantly positively related to share prices after controlling for recognized brand assets and analysts' earnings forecasts. Several sensitivity checks indicate that our findings are robust.

Taken together, our findings indicate that the FW brand value estimates capture information that is relevant to investors and are sufficiently reliable to be reflected in share prices and returns.[1] Because our priors are that brand values are relevant to equity investors, these findings call into question concerns of those who believe that brand value estimates are too unreliable to be the basis for recognition as an intangible accounting asset.

The remainder of the paper proceeds as follows. Section 1 discusses institutional background relating to brand values and related research. Section 2 describes the data and presents descriptive statistics. Section 3 outlines our research design and Section 4 presents our empirical findings. Section 5 offers some additional analyses and Section 6 summarizes and concludes the study.

1. Institutional Background and Related Research

1.1. Institutional Background

Although definitions of brands differ (see, e.g., Aaker, 1991, 1996, and Keller, 1997), the underlying notion is that of a distinctive name with which the consumer has a high level of awareness and a willingness to pay either higher than otherwise average prices or make higher than otherwise purchase frequency. Keller (1997) lists the following benefits of a brand name: greater loyalty from customers, less vulnerability to competitive marketing actions, less vulnerability to marketing crises, larger margins, more inelastic consumer response to price increases, more elastic consumer response to price decreases, greater trade cooperation and support, increased marketing communication effectiveness, possible licensing opportunities, and additional brand extension opportunities. The net effect of these benefits is that a branded product potentially provides a firm with a higher level of operating earnings over time than does an otherwise unbranded product. However, although cost incurred is a potential measurement alternative for brands, not all expenditures made in promoting a brand result in increases in brand value. For example, an expensive advertising program that misfires may, at best, have a minimal effect on sales and, at worst, turn away existing or potential customers. It is an empirical issue whether the potential benefits listed above are realized for a given brand, thereby translating into increased firm value.[2]

U.S. GAAP for brands has at least three features that are the subject of debate. First, recognition of brands is inconsistent across firms. Internally developed brands are not recognized as assets whereas acquired brands, e.g., through a purchase business combination, typically are recognized and amortized against net income over the brand's estimated useful life, which cannot exceed forty years. Second, even though brand values can change markedly from period to period, changes in brand values largely are unaccounted for, even for brands recognized as assets. Although U.S. GAAP requires write-downs for impaired recognized brand assets, U.S. GAAP does not permit recognition of increases in brand values. Third, expenditures that increase brand values, such as advertising, are expensed in the period incurred rather than capitalized. This can result in firms that invest in brand name development reporting depressed earnings while brand values are increasing.[3]

U.S. GAAP requires disclosure, and the Financial Accounting Standards Board (FASB) is considering requiring recognition, of fair values of all financial instruments. Although currently there is no U.S. proposal to disclose or recognize non-financial assets at fair value, fair values of all assets likely are relevant to financial statement users. One reason the FASB distinguishes financial and non-financial assets is the belief that values are not reliably estimable for non-financial assets, especially intangible assets such as brands. However, GAAP in countries other than the U.S., e.g., Australia, permits recognition of the value of internally developed intangible assets, such as those associated with brand names (see, e.g., Barth and Clinch, 1998).

1.2. Related Research

The marketing and management literatures include several empirical studies linking brand attributes and security prices and/or returns. Simon and Sullivan (1993) outline a technique for estimating a firm's brand equity, based on firms' market value. In their technique, the replacement cost of tangible assets is first subtracted from the firm's market capitalization to estimate the value of intangible assets. Second, this value of intangible assets is apportioned into a brand value component, a non-brand value component, e.g., research and development and patents, and an industry component, e.g., regulation. Simon and Sullivan use their intuition to validate Wall Street's cognizance of marketing factors. They find, as one might expect, that industries and firms with commonly known brand names have high estimates of brand equity.

Aaker and Jacobson (1994) examine associations between measures of brand quality and security returns, using the EquiTrend measure of brand quality. The EquiTrend brand quality measure is based on a study by Total Research Corporation, which surveyed a nationally representative sample of consumers from 1991 to 1993 to evaluate the quality of 100 major brands. Aaker and Jacobson examine whether returns in the twelve months preceding each annual survey reflect the unexpected change from one survey to the next in the brand's quality measure. They find that the relation between brand quality and returns is positive, as predicted, and statistically significant.

Related studies in the accounting literature, e.g., Abdel-khalik (1975), and Hirschey and Weygandt (1985), investigate whether advertising expenses are value-relevant, which one would expect if advertising expense is a proxy for the development of valuable brand names. These studies find evidence consistent with this conjecture. However, Bublitz and Ettredge (1989) conclude that benefits from advertising expenditures are short-lived, consistent with recognizing them as current-period expenses. More recently, Barth and Clinch (1998) provide evidence that recognized revalued intangible assets of Australian firms, a substantial proportion of which relate to brand names, are value-relevant. Some studies also investigate firms' and analysts' actions associated with non-recognition of intangible assets, such as brand names. In particular, Barth and Kasznik (1998) find that firms' decisions to repurchase shares on the open market and the market's reaction to the repurchase announcement are significantly positively related to proxies for unrecognized intangibles, including brand names. Also, Barth, Kasznik, and McNichols (1998) find that unrecognized intangible assets, including brand names, are significantly positively related to analyst coverage and the effort analysts expend to cover firms.

2. Data and Descriptive Statistics

We obtain estimated brand values from FW's 1992 to 1997 annual surveys of brands that relate to brand values for fiscal years from 1991 to 1996 (*FinancialWorld*, 1992–1997). FW reports value estimates, sales, and operating margins for individual brands, by industry. It also reports the percentage change in the brand value estimate from the previous year. The Appendix describes the methodology FW uses to estimate brand values, which is designed to estimate the increased firm value associated with the firm's brand names. Our sample comprises 1,204 brands with value estimates reported by FW during the sample period. To obtain estimated brand value for a particular firm-year observation, we sum the estimated values of the brands owned by a particular firm and reported by FW in that year.[4] This results in 595 sample firm-year observations, relating to 183 publicly traded U.S. firms.[5] We obtain data for other variables from the 1996 Full Coverage Compustat and CRSP databases.

Table 1 presents selected descriptive statistics relating to brand value estimates. Panel A presents statistics relating to the temporal distribution of sample firms and brand names and reveals that, over the sample period, FW expanded coverage of brands and firms. The 1991 sample includes 37 brands owned by 26 firms, whereas the 1996 sample includes 299 brands owned by 152 firms. Panel B presents statistics relating to the number of FW reported brands owned by each sample firm and reveals that in each sample year, the median (mean) firm has approximately one (two) brand(s). However, the number of brands owned by a particular firm ranges up to 17 in 1995. Panel C of Table 1 presents descriptive statistics relating to values of individual brands. It shows that, over the sample period, the mean (median) brand values ranges from \$1,538 (\$541) million in 1993 to \$4,098 (\$1,454) million in 1991. The large brand values in 1991 are primarily attributable to the inaugural survey focusing on major brand names, e.g., Marlboro, Coca-Cola, Budweiser, and Pepsi-Cola.

Figure 1, Panel A, graphs the distribution of one-year changes in estimated brand values for the 1,083 brands of 520 firms for which we have brand value estimates in two consecutive years.[6] It indicates that brand values in our sample have, for the most part, increased over

Table 1. Summary of 1,204 brand value estimates, for 595 firm-year observations from 1991–1996 surveys, reported in *FinancialWorld* (1992–1997).

Panel A: Number of sample firms and brand names

	Firms	Brand Names	
Year	Number	Number	% of Total
1991	26	37	3
1992	58	95	8
1993	108	240	20
1994	106	229	19
1995	145	304	25
1996	152	299	25
Total	595	1,204	100

Panel B: Number of brands per firm

Year	Firms	Mean	Median	Std Dev.	Min	Max
1991	26	1.4	1.0	0.9	1.0	4.0
1992	58	1.6	1.0	1.2	1.0	5.0
1993	108	2.2	1.0	2.5	1.0	12.0
1994	106	2.1	1.0	2.4	1.0	12.0
1995	145	2.1	1.0	2.7	1.0	17.0
1996	152	2.0	1.0	2.3	1.0	14.0
Pooled	595	2.0	1.0	2.3	1.0	17.0

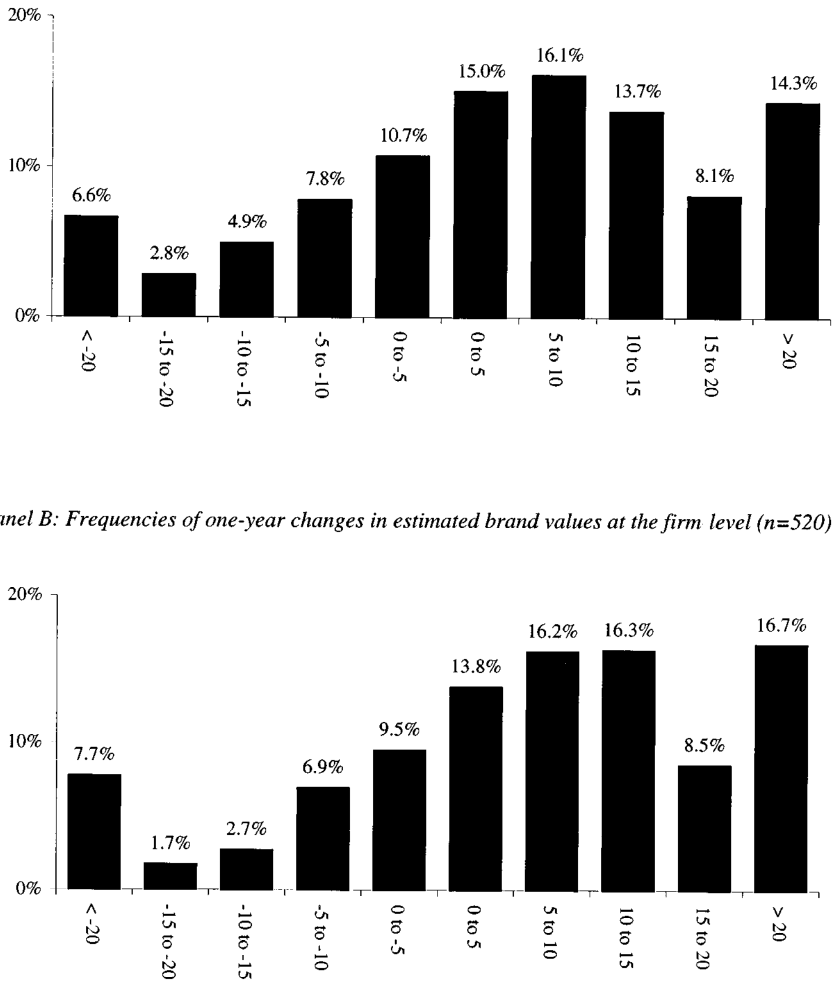
Panel C: Brand values (in $ million)

Year	Number	Mean	Median	Std Dev.	Q1	Q2
1991	37	4,098	1,454	6.524	582	3,732
1992	95	2,696	1,058	5,644	436	2,378
1993	240	1,538	541	3,612	185	1,434
1994	229	2,091	739	4,416	256	1,900
1995	304	1,900	633	4,388	222	1,651
1996	299	2,267	880	4,898	328	1,994
Pooled	1,204	2,085	745	4,591	256	1,879

time, although many have decreased. Figure 1, Panel B, shows that the one-year change in estimated brand values at the firm-level also varies considerably. Untabulated statistics indicate that the mean (median) year-to-year changes in brand values at the brand- and firm-levels are 6.7% (6.0%) and 8.3% (7.0%), respectively. They also indicate that 67.2% and 71.5% year-to-year changes in brand values at the brand- and firm-level are increases, 30.2% and 28.1% are decreases, and only 2.6% and 0.4% are unchanged.

Figure 2 presents multi-year changes in estimated brand values for the 1993 to 1996 period, over which FW brand value estimates are available for a substantial number of brands. We base the figure on brands for which FW reports estimated values each year in

Panel A: Frequencies of one-year changes in estimated values at the brand level (n=1,083)



Panel B: Frequencies of one-year changes in estimated brand values at the firm level (n=520)

Figure 1. Frequencies of one-year percentage changes in estimated individual and firm brand values. Based on one-year changes in estimated brand values at the brand and firm levels, from 1992–1996.

this period, enabling us to calculate a sequence of three successive brand value changes.[7] Figure 2, Panel A, first partitions the 1993 to 1994 estimated brand value changes into those that are positive and those that are negative or zero. For each of these partitions, we repeat the sign-partitioning for 1994 to 1995 estimated value changes, and repeat the entire process for 1995 to 1996 changes. This results in eight portfolios representing different combinations of the sign of successive annual estimated brand value changes. For each

Panel A: Brand-level analysis ($n = 184$)

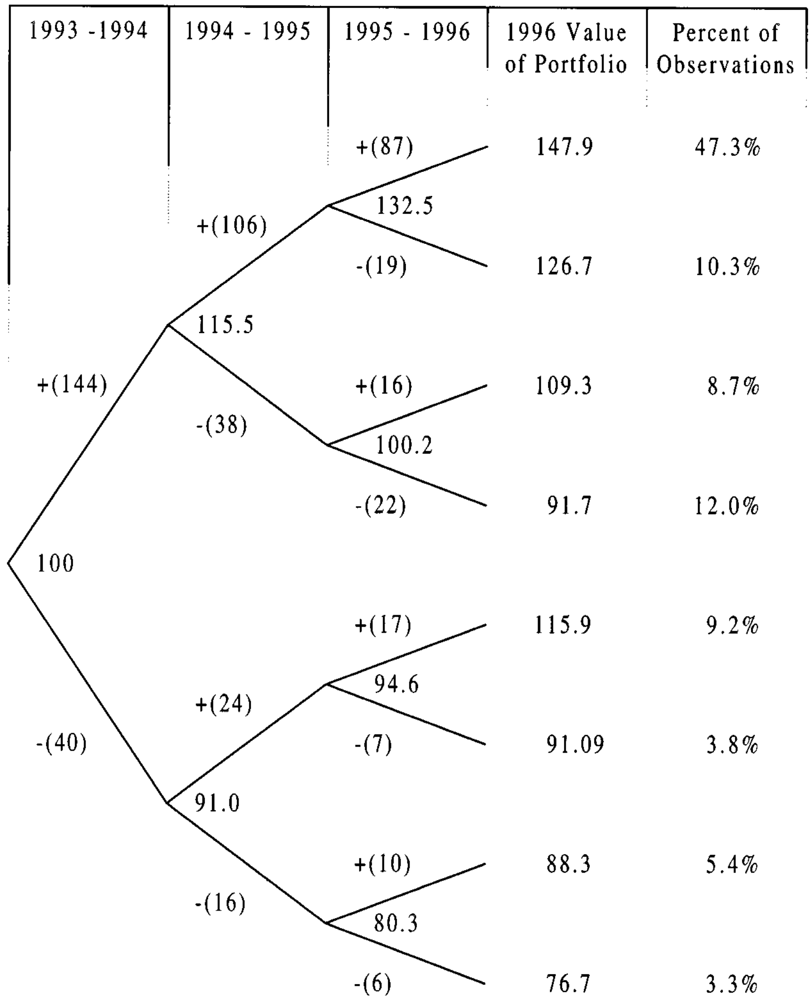


Figure 2. Sequence of changes in estimated individual and firm brand values over the period 1993–1996 (values are normalized by setting 1993 brand value estimates to 100). Based on brands with value estimates for each of the years 1993–1996.

portfolio, we set the 1993 estimated brand value equal to 100 and then compute the mean estimated brand value of each portfolio in 1996 relative to the normalized 1993 value. Thus, brands that increase in value after 1993 have calculated amounts greater than 100. Panel B presents analogous statistics for year-to-year changes at the firm level.

Consistent with Figure 1, Figure 2, Panel A, reveals a substantial proportion of brands with three consecutive years of increased value, 47.3% of the sample brands. These brands

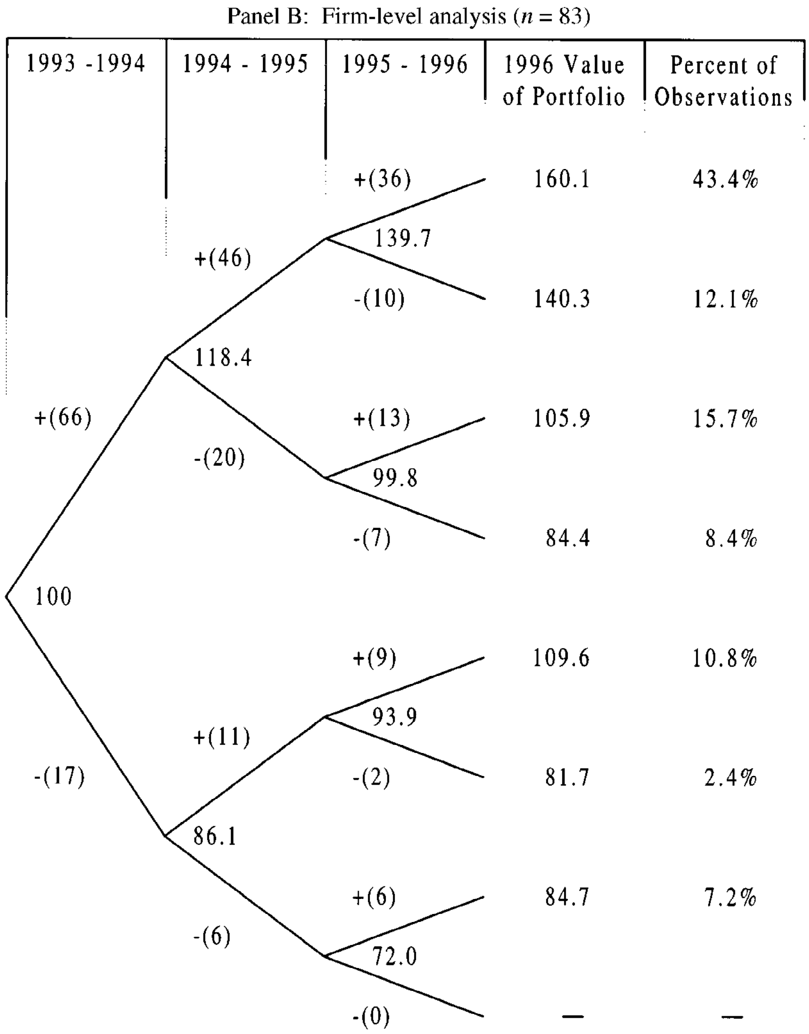


Figure 2. Continued.

have a 1996 mean normalized value of 147.9, which means that, on average, these brands increased in value 47.9% over the 1993 to 1996 period. The 3.3% of sample brands with a sequence of three negative changes in brand value have a 1996 mean normalized value of 76.7%, which means that, on average, these brands decreased in value 23.3%. Panel B reveals a similar pattern for firm-level brand value estimates, although there are no firms with three consecutive years of total brand value decreases.

Figures 1 and 2 highlight several features of estimated brand values that are pertinent to existing financial reporting rules. First, a policy of assuming brand values do not increase

Table 2. Descriptive statistics for 595 firm-year observations for 183 firms, from 1991–1996 surveys, with brand value estimates reported in *FinancialWorld* (1992–1997).

Panel A: Industry classification of the 183 sample firms

Industry	Frequency in Sample		Frequency in Compustat	Ratio of (1) to (2)
	No.	% (1)	% (2)	
Mining, Oil and Gas, Construction	3	1.6	6.4	0.25
Food, Tobacco	42	22.9	2.1	10.90
Textile, Apparel	5	2.7	1.4	1.93
Lumber, Furniture, Paper, Printing	5	2.7	3.3	0.82
Chemicals and Allied Products	30	16.4	6.4	2.56
Rubber, Plastics, Leather, Glass	14	7.7	2.1	3.67
Metal Industries	2	1.1	2.8	0.39
Machinery	13	7.1	6.2	1.15
Electrical Equipment	14	7.7	6.5	1.18
Miscellaneous Manufacturing	15	8.2	8.4	0.98
Transportation	8	4.4	2.3	1.91
Communications	8	4.4	3.2	1.38
Utilities	0	0.0	3.4	0.00
Durable goods wholesale	0	0.0	4.1	0.00
Retail trade	4	2.2	6.2	0.35
Financial services	3	1.6	19.0	0.08
Software	11	6.0	7.3	0.82
Real Estate	0	0.0	1.1	0.00
Others	6	3.3	7.8	0.42
Total	183	100.0	100.0	

over time, absent a change in brand ownership, is inconsistent with the evidence; the average one-year sample brand value increase is more than 6%. Second, there is considerable variation in the sign and magnitude of brand value changes over time. This variation is not surprising given the diverse factors that can affect brand values, including factors beyond the control of the firm owning the brand, such as actions by competitors.[8]

Table 2 presents descriptive statistics relating to sample firms, for firm-year observations with available data. The industry statistics in Panel A are based on two-digit SIC codes. The last column in the panel reports the ratio of sample firms' industry membership percentage to the Compustat population percentage. A ratio greater than 1.00 means that the industry has greater than average representation in this study. Panel A reveals that the sample includes more food and tobacco, chemicals and allied products, and rubber, plastic, leather, and glass firms than one would expect based on the Compustat population. The industry group with a markedly lower representation in our sample relative to the Compustat population is financial services, 1.6% in the sample versus 19% in Compustat.

The size and performance measure statistics in Panel B reveal that sample firms are relatively large; the mean (median) market value of equity, MV, is \$13,673 (\$6,777) million. The book value of equity, BV, for these firms is substantially lower, with mean (median) value of \$3,682 (\$1,700) million. The sample firms' mean (median) market-to-book ratio

Table 2. Continued.

Panel B: Size and performance measures for sample firm-years

Variable	No.	Mean	Median	Std dev.
MV	515	13,673	6,777	19,581
BV	536	3,682	1,700	4,936
M/B	504	4.75	3.38	4.91
ASSETS	537	12,789	5,050	26,340
SALES	536	10,631	5,897	14,930
NI	536	697	310	1,143
MARGIN	536	4,331	2,507	5,645
ADV	536	344	120	572
SALES_GRWTH	530	10%	8%	12%
NI/AVG_MV	497	5%	6%	6%
NI/AVG_ASSETS	531	8%	7%	9%
NI/AVG_BV	511	22%	20%	22%
RETURN	506	1%	−2%	31%

MV is market value of equity at fiscal year end.
BV is book value of equity at fiscal year end.
M/B is market-to-book ratio, for firms with positive book value of equity.
ASSETS is total assets at fiscal year end.
SALES is total sales.
NI is income from continuing operations.
MARGIN is sales minus cost-of-goods-sold.
ADV is advertising expense.
SALES_GRWTH is sales growth, measured as $(\text{sales}_{t-1}/\text{sales}_{t-(1+i)})^{1/i}$, where $3 \leq i \leq 5$.
AVG_MV, *AVG_ASSETS*, and *AVG_MV* reflect the average of beginning and ending balances.
RETURN is year t stock return, measured from three months after end of year $t-1$ to three months after the end of year t, minus the CRSP value-weighted return.
For purposes of this table, all variables are expressed in $ million, except for variables expressed in percentage form. As regression variables, they are deflated by number of shares outstanding.

is 4.75 (3.38), which compares with an untabulated mean (median) of 3.18 (1.83) for all Compustat firms. These statistics are consistent with the notion that, on average, sample firms have substantial unrecognized net assets, presumably such as brand names. Untabulated statistics reveal that adjusting book value of equity by adding the brand value estimates results in mean and median market-to-book ratios that are closer to, but still greater than, unity; i.e., 1.91 and 1.43, respectively.

Table 2 also reveals that sample firms are, on average, profitable, with mean (median) net operating income, *NI*, of $697 ($310) million, or 5% (6%) of mean market value of equity. The ratio of net income to book value of equity is substantially higher, with mean (median) ratio of 22% (20%). The table also indicates that the sample firms, on average, have 10% annual sales growth. Untabulated tests reveal that the 1% (−2%) mean (median) annual market-adjusted return for sample firms is not significantly different from zero.

Table 3 presents summary statistics associated with sample firms' brand values (Panel A)

Table 3. Estimated values of brand names, for 595 firm-year observations from 1991–1996 surveys, reported in *FinancialWorld* (1992–1997).

Panel A: Firms' brand value estimates

Variable	No.	Mean	Median	Std dev.
BRANDS	595	4,220	1,748	7,855
BRANDS/MV	515	44%	37%	43%
BRANDS/ASSETS	537	70%	42%	85%
BRANDS/BV	520	209%	105%	335%

Panel B: One-year changes in firms' brand value estimates

Variable	No.	Mean	Median	Std dev.
Δ*BRANDS*	520	278	68	1,587
Δ*BRANDS/AVG_MV*	439	1%	2%	13%
Δ*BRANDS/AVG_ASSETS*	462	4%	2%	18%
Δ*BRANDS/AVG_BV*	450	11%	5%	41%

BRANDS is the firm's total estimated value of brand names.
ASSETS is total assets at fiscal year end.
MV is market value of equity at fiscal year end.
BV is book value of equity at fiscal year end.
Δ*BRANDS* is the one-year change in the firm's total estimated value of brand names.
AVG_MV, *AVG_ASSETS*, and *AVG_MV* reflect the average of beginning and ending balances.
BRANDS and Δ*BRANDS* are expressed in $ million.

and annual changes in these values (Panel B). The statistics reveal that the mean (median) firm-year has brand values estimated at $4,220 ($1,748) million, and that these unrecognized assets represent a significant portion of sample firms' recognized assets. For example, the mean (median) ratio of estimated brand values to market value of equity is 44% (37%). Moreover, the mean (median) ratio of estimated brand values to recognized assets is 70% (42%), and the mean (median) ratio of estimated brand values to book value of equity is 209% (105%). Thus, including estimated brand values on the balance sheet could have a significant effect on reported financial statement amounts.[9] Consistent with Figures 1 and 2, the statistics in Panel B suggest that the average one-year change in sample firms' brand value is positive. Specifically, the mean (median) one-year change in brand values is $278 ($68) million, which represents 1% (2%) of market value of equity and 11% (5%) of book value of equity.

3. Research Design

Our objective is to assess whether FW's brand value estimates are associated with share prices and returns. Finding that they do is evidence that brand names are relevant for equity valuation of firms owning brand names and that FW's brand value estimates are sufficiently reliable to be reflected in share prices.[10] Because our priors are that brand values are relevant to investors, we interpret failure to detect a significant relation as evidence that error in estimating brand values is substantial. Thus, we interpret a significant relation as evidence that brand value estimates are sufficiently reliable to be reflected in share prices. We test our predictions using two specifications, one relating brand values to share prices, and one relating one-year changes in brand values to annual share returns.

3.1. *Brand Values and Share Prices*

The first set of tests examines the association between market value of equity and brand value estimates. Specifically, we estimate the following cross-sectional regression:

$$MV_{it} = \sum_{Y=91}^{96} \alpha_{0Y} YR_{Yit} + \alpha_1 BV_{it} + \alpha_2 NI_{it} + \alpha_3 BRANDS_{it} + \varepsilon_{1it} \tag{1}$$

where MV is share price at fiscal year end; BV is book value of equity per share; NI is earnings per share from continuing operations; $BRANDS$ is the total of the firm's FW brand value estimates per share, i.e., the sum of the individual brand value estimates, deflated by number of shares outstanding; and YR_Y is an indicator variable that equals one if the observation is from fiscal year Y, and zero otherwise.[11] i and t denote firms and years, respectively. We permit the regression intercept to vary across years to control for mean calendar time-specific effects. We also estimate equation (1), excluding YR_Y, separately for each year, thereby effectively permitting all coefficients to vary across years.

One can interpret equation (1) using the Ohlson (1995) valuation model. For example, one can interpret $BRANDS$ as an "other information" variable in Ohlson's model. Thus, observing $\alpha_3 > 0$ is evidence that estimated brand values capture valuation-relevant information not reflected in BV or NI. Alternatively, focusing on the possibility of recognizing brand values on the balance sheet, one could interpret $(BV + BRANDS)$ as an "as if" book value of equity. This interpretation suggests testing whether α_1 and α_3 are equal.[12] Equation (1) also can be viewed as deriving from an asset-based valuation equation, where earnings is included as a proxy for unrecognized net assets (Barth and Landsman, 1995). All interpretations of the equation lead to predicting a positive α_3. Based on prior research, we also predict the coefficients on book value of equity per share and earnings per share, α_1 and α_2, to be positive.

3.2. *Brand Value Changes and Returns*

One also can examine value-relevance of estimated brand values by investigating the association between annual changes in brand values and contemporaneous annual share returns. Another motivation for estimating a returns specification is to investigate the timeliness of changes in brand value estimates, where timely means that the change in *BRANDS* from one year to the next reflects changes in the value of the firm's brands during that year. If FW's brand value estimates capture valuation relevant information, but are not timely, we can observe a significant relation in the price specification, but not in the returns specification. Thus, observing a significant relation in both specifications is evidence that brand value estimates are timely. Estimating a returns specification also permits us to investigate effects on our inferences of potential specification problems, such as omitted variables. If the omitted variables and coefficients are constant (change) over time, then the price (returns) regression can be misspecified (Landsman and Magliolo, 1988).

The following cross-sectional estimation equation specifies our returns regression:

$$RETURN_{it} = \sum_{Y=92}^{96} \beta_{0Y} YR_{Yit} + \beta_1 NI_{it} + \beta_2 \Delta NI_{it} + \beta_3 \Delta BRANDS_{it} + \varepsilon_{2it} \quad (2)$$

where $RETURN_{it}$ is the firm i's year t share return, measured from three months after year end for $t-1$ to three months after year end for year t. ΔNI_t is NI_t minus NI_{t-1}, and $\Delta BRANDS_t$ is $BRANDS_t$ minus $BRANDS_{t-1}$. Because the number of brands covered by FW increases over time, for purposes of estimating equation (2), we measure $BRANDS_{t-1}$ by applying FW's reported value change percentage to $BRANDS_t$.[13] Other variables are as previously defined and all independent variables, except *YR*, are deflated by market value of equity at the beginning of year t. As with equation (1), we also estimate equation (2) separately for each year.

Assuming FW's brand value estimates provide at least some timely value-relevant information, we predict a positive association between annual changes in brand value estimates and contemporaneous returns, incremental to income and changes in income. Thus, we predict β_3 to be positive. Following Easton and Harris (1991), among others, we include in equation (2) *NI* and ΔNI and predict their coefficients, β_1 and β_2, to be positive.

3.3. Simultaneous Equations Estimation

Our hypothesis is that market value of equity reflects firms' brand values. Thus, we view brand values as "causing" observed share prices, incremental to other value-relevant variables, such as book value of equity and net operating income. However, our estimation equations use a proxy for brand values, rather than the "true" value of brand names. It is possible that FW bases its brand value estimates, at least in part, on observed share prices. That is, it is possible that brand value estimates and share prices are jointly endogenously determined. This possibility raises concerns about whether any relation we document using equations (1) and (2) is attributable to simultaneity bias.

To address this issue, we discussed with FW personnel the process that they use to estimate brand values. They emphasized that their focus is on the brand strength and profitability factors which comprise the Interbrand brand valuation model, as described in the Appendix, and that the valuation process does not involve consideration of the market value of equity of the brand-owner firms.

However, to ensure that our inferences are unaffected by possible simultaneity bias, we also test our hypothesis about value-relevance of the FW brand value estimates using the following system of simultaneously estimated equations. The first is equation (1), which specifies market value of equity as a function of brand values and the second, equation (3), specifies brand values as a function of market value of equity.

$$MV_{it} = \sum_{Y=91}^{96} \alpha_{0Y} YR_{Yit} + \alpha_1 BV_{it} + \alpha_2 NI_{it} + \alpha_3 BRANDS_{it} + \varepsilon_{1it} \tag{1}$$

$$BRANDS_{it} = \sum_{Y=91}^{96} \delta_{0Y} YR_{Yit} + \boldsymbol{\delta_1 \mathrm{FACTORS}_{it}} + \delta_2 MV_{it} + \varepsilon_{3it} \tag{3}$$

where **FACTORS** is a vector of exogenous variables that reflect factors likely considered by FW in estimating brand values. These variables serve to identify equation (3) and thus, ideally, are significantly associated with brand values, but not significantly associated with the error in its estimation. In our implementation, **FACTORS** comprises advertising expense, *ADV*, brand operating margin as reported by FW, *BR_MARGIN*, firm sales growth, *SALES_GRWTH*, and brand market share, *MKT_SHARE*. *SALES_GRWTH* is measured as $(\text{sales}_{t-1}/\text{sales}_{t-(1+i)})^{1/i}$, where $3 \leq i \leq 5$ and sales are obtained from Compustat. *MKT_SHARE* is measured as the weighted average of the firm's sales from brands in a given industry divided by sales of all brand sales in that industry, as reported by FW, with weights equal to the firm's sales relating to brands in a particular industry compared with total firm sales from brands.[14] *ADV* and *BR_MARGIN* are deflated by number of shares outstanding.[15]

To estimate the system of equations, we use two-stage least squares (2SLS). In the first stage, we regress *BRANDS* on all of the exogenous variables in equations (1) and (3), i.e., *BV*, *NI*, *ADV*, *BR_MARGIN*, *SALES_GRWTH*, and *MKT_SHARE*. In the second stage, we estimate equation (1) using the fitted value of *BRANDS* from the first stage, *BRANDS_PRD*, in place of *BRANDS*. By construction, the fitted value does not reflect the association between the estimation error in *BRANDS*, relative to brand value, and market value of equity and, thus, using ordinary least squares in the second stage yields a consistent estimator of α_3. We perform the analogous estimation procedure for equation (3). As explained in Section 4.2, we also estimate a simultaneous estimation equation system for the relation between changes in brand values and returns.

4. Findings

4.1. Value-Relevance of Brand Value Estimates

Table 4 presents summary statistics from estimating equation (1), which provide evidence that brand value estimates are value-relevant. Findings from the fixed-effects pooled regression in the first set of columns indicate that, as predicted, the coefficient on *BRANDS* is significantly positive, incremental to net income and book value of equity (t-statistic = 5.57). This finding is consistent with the brand value estimates capturing valuation-relevant information and being sufficiently reliable to be reflected in share prices. The second set of columns presents summary statistics for the separate-year estimation of equation (1), including two Z-statistics that test coefficient estimate significance across years. The first, Z1,

Table 4. Summary statistics from regression of market value of equity on book value of equity, net operating income, and brand value estimates. Sample of firms with brand value estimates from 1991–1996 surveys, reported in *FinancialWorld* (1992–1997).

		Pooled fixed year effects		Separate-year estimation					
				Coefficient		t-statistic			
Variable	Prediction	Coefficient	t-statistic	Mean	Std dev.	Mean	Std dev.	Z1	Z2
Intercept		–	–	17.77	4.77	5.50	1.79	13.27	6.87
BV	+	0.64	8.84	0.26	0.74	2.57	2.80	6.24	2.05
NI	+	5.23	12.78	8.92	5.17	6.70	2.42	16.13	6.19
BRANDS	+	0.29	5.57	0.25	0.08	2.16	0.88	5.22	5.49
Number	508			84.17	44.38				
Adjusted R^2	0.56			0.66	0.14				

BV is book value of equity at fiscal year end.
NI is income from continuing operations.
BRANDS is the firm's total estimated value of brand names.
All variables are deflated by number of shares outstanding.
Fixed-effects refers to estimation with fixed-year effects. The year-specific intercepts are untabulated.
Z1 equals $(1/\sqrt{T})\sum_{j=1}^{T}(t_j/\sqrt{k_j/(k_j-2)})$ where t is t-statistic, T is number of years, and k is degrees of freedom for regression in year j.
Z2 equals mean $t/(\text{stddev}\, t/\sqrt{5})$.

assumes residual independence, and the second Z2, relaxes this assumption.[16] The Z1 (Z2) statistic of 5.22 (5.49) for the separate-year regressions corroborates the pooled regression findings of significance in the predicted direction for the coefficient on *BRANDS*. Also, as predicted, the coefficients on book value of equity, *BV*, and net income, *NI*, are significantly positive in the pooled and separate-year estimations.[17]

The coefficient on *BRANDS*, 0.29, is significantly less than on *BV*, 0.64, in the pooled specification, consistent with *BRANDS* containing more estimation error than the average component of book value of equity. However, in the separate-year estimation, the mean *BRANDS* coefficient is almost the same as that for the coefficient on *BV*, 0.25 versus 0.26, consistent with *BRANDS* and *BV* being assessed similarly by investors.[18]

Table 5 presents summary statistics from estimating equation (2). The table reveals that, consistent with predictions, one-year changes in brand value estimates are significantly positively associated with contemporaneous returns. The evidence is consistent between the pooled fixed effects estimation (t-statistic = 5.55) and the aggregate separate-year estimation statistics (Z1 = 5.17 and Z2 = 3.47). Untabulated findings indicate that inclusion in the pooled estimation of Δ *BRANDS* increases the adjusted R-squared of the model from 0.12 to 0.18. These findings are consistent with those of the price specification and provide evidence that the finding of value-relevance for estimated brand values is not attributable to effects of omitted correlated variables. Finding that changes in brand value estimates are significantly positively related to contemporaneous returns also indicates that at least some of the change in brand value estimates is timely. Also consistent with predictions, net income and changes in net income are significantly positively associated with contemporaneous returns in both estimation specifications.

Table 5. Summary statistics from regression of returns on net operating income, change in net operating income, and changes in brand value estimates. Sample of firms with brand value estimates from 1992–1996 surveys, reported in *FinancialWorld* (1993–1997).

		Pooled fixed year effects		Separate-year estimation					
				Coefficient		t-statistic			
Variable	Prediction	Coefficient	t-statistic	Mean	Std dev.	Mean	Std dev.	Z1	Z2
Intercept		–	–	−0.09	0.12	−1.94	2.30	−4.29	−1.69
NI	+	1.37	4.79	1.18	2.31	1.92	2.59	4.24	1.48
Δ *NI*	+	0.35	1.68	1.17	1.14	1.26	0.71	2.78	3.55
Δ *BRANDS*	+	0.54	5.55	0.58	0.34	2.36	1.36	5.17	3.47
Number	412			82.20	35.41				
Adjusted R^2	0.18			0.24	0.03				

Returns are market-adjusted returns for the 12-month period beginning three months after the beginning of year t.
NI is income from continuing operations; Δ *NI* is *NI* in year t minus *NI* in year $t-1$.
Δ *BRANDS* is the one-year change in the firm's total value of brand names.
Fixed-effects refers to estimation with fixed-year effects. The year-specific intercepts are untabulated.
Independent variables are deflated by beginning of period price.
Z1 equals $(1/\sqrt{T})\sum_{j=1}^{T}(t_j/\sqrt{k_j/(k_j-2)})$ where t is t-statistic, T is number of years, and k is degrees of freedom for regression in year j.
Z2 equals mean $t/(\text{stddev}\, t/\sqrt{4})$.

4.2. Evidence on Lack of Simultaneity Bias

Table 6 presents summary statistics from estimating the price specification as part of a system of simultaneous equations. Panel A presents findings relating to the brand value estimation equation (3) and Panel B presents findings relating to the market value estimation equation (1) where *BRANDS* is an explanatory variable.

The first set of results in Panel A relates to the OLS regression of *BRANDS* on market value of equity and the four variables we use to identify the brand value equation. It reveals that, as predicted, advertising expense, *ADV*, brand operating margin, *BR_MARGIN*, and brand market share, *MKT_SHARE*, all have significantly positive relations with estimated brand values. These findings indicate that brands of firms that spend more on advertising and brands that have larger margins and market share have larger estimated brand values. The relation between *BRANDS* and *SALES_GRWTH* is insignificant. Also, as predicted, we observe a significantly positive relation between *BRANDS* and market value of equity, *MV*, which is consistent with market value of equity explaining brand value estimates.[19]

The second set of summary statistics in Table 6, Panel A, is from estimating the second-stage regression using the fitted value from the first stage, *MV_PRD*, in place of market value of equity, *MV*. The results are consistent with the OLS estimates for all of the variables except *MV_PRD*, which, as explained below, we obtain from an analogous two-stage estimation procedure. Interestingly, the coefficient on *MV_PRD* is not significantly different from zero, indicating that after controlling for potential simultaneity bias, market value of equity does not explain estimated brand values.

Table 6, Panel B, presents findings related to the effects of potential simultaneity on our

Table 6. Summary statistics from simultaneous equation estimation treating market value of equity and brand value estimates as jointly determined endogenous variables. Fixed year effects estimation for sample firms with brand values estimates from 1991–1996 surveys, reported in *FinancialWorld* (1992–1997).

Panel A: $BRANDS_{it} = \sum_{Y=91}^{96} \delta_{0Y} YR_{Yit} + \delta_1 \mathbf{FACTORS}_{it} + \delta_2 MV_{it} + \varepsilon_{3it}$

Ordinary Least Squares				2nd stage of 2-stage least squares			
Variable	Prediction	Coefficient	t-statistic	Variable	Prediction	Coefficient	t-statistic
ADV	+	1.70	6.40	*ADV*	+	1.73	6.43
BR_MARGIN	+	3.58	17.34	*BR_MARGIN*	+	3.75	15.93
SALES_GRWTH	+	−2.03	−0.47	*SALES_GRWTH*	+	−1.47	−0.34
MKT_SHARE	+	13.94	4.03	*MKT_SHARE*	+	14.55	4.14
MV	+	0.06	2.89	*MV_PRD*	?	0.02	0.65
Number	487			*Number*	487		
Adjusted R^2	0.58			*Adjusted* R^2	0.58		

Panel B: $MV_{it} = \sum_{Y=91}^{96} \alpha_{0Y} YR_{Yit} + \alpha_1 BV_{it} + \alpha_2 NI_{it} + \alpha_3 BRANDS_{it} + \varepsilon_{1it}$

Ordinary Least Squares				2nd stage of 2-stage least squares			
Variable	Prediction	Coefficient	t-statistic	Variable	Prediction	Coefficient	t-statistic
BV	+	0.63	8.64	*BV*	+	0.62	8.33
NI	+	5.35	12.95	*NI*	+	5.23	12.05
BRANDS	+	0.29	5.49	*BRANDS_PRD*	+	0.34	4.54
Number	487			*Number*	487		
Adjusted R^2	0.57			*Adjusted* R^2	0.56		

BRANDS is the firm's total estimated value of brand names.
BRANDS-PRD is fitted value from estimation of *BRANDS* on all exogenous variables in the system of equations consisting of the equations in Panels A and B.
FACTORS comprises advertising expense, *ADV*, brand operating margin as reported by FW, *BR_MARGIN*, firm sales growth, *SALES_GRWTH*, measured as $(\text{sales}_{t-1}/\text{sales}_{t-(1+i)})^{1/i}$, where $3 \leq i \leq 5$ and sales are obtained from Compustat, and brand market share, *MKT_SHARE*, calculated as the weighted average of the firm's sales from brands in a given industry divided by sales of all brand sales in that industry, as reported by FW, with weights equal to the firm's sales relating to brands in a particular industry compared with total firm sales from brands.
MV is market value of equity measured at fiscal year end.
BV is book value of equity at fiscal year end.
NI is income from continuing operations.
All variables, except for *SALES_GRWTH* and *MKT_SHARE*, are deflated by number of shares outstanding.
YR_Y is an indicator variable that equals one if the observation is from fiscal year Y, and zero otherwise.
Year-specific intercepts are untabulated.

primary regression equation (1). The first set of results relates to OLS estimation using the 487 observations for which we have complete data for estimating equation (3). The results are similar to those in Table 4 for the entire sample. The second set of results reveals that inferences from Table 4 are not attributable to effects of simultaneity bias. Specifically, findings from estimating equation (1) after replacing *BRANDS* by *BRANDS_PRD*, the fitted brand value variable based on a first-stage regression of *BRANDS* on all of the exogenous variables in the system, and, thus, not on market value of equity, are similar to those in Table 4. The coefficient on *BRANDS_PRD* is significantly positive, as predicted.

Consistent with measurement error reduction via the two-stage procedure, the coefficient

Table 7. Summary statistics from simultaneous equation estimation treating market value of equity and brand value estimates as jointly determined endogenous variables. Fixed year effects estimation for sample of firms with brand value estimates from 1992–1996 surveys, reported in *FinancialWorld* (1993–1997).

$$RETURN_{it} = \sum_{Y=92}^{96} \beta_{0Y} YR_{Yit} + \beta_1 NI_{it} + \beta_2 \Delta NI_{it} + \beta_3 \Delta BRANDS_{it} + \varepsilon_{2it}$$

Ordinary Least Squares				2nd stage of 2-stage least squares			
Variable	Prediction	Coefficient	t-statistic	Variable	Prediction	Coefficient	t-statistic
NI	+	1.60	5.52	*NI*	+	1.12	2.87
Δ *NI*	+	0.14	0.67	Δ *NI*	+	−0.08	−0.32
Δ *BRANDS*	+	0.54	5.56	Δ*BRANDS_PRD*	+	1.59	2.74
Number	404			*Number*	404		
Adjusted R^2	0.19			*Adjusted* R^2	0.14		

RETURN is market-adjusted returns for the 12-month period beginning three months after the beginning of year t.
Δ *BRANDS* is the one-year change in the firm's total value of brand names.
NI is income from continuing operations; Δ *NI* is *NI* in year t minus *NI* in year $t-1$.
Δ*BRANDS_PRD* is fitted value from estimation of Δ *BRANDS* on all exogenous variables in the system of equations, where the system comprises the returns equation specified above and $\Delta\, BRANDS_{it} = \gamma_0 + \gamma_1 \mathbf{FACTORS}_{it} + \gamma_2\, RETURN_{it} + \varepsilon_{3'it}$, where **FACTORS** include advertising expense, *ADV*, brand operating margin as reported by FW, *BR_MARGIN*, firm sales growth, *SALES_GRWTH*, measured as $(\text{sales}_{t-1}/\text{sales}_{t-(1+i)})^{1/i}$, where $3 \le i \le 5$ and sales are obtained form Compustat, and brand market share, *MKT_SHARE*, calculated as the weighted average of the firm's sales from brands in a given industry divided by sales of all brand sales in that industry, as reported by FW, with weights equal to the firm's sales relating to brands in a particular industry compared with total firm sales from brands.
All independent variables, except for *SALES_GRWTH* and *MKT_SHARE*, are deflated by beginning of period price.
YR_Y is an indicator variable that equals one if the observation is from fiscal year Y, and zero otherwise. Year-specific intercepts are untabulated.

on *BRANDS_PRD* is somewhat larger than on *BRANDS* in the OLS estimation, 0.34 versus 0.29. This increase in *BRAND*'s estimated coefficient is sufficient to prevent us from rejecting the null hypothesis that the coefficients on *BRANDS_PRD* and *BV* in Table 6, Panel B, are equal. Although failure to reject the null hypothesis is not strong evidence, it is evidence inconsistent with investors perceiving brand value estimates as significantly less reliable than other components of book value of equity.

Table 7 presents findings from using simultaneous estimation techniques to estimate the relation between returns and changes in brand values. The equation specifying changes in brand values is:

$$\Delta\, BRANDS_{it} = \sum_{Y=92}^{96} \gamma_{0Y} YR_{Yit} + \gamma_1 \mathbf{FACTORS}_{it} + \gamma_2\, RETURN_{it} + \varepsilon_{4it} \tag{4}$$

where **FACTORS** includes advertising expense, *ADV*, brand operating margin, *BR_MARGIN*, firm sales growth, *SALES_GRWTH* and brand market share, *MKT_SHARE*. All independent variables, except for *SALES_GRWTH* and *MKT_SHARE*, are deflated by market value of equity at the beginning of year t. We use the levels of these variables to explain annual changes in brand values because these variables change little year-to-year. Their primary role is to identify equation (4); we have no hypothesis relating to these variables.

The findings in Table 7 indicate that the Table 5 inferences relating to the significant positive relation between returns and changes in brand value estimates are not attributable to potential simultaneity bias. Specifically, the first set of results in Table 7 shows that our Table 5 OLS findings apply to the 404 firms for which we have complete data for estimating equation (4). More importantly, the second set of results shows that the coefficient on Δ*BRANDS_PRD* is significantly positive in the relation with contemporaneous returns. The coefficients on net income (change in net income) are significantly positive (insignificant) in both specifications.

5. Additional Analyses

5.1. Alternative Brand Proxies

The results in Table 4 indicate that FW brand value estimates are value-relevant, incremental to book value of equity and net income. The results in Table 6 indicate that much of the variation in the brand value estimates can be explained by variables that might be used to estimate brand values. Thus, to investigate whether the brand value estimates themselves provide power in explaining share prices incremental to these other variables, we estimate equation (1) after including the explanatory variables from equation (3) and interpret the additional variables as alternative proxies for brand values. Recall that these variables include advertising expense, *ADV*, brand operating, *BR_MARGIN*, firm sales growth, *SALES_GRWTH*, and brand market share, *MKT_SHARE*.

Table 8, Panel A, presents the results and reveals that *BRANDS* has a significantly positive relation with market value of equity, after controlling for these alternative brand value proxies (t-statistic = 3.22). Interestingly, the coefficients on all of the alternative proxies are insignificant, with the single exception of that on *SALES_GRWTH*, which is significantly positive, as predicted. These findings indicate that *BRANDS* reflects value-relevant information, not reflected in these alternative proxies.

Two of the variables in the Table 8, Panel A, estimation specification are obtained from FW and are not available in firms' published financial statements. To investigate the possibility that brand value estimates are proxies for value-relevant information already reflected in firms' financial statements, we estimate the relation using only financial statement variables. That is, we exclude *MKT_SHARE* and calculate *MARGIN* as the firm's gross margin, i.e., sales minus cost of goods sold. The findings, reported in Table 8, Panel B, indicate that *MARGIN* is significantly positively associated with market value of equity, incremental to the other included variables, as predicted. *SALES_GRWTH* also is significantly positively related, as in the Panel A specification. Interestingly, *ADV* has a significantly negative relation with market value of equity, after controlling for brand value estimates and the other potential brand proxies. This suggests that investors view as an economic expense the component of advertising expense that is orthogonal to the brand value estimate and other included variables. More importantly for our research question, the findings also indicate that, as predicted, the coefficient on *BRANDS* is significantly positive (t-statistic = 4.75). This finding again indicates that brand value estimates reflect value-relevant information not reflected in these financial statement amounts.

Table 8. Summary statistics from fixed year effects regression of market value of equity on brand value estimates, book value of equity, net operating income, and other potential proxies for brand values. Sample of firms with brand value estimates from 1991–1996 surveys, reported in *FinancialWorld* (1992–1997).

Panel A				Panel B			
Including *FinancialWorld* Variables				Financial Statement Variables			
Variable	Prediction	Coefficient	t-statistic	Variable	Prediction	Coefficient	t-statistic
BV	+	0.62	8.32	*BV*	+	0.43	5.82
NI	+	5.35	12.75	*NI*	+	4.71	11.92
BRANDS	+	0.24	3.22	*BRANDS*	+	0.24	4.75
ADV	+	0.25	0.55	*ADV*	+	−0.85	−1.93
BR_MARGIN	+	0.26	0.58	*MARGIN*	+	0.68	7.78
SALES_GRWTH	+	22.82	3.27	*SALES_GRWTH*	+	27.42	4.17
MKT_SHARE	+	7.89	1.40				
Number	487			*Number*	489		
Adjusted R^2	0.58			*Adjusted* R^2	0.62		

BRANDS is the firm's total value of brand names.
BV is book value of equity at fiscal year end.
NI is income from continuing operations.
ADV is advertising expense.
BR_MARGIN is the brand operating margin as reported by FW. *MARGIN* is the firm's total sales minus cost-of-goods-sold.
SALES_GRWTH is sales growth, measured as $(\text{sales}_{t-1}/\text{sales}_{t-(1+i)})^{1/i}$, where $3 \leq i \leq 5$, and sales are obtained from *Compustat*.
MKT_SHARE is brand market share, calculated as the weighted average of the firm's sales from brands in a given industry divided by sales of all brand sales in that industry, as reported by FW, with weights equal to the firm's sales relating to brands in a particular industry compared with total firm sales from brands.
Dependent variable is market value of equity measured at fiscal year end.
All variables, except for *SALES_GRWTH* and *MKT_SHARE*, are deflated by number of shares outstanding.
Fixed-effects refers to estimation with fixed-year effects. The year-specific intercepts are untabulated.

5.2. Analysts Earnings Forecasts

Brand values arise from the present value of future cash flows, or earnings, expected to be generated by the firm's brand names. Although FW uses historical earnings from a brand to calculate brand value estimates, FW incorporates expectations about the future earnings generating potential of the brand through the brand strength multiple. (See the Appendix for descriptions of the brand strength multiple components.) Because of the link between asset values and expected future earnings, we conduct three additional analyses based on equation (1) that investigate whether the brand value estimates capture brand values incremental to analyst earnings forecasts, a proxy for expected future earnings.

First, we include as an additional explanatory variable in equation (1) the mean analysts' long-term earnings growth forecast, which we obtain from *I/B/E/S* International, Inc. Second, we include as an additional explanatory variable earnings per share multiplied by the mean analysts' long-term earnings growth forecast. Third, we include as additional explanatory variables the mean analyst one- and two-year ahead earnings forecasts and the long-term earnings growth forecast multiplied by the two-year ahead earnings forecast.

Untabulated findings reveal that, although the coefficients on the analyst forecast variables often are significantly positive, as one would expect, in all three specifications the coefficient on *BRANDS* is significantly positive in the pooled and separate-year estimations. These findings suggest that the brand value estimates reflect value-relevant information beyond that reflected in expected future earnings as measured by analyst earnings forecasts.

5.3. Recognized Brand Assets

Thus far, we have implicitly assumed that sample firms do not recognize brand assets, which might not be the case for firms that acquire brands, e.g., in a purchase business combination. To investigate the effects on our inferences of this assumption, we obtain from the sample firms' financial statements disclosures about recognized brand assets. Untabulated findings reveal that of the 435 available firm-year financial statements, only 91, or 21%, relating to 35 firms, mention that recognized intangible assets include purchased brands. Only 59 or 14% of the firm-year observations disclose the recognized brand asset amount. Financial statements associated with more than three-quarters of firm-year observations, 344, do not mention brands in connection with recognized intangible assets.

Untabulated statistics also reveal that the amounts recognized by sample firms differ noticeably from the FW brand value estimates. For firms with available financial statements, the mean (median) ratio of recognized brand assets to FW brand value estimates is 0.12 (0.00), when we assign zero to recognized brand assets for firms not disclosing recognized brand assets. This ratio is particularly low when one considers the possibility that FW does not necessarily estimate values for all of a firm's brands. For the firm-year observations disclosing recognized brand assets, the mean (median) ratio is 0.56 (0.14), where the skewness is primarily attributable to one firm.[20]

We conduct two additional analyses to investigate the potential effects on our inferences of recognized brand assets. First, to the extent that brand assets are recognized by sample firms and, thus, included in *BV*, the coefficient on *BRANDS* in equation (1) represents the incremental coefficient on brand assets, relative to the coefficient on *BV*, not the coefficient on the asset itself. Thus, we estimate equation (1) after subtracting from *BV* recognized brand assets for firms that disclose recognized brand assets. Untabulated findings reveal that the coefficient on *BRANDS* is significantly positive, as predicted. We also estimate equation (1) after subtracting from *BV* goodwill and, for firms that disclose the recognized amount of brand assets, we also subtract recognized brand assets. We do this because it is possible that some firms recognize brands acquired in a purchase business combination as part of goodwill, not as a separate asset. Untabulated findings relating to this specification reveal that the coefficient on *BRANDS* is significantly positive, consistent with other specifications we report.

Second, we consider whether FW brand value estimates reflect brand values incremental to recognized brand assets. Although one can interpret equation (1) as providing this evidence, constraining the coefficient on recognized brands to equal that on other components of book value of equity potentially confounds the test. Thus, we estimate equation (1) after subtracting from *BV* recognized brand assets and including recognized brand assets as a separate explanatory variable. The untabulated findings reveal that the coefficient on recognized brand assets is insignificantly different from zero and the coefficient on *BRANDS* is significantly positive, as in Table 4. We also estimate this specification after subtracting from *BV* recognized brand assets and goodwill, and including the amount subtracted as an additional explanatory variable. The findings again reveal that the coefficient on recognized brand assets, including goodwill, is insignificantly different from zero and the coefficient on *BRANDS* is significantly positive.

5.4. Other Sensitivity Checks

We conduct several additional analyses to investigate the robustness of our findings. First, we examine the possibility that our results are driven by a small set of observations with a substantial level of brand values. To this end, we partitioned the sample into firms with ratios of brand values to total assets above and below the sample median. Untabulated results indicate that the association between brand value estimates and prices and returns are similar for the two subsamples.

Second, we investigate whether our inferences relate only to firms for which brands with values estimated by FW are large relative to the firms' operations. We investigate this by permitting the coefficient on *BRANDS* in equation (1) to vary for firms with ratios of brand sales per FW to total sales per Compustat above and below the sample median. Although the untabulated incremental coefficient for the above-median firms is positive, it is insignificantly different from zero, indicating that our findings do not relate only to firms whose brands represent a large fraction of their operations.

Third, we note that 68% of our sample firms have only one brand for which FW reports an estimated value. We investigate whether the relation between market value of equity and brand value estimates differs for these firms by permitting the coefficient on *BRANDS* in equation (1) to vary for firms with multiple brands. Untabulated findings indicate that both the base and incremental coefficients on *BRANDS* are significantly positive, indicating that the relation is significant for all firms, but stronger for firms with multiple brands. This finding is consistent with brand value estimates reflecting more value-relevant information for firms with multiple brands, perhaps because net income and book value of equity capture single-brand values more directly than multiple brand values.

6. Summary and Concluding Remarks

Although brand names are important intangible assets of many firms, U.S. GAAP does not permit firms to recognize internally developed brands as accounting assets. A major reason precluding accounting recognition is concern about whether brand values are reliably estimable. This paper provides evidence relating to the reliability of estimates of brand values by investigating whether share prices and returns reflect brand values estimated by *FinancialWorld* (FW), based on the methodology developed by Interbrand, Ltd., an established brand valuation consulting firm.

We use a sample of 1,204 brand value estimates collected from FW's annual surveys of brands relating to 1991 to 1996 fiscal years to test the joint hypothesis that brand values are relevant for equity valuation of firms owning brands and FW brand value estimates are sufficiently reliable to be reflected in share prices. Our tests are based on estimating the association between the FW brand value estimates and share prices, incremental to book value of equity and net income, and the association between year-to-year changes in the brand value estimates and annual returns, incremental to net income and changes in net income. We find consistent evidence that brand value estimates are significantly associated with equity market values in both specifications, providing evidence in support of our hypothesis.

Because brand value estimates could be, at least in part, determined with reference to equity share prices, we also estimate a system of simultaneous equations that treats the brand value estimates and market value of equity as jointly determined endogenous variables. Findings from estimating these equations provide strong evidence that our inferences are not attributable to simultaneity bias. That is, the brand value estimates are significantly positively related to share prices and returns, even after controlling for potential simultaneity bias. Findings from this analysis are inconsistent with investors assessing brand value estimates as significantly less reliable than other components of book value of equity.

The simultaneous equation analysis also shows that brand value estimates are, as predicted, significantly positively associated with advertising expense, brand operating margin, and brand market share, although, contrary to predictions, they are not significantly positively associated with sales growth. Thus, we also investigate whether the brand value estimates are significantly related to market value of equity incremental to these additional factors, which could be viewed as alternative proxies for brand value, and find that they are. Thus, brand value estimates reflect value-relevant information beyond that reflected in these alternative measures associated with brand value. Additional analyses reveal that brand value estimates also reflect value-relevant information beyond that reflected in recognized brand assets and analysts' earnings forecasts.

Because brand values likely are relevant to investors, finding that estimates of brand values are reflected in share prices and returns calls into question concerns that estimates of brand values are unreliable. Whether their reliability is sufficient to warrant financial statement recognition is left to accounting standard-setters to determine.

Appendix: Description of *FinancialWorld*'s Brand Valuation Methodology

FW draws heavily on a brand value methodology developed by Interbrand Ltd., which is a London-headquartered consulting firm. FW began reporting estimated values for a small number of high profile brands (such as Budweiser, Coca-Cola, Heinz, and Marlboro) in September 1992. Over time, FW has expanded its coverage to include more brands across a broad set of industries. Key factors that guide FW's addition or deletion of brands in their annual survey are readership interest in the brand as assessed by FW or Interbrand, and availability of data to estimate brand profit and brand strength. Relating to readership, for example, FW has increased its coverage of brands of information technology firms (e.g., America Online, Dell Computer, and Netscape) beyond well-established brands that were covered in the early surveys (e.g., IBM, Intel, and Microsoft). Relating to data availability, FW does not publish brand value estimates for brands for which FW does not believe it has sufficient reliable information. For example, values for brands owned by Mars, Inc. (e.g., M&M's, Snickers, and Uncle Ben's) are not reported by FW because Mars Inc. is privately held and has a reputation for minimal public disclosure of financial information. Similarly, FW makes no attempt to estimate brand values owned by privately held firms where FW believes the information available is reliable (e.g., the Levi's brand of Levi Strauss).

A brand value reflects the product of two factors: net brand-related profits and a brand strength multiplier. We describe each below.

A.1. Net Brand-Related Profits

Net brand-related profits is the estimated after-tax operating income of a brand minus what could be earned on a basic non-branded, i.e., generic, version of the product. FW estimates the worldwide operating income of the brand by extensive discussions with the brand-owner firm's securities analysts and by its own analysis of the firm's financial statements, including segment disclosures. FW estimates the earnings of a non-branded version of the product by estimating the amount of capital required to generate the brand's sales and assuming a generic version of the product would generate a 5% net pre-tax return on that capital. The excess of the brand's estimated after-tax profits over the generic product's estimated after-tax profits is net brand-related profits.[21]

A.2. Brand Strength

FW obtains brand strength multiples for each brand directly from Interbrand. The Interbrand model of brand strength has seven components (see discussion in Guilding and Moorhouse, 1992):

1. Leadership *(maximum 25 points)*: The brand's ability to influence its market. To achieve a high leadership score, a brand must be a dominant force in its sector with a strong market share.

2. Stability *(maximum 15 points)*: The ability of a brand to survive. Well-established brands that enjoy consumer loyalty will receive higher strength scores.

3. Market *(maximum 10 points)*: The brand's trading environment. Changes in market growth, market stability, or in the level of competition are important factors, as are opinions on supplier or customer (buyer) power and demand elasticity.

4. Internationality *(maximum 25 points)*: The ability of the brand to cross geographic and cultural borders. It is difficult to affect the internationality score by any significant amount over a short time horizon. Plans for international expansion or the withdrawal from specified markets will, however, have an impact on profitability. International brands are almost always more valuable than national or regional brands, especially because international brands usually benefit from marketing economies of scale and more robust sales, and because the brand is not dependent on one domestic market.

5. Trend *(maximum 10 points)*: The ongoing direction of the brand's importance to its industry. Unlike other dimensions of brand strength, trend can change dramatically over a short time period. Trend will not only affect brand strength, but also may well affect the ability of the brand to improve or maintain profitability. Trend analysis indicates a brand's ability to remain contemporary and hence retain profitability.

6. Support *(maximum 10 points)*: The effectiveness of the brand's communications. In the short-term, the level of support expenditures is an essential feature in the calculation of profitability. This support includes discretionary expenditures such as marketing support, which is made up of brand maintenance and brand development expenses. It is often difficult to determine a brand's support score because one needs to consider both quantity and quality of support.

7. Protection *(maximum 5 points)*: The brand owner's legal title. This factor is generally an opportunity to express doubts or concerns over a brand's relative level of protection, e.g., challenges to the trademark registration, rather than to appraise its absolute existence.

These components are weighted to develop a single brand strength measure, which ranges from 0 to 100. Each brand strength measure translates to a specific earnings multiplier—the higher the brand strength, the higher the multiplier. The brand strength multiplier can change each year, although the range remains similar from year-to-year. For example, in 1994 the range was 6 to 20 while in 1995 the range was 4.4 to 19.3.[22]

A.3. Illustrating the Interbrand Methodology

FW uses the Gillette brand name to illustrate its approach. In 1995 the Gillette brand was estimated to be worth $10.3 billion (FW, 1996):

> "The blades and razor brand had $2.6 billion in 1995 sales and $961 million in operating earnings. First, we estimated how much capital was employed to produce the brand. To do so, we first determined the median ratio of capital employed to company sales for each industry. In the personal-care category, this was 0.38, or $38 of capital to produce $100 in sales. We estimated this ratio by the brand sales to estimate the capital employed to produce the brand. For Gillette this came to $988 million ($2.6 billion times 0.38).
>
> "A generic brand on average should have a 5% profit on the capital employed to produce a product. So we multiplied this 5% by the capital employed to produce the brand, and we arrived at $49 million for Gillette.
>
> "After subtracting this $49 million from the brand's $961 million in earnings, we got the earnings that can be attributed to the Gillette brand name—$912 million. Keep in mind that we use the two-year weighted average of the earnings attributed to the brand.
>
> "We then applied the maximum corporate tax rate for the country where the brand's parent company is located (35% for U.S. companies) to the two-year earnings average. For Gillette the calculated net income attributable to the brand was $575 million.

"The final step was to multiply the brand's after-tax earnings figure by its strength multiple. Such multiples, in 1995, range from 4.4 to 19.3. For Gillette, one of the most prestigious names in the personal-care industry, this multiple was an impressive 17.9. The final brand value is $10.3 billion."

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Notes

1. Brand values also potentially are relevant to evaluating the performance of brand managers because the single most important asset a brand manager must manage is the brand itself. This study's motivation relates to external financial reporting and, thus, we do not focus on brand manager performance evaluation. See Foster and Gupta (1994) for a discussion of research challenges in this area.
2. Annual reports to shareholders of several of our sample firms contain statements highlighting their focus on brand management. For example, Time Warner states "We believe that the surest way to create value for our shareholders is to develop, extend, and enhance the global brands that are Time Warner's alone" (1995 Annual Report).
3. FW articulates similar criticisms of U.S. GAAP when presenting their annual survey of brand value. The following quotation is illustrative: "Given the large and growing importance of brand equity, it is high time that the accounting profession took a second look at the topic. FW maintains that brand value can indeed be measured and that, in general, it does not depreciate over time like a factory or machine. . . . In FW's opinion, the conventions of historical cost introduce more distortions than they avoid, particularly in the field of brand equity" (1991 survey, FW, 1992).
4. For example, in the 1995 survey, FW (1996) reports value estimates for 14 Philip Morris brands, e.g., Marlboro, Kraft, Maxwell House, Miller, and Kool-Aid, the aggregate value of which is $65.663 billion. The largest among these are Marlboro and Kraft, with estimated values of $44.614 billion and $5.742 billion, respectively.
5. Our sample does not include privately held or non U.S. firms for which Compustat data are unavailable, even though FW reports estimates of brands for several such firms.
6. One reason for lack of two consecutive years of brand value estimates is the increase in FW's brand coverage over time. Another is that FW ceased reporting brand value estimates for 63 brands, most of which FW dropped after only one year of coverage, perhaps because of large decreases in estimated brand value.
7. Because FW focuses its reporting on brands with large estimated values, use of brand value estimates available in three consecutive years likely biases the graph against brands with large decreases in estimated brand value.
8. The returns analysis in Section 3.2 is designed to investigate whether these year-to-year changes in brand value estimates reflect changes in brand values.
9. See Section 5.3 for additional analyses relating to the possibility that book value of equity of some sample firms includes the cost of acquired brands.
10. Reliability is a matter of degree. Whether an estimate possesses sufficient reliability for accounting standard-setters to consider it reliable enough for financial statement recognition is a judgment for them to make. We provide evidence on the extent of reliability, not conclusions about whether the estimates are reliable "enough" for recognition. Comparison of the coefficient on the brand value estimates with that on book value of equity provides some evidence on how the reliability of the estimates compares with that of recognized amounts.

11. Our inferences are unaffected by using share prices three months after year end.
12. Under this interpretation, Ohlson's (1995) model also suggests including in equation (1) the annual change in *BRANDS*, Δ *BRANDS*, consistent with viewing Δ *BRANDS* as an "as if" component of net income. Untabulated findings from including Δ *BRANDS* as an additional explanatory variable in equation (1) indicate that although its coefficient is significantly positive, as one might expect, its inclusion has little effect on the coefficients on the other variables. Note also that equation (1) is analogous to Ohlson (1995), equation (7), which is based on a particular linear information dynamics for net income. If net income does not follow this dynamic, then growth and/or expected future earnings are potential omitted variables. We include growth in the specification in Table 8 and report in Section 5.2 findings from additional analyses that consider analysts' forecasts of future earnings. In both cases, our inferences regarding *BRANDS* are unaffected.
13. Our inferences are unaffected if we use the amount reported in the prior year to calculate change in brand value. Our inferences also are unaffected if we include in equation (2) the change in Δ *BRANDS*, although the associated data requirements result in loss of a substantial number of observations.
14. We define sales growth using Compustat rather than FW data because of data limitations. Our inferences regarding the value-relevance of brand value estimates are unaffected by using a one-year sales growth measure based on FW reported brand sales, although doing so substantially reduces the sample size. Our inferences also are unaffected by using Compustat data for all variables, and to using one-year lagged, rather than contemporaneous, advertising expense.
15. Including sales growth and brand market share as explanatory variables in equation (3) with other variables on a per share basis implicitly assumes that all variables are devoid of scale. To ensure our inferences are unaffected by this assumption, we estimated equation (3), using ordinary least squares (OLS) and as part of the simultaneous system, where the share-deflated variables are instead deflated by sales, which effectively is the deflator for *SALES_GRWTH* and *MKT_SHARE*. The untabulated findings are similar to those we report in Table 6, except that the insignificantly negative coefficient on *SALES_GRWTH*, reported in Panel A, is significantly negative in the revised specification.
16. The Z1-statistic is $(1/\sqrt{T})\sum_{j=1}^{T}(t_j/\sqrt{k_j/(k_j-2)})$, where T is the number of years, t_j is the t-statistic, and k_j is the degrees of freedom for year j (see Healy, Kang and Palepu, 1987). The Z2-statistic is (mean t)/(std deviation t/$\sqrt{(T-1)}$) (see White, 1984, and Bernard, 1987).
17. We use the term significant to denote p-values less than 0.05. Untabulated findings reveal that including *BRANDS* in equation (1) reduces the estimated coefficients on both *BV* and *NI*, by 9% and 11%, respectively. Our inferences are unaffected by estimating equation (1) using sales as a deflator, and undeflated, and including either number of shares outstanding or sales as an additional explanatory variables (Barth and Kallapur, 1996). All of our inferences are unaffected by using White (1980) heteroscedasticity-consistent standard errors to calculate test statistics.
18. Inspection of the untabulated separate-year regressions reveals that the difference between the coefficients on *BRANDS* and *BV* is decreasing over the sample period. In the 1993, 1994, 1995, and 1996 regressions, the difference is 0.79, 0.29, 0.11, and 0, respectively. Untabulated regressions that also include Δ *BRANDS* reveal that the coefficient on Δ *BRANDS* is significantly smaller than that on *NI* in the pooled regression and in all separate-year estimations. Unlike the coefficient on *BRANDS*, this difference in coefficients is not shrinking over time, suggesting Δ *BRANDS* is estimated with more error than is *BRANDS* (Barth, 1994).
19. Note that the effectiveness of the two-stage estimation depends, in part, on whether the first-stage regression explains a significant portion of the variation in *BRANDS*. The untabulated adjusted R-squared of the first-stage regression of *BRANDS* on all of the exogenous variables is 0.57, suggesting the exogenous variables explain a substantial portion of the variation in brand value estimates.
20. For firms disclosing that recognized intangible assets include brands, but not disclosing separately the brand amount, we treat total intangible assets as if they relate to brands.
21. Prior to 1994, FW used the most recent year's brand operating income to calculate brand values. Starting with the 1994 survey (FW, 1995), it uses a two-year weighted average of the earnings attributed to the brand, with the most recent year weighted twice as much as the previous year. FW uses this averaging to prevent brand values from varying widely because of economic or short-term industry fluctuations that do not reflect variations in the value of the brand itself. Nonetheless, our separate-year estimation results reveal no discernible temporal pattern.
22. We reviewed the Letters to the Editor of *FinancialWorld* subsequent to each annual survey to identify any specific criticism of the FW brand valuation methodology. The few letters that were published did not take

issue with the methodology. For example: “I have sent your article on brands to our clients. It is important reading for all of us”—Chief Executive Officer (CEO), J. Walter Thompson.

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Capital markets research and accounting standard setting

Philip Brown[a], Bryan Howieson[a]

[a]*Department of Accounting and Finance, University of Western Australia, Western Australia* 6907

Abstract

Accounting academics and practitioners have been known to question whether accounting research is as efficacious as it might be. This paper focuses on capital markets-based research in accounting and how its potential contribution to the wider regulatory process can be realised more fully. Examples used are: research on corporate regulation; the move to 'harmonise' accounting standards; accounting for R&D; accounting for goodwill; and equity accounting.

Key words: Capital markets-based research; Accounting standards; Standard-setting

JEL classification: G14, G18, M40

1. Introduction

Many papers discuss the alleged gap between accounting research and accounting practice (see, for example, Schipper, 1994; Beresford and Johnson, 1995; and Howieson, 1996). In this paper, we adopt a similar theme devoted to understanding and closing the gap between 'accounting research' and 'accounting practice'. Like Leisenring and Johnson (1994, p. 74), respectively Vice Chairman and Research Manager of the U.S. Financial Accounting Standards Board (FASB), we take the narrower view that 'accounting practice' means 'accounting standard setting'. Similarly, we limit our comments on 'accounting research' to capital markets-based research in financial accounting. Limiting our comments to capital markets-based accounting research is not to

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deny there are many other, important ways in which the gap between accounting research and accounting standard setting can be narrowed. For example, Beresford and Johnson (1995, p. 115) refer to the FASB working with the American Accounting Association's (AAA) Accounting, Behavior and Organisations Section to develop a research agenda of projects that would interest standards-setters.

Capital markets-based research in financial accounting is more than 30 years old and it continues to thrive, with good reason. Typically, capital markets-based accounting research investigates the association between accounting information and key capital market variables, such as the subject company's share price, or the rate of return on its shares over some time period, or their systematic risk. An example would be to see how well share rates of return are predicted by EPS calculated by the cost method of accounting for investments, compared with the equity method.

In this paper we first discuss in general terms how capital markets-based research can contribute to standard setting. We follow this review with a discussion of the comparative strengths of Australasian researchers in capital markets. Then, to illustrate some of the possibilities, we look at five specific research opportunities, namely: (1) the 'new mood' in corporate regulation in Australia, covering the economic consequences of corporate regulation, including accounting standards, and the uniquely Australian Continuous Disclosure regime; (2) the move to 'internationalise' or 'harmonise' accounting standards; (3) accounting for R&D; (4) accounting for goodwill; and (5) equity accounting. Having canvassed these topics we then suggest means by which capital markets research can be made more effective for standard setting and we finish with some overall conclusions.

2. Can capital markets-based research contribute to standard setting?

We begin with the question, is capital markets-based research ever likely to be of any great interest to standard setters? Some commentators say that, if there is a role, it can only be quite limited, and they note the following limitations.

First, in the early 1970s a series of papers pointed out, quite correctly, that standard setters face an *economically* impossible task because accounting standards affect interested parties in various ways, with both 'winners' and 'losers' in the wealth stakes. Pareto optimality requires that at least one party be better off and none worse off, which is a seemingly impossible ideal to achieve with an accounting standard, given the number of informational and contractual arrangements that rely on accounting numbers. We believe, however, that society expects more of its standard setters. They cannot simply shrug their shoulders and walk away from the task just because it is, in a formal sense, economically impossible. Further, because financial accounting standard setters stress the informativeness of accounting measures, especially to the residual risk bearers, accounting researchers can at least try to help them out, for instance by saying something about the valuation implications of alternatives under consideration.

Second, there is the empirical evidence that suggests accounting information is of limited relevance even to residual risk bearers. Lev's much cited 1989 paper made that point very clearly. Lev defines the 'quality' of earnings by its explanatory power (r^2) in the returns-earnings relation. He concludes that the quality of reported earnings is low, with r^2 in the returns-earnings relation typically being of the order of 5%. Interestingly, Lev also spells out a challenging research agenda, focused on the 'quality' of accounting information. Since Lev's paper, a great deal of effort goes into improving explanatory power, including:

(1) relating returns to earnings levels and changes, both theoretically (for example, Ohlson, 1995; Ali and Zarowin, 1992) and empirically (for example, Easton and Harris, 1991);

(2) separating accruals and cash flows into their components, on the grounds that they differ with respect to their valuation implications;

(3) fitting non-linear models, to allow for the transitory nature of extreme values of earnings, and employing different estimators, for example to mitigate measurement error bias in the Earnings Response Coefficient;

(4) widening the returns-earnings window, so that it covers multiple years (but doesn't that beg the fundamental accruals question, implied by the accounting period convention?);

(5) fitting price-to-book models, such as that used by Landsman (1986) to study defined benefit pension assets and liabilities and since then adopted and adapted in a variety of contexts.

Third, externalities can complicate how we interpret the results of capital markets studies and thereby limit their relevance to standard setters. In particular, consider the implications of the information transfers literature that were first referred to by Foster (1981) and later by Schipper (1990), whereby the benefits of information generated by the reporting firm are seen to spill over to other firms in the same industry; how can we factor those effects into the cost-benefit equation of an accounting standard? Given Lev's (1989) conclusion, that earnings explains relatively little of the cross-sectional variance in the reporting firm's returns, it is perhaps fortuitous that the information transfers literature suggests accounting-induced externalities are of a 'second order of smallness'.

Fourth, Skinner's (1996) observations are sobering. He comments on two studies reported in the *Journal of Accounting and Economics* in 1996. In one study, Venkatachalam (1996) investigates the value-relevance of banks' derivatives disclosures provided under FAS119 and finds that the fair values of derivatives are value-relevant. In the other, Aboody (1996a) investigates whether investors incorporate the value of a firm's outstanding employee stock options (ESOs) into its stock price. He finds that options that are not yet fully-vested on balance increase the stock price (because their incentive effects outweigh the expected costs of dilution), while in-the-money options that are already fully vested are a net cost to shareholders. Moreover, investors appear to value vested ESOs by marking them to market. Correspondingly, the FASB's method of calculating compensation expense has no explanatory power beyond the options' fair value. Skinner argues that, as interesting as these and similar papers may be, how we interpret their results depends on our beliefs about the sophistication of market participants: can the marginal investor (that is, the 'user') in fact value complex financial instruments, reconstruct the financial statements, derive the financial ratios, and select and fit the econometric models that are employed at 'the cutting edge' of capital markets-based financial accounting research?

Fifth, as Schipper (1994) points out, researchers and standard setters have different incentives. If so, why should we expect a close commonality of interests? For their part, standard setters face judgmental issues, like: when should an item be recognised or disclosed, and how should it be measured? They must decide an issue ex ante, that is, before the standard is set. They want research that is available 'now', that comprehensively addresses the entire issue and is conclusive. And they emphasise the answer to the question, not the research process. Schipper notes that, in contrast to the standard setters, capital markets researchers (as we use that term) face an ex post empirical question. For instance, is an item that is currently recognised, or disclosed in some way, value-relevant? Further, their research is time consuming, incremental, inconclusive (because of its incrementalist nature), and it emphasises the research process as well as the question.

So for all these reasons (the impossibility of Pareto optimality, the weak explanatory power of accounting data, externalities, research based on overly complex models and a mismatch of regulators' and researchers' incentives), some would say that capital markets research has little to do with standard setting in practice.

On the other hand, others would say that there is a standard setting role for capital markets-based research, but the opportunity has not been realised as fully as it might be. For instance, the FASB's Leisenring and Johnson (1994, pp. 74–79) claim there simply is not enough '*good*' accounting research. They distinguish between 'research and scholarship' and 'writing and publishing', with the majority of accounting academics being unproductive as researchers. They report that an internal FASB study revealed 87% of U.S. college and university level accounting academics had not published a single paper in any of six leading accounting scholarly journals in six years (1987–1992). The Mathews Committee report of 1990 (vol. 2, Table 3.12B, p. 35) contains a similarly unflattering view of the research productivity of Australian university-level accounting academics, 58% of whom had not published even one refereed article in 10 years.

This pessimistic view of the past is not just from the FASB or a governmental inquiry. Two highly accomplished researchers, Holthausen and Palepu (1994) claim accounting researchers have not done a thorough job of documenting the extent to which accounting standards either:

(1) provide new value-relevant information to investors;

(2) or affect a firm's access to capital markets;

(3) or stifle innovation;

(4) or reduce the cost of obtaining information;

(5) or make information available more uniformly to market participants.

We, however, take a more optimistic view of the future. We believe that there is a role for properly executed capital markets research and that accounting researchers should try to fill it more effectively.

3. Why the optimism?

We have several grounds for suggesting that capital markets research can contribute to accounting standard setting. First, there is no shortage of research questions. Standards setters are active and the research questions they generate are becoming more challenging. We illustrate some of these research questions in the fourth section of this paper. Second, there are steady improvements in the quality of our inputs into the research process. The improvements reflect the higher quality of the research training that is now available in our universities in recent years, combined with the increased research experience of their academic staff. Other initiatives are also leading to better trained researchers, such as the AAANZ's doctoral consortium and doctoral colloquium.

Recent years have given accounting researchers access to higher quality data as computerised databases become increasingly available. We will mention just a few:

(1) Connect 4 which publishes data from Australian annual reports and prospectuses on CD-ROM;

(2) the Securities Industry Research Centre of Asia Pacific (SIRCA's)

infrastructure initiative which provides intraday, high frequency data from Australasian equity and derivatives markets. This database will be extended to financial statement data on overseas stock and futures markets and the over-the-counter market;

(3) several overseas-based data services are now available in Australasia. They include the I/B/E/S earnings forecasts, Standard & Poor's Compustat and Global Vantage databases, Bloomberg, Datastream, Financial Times, and Reuters.

Some research will always require painstaking hand collection. One example is Cotter's (1996) careful work on specific provisions in banks' trust deeds, but the data sources mentioned above can help. Ready availability of data does, of course, expose us to competition from academics in other countries.

Better research methods are another way quality has improved. For instance, better research frameworks have been developed as outgrowths of Ohlson's extensive work on the relations between accounting earnings, book values and stock prices. A second example is the evolution of Landsman's (1986) initial study of pension plan assets and liabilities via the 'balance sheet' approach. Papers such as these lead to alternative ways to fit the data. Technological change also brings great benefits to researchers. There are now more user-friendly computer packages and the internet vastly improves communication and helps overcome the tyranny of distance.

A third reason for being optimistic about the future is that output barriers to research effort are being broken down by the ready availability of publication outlets. It is still true to say that it may be tougher if a researcher targets only, say, *The Accounting Review*, *Journal of Accounting and Economics* or the *Journal of Accounting Research*. To be published in these journals, a 'local' paper may be best motivated in terms of not only what it adds to the literature, but also what special or unique insights can be gained from Australasian data. Nevertheless, the growth in the number of journals makes it easier to publish than it would otherwise have been. Zeff (1996) reports that the number of 'academic research journals in accounting, edited in the English language' grew from 17 in 1980 to 42 by 1988 and 77 by mid-1996. Of the 77, nine are either wholly or partly 'editorial residents' of Australia or New Zealand (Zeff, 1996, Exhibit II, p. 170). As well as the more traditional academic journals, among Zeff's 77 are various outlets for high quality 'applied' or 'professionally oriented' research, such as the *Australian Accounting Review*, which aims to be 'the major forum in Australia for the explanation and discussion of developments in the discipline and practice of accounting'.

Another exciting development is the rapid spread of electronic publishing. One example is the Accounting Research Network (ARN), which references an ever-increasing number of working and accepted papers. The Australian Graduate School of Management is studying the feasibility of electronic publishing, focused on the *Australian Journal of Management*. Although established hard-copy journals, such as *Accounting & Finance* or *The Accounting Review*, add the solid imprimatur of their review process, we might ask at what cost? In the information age, time to market is becoming increasingly critical in the academic world as well. The significance of electronic publishing can only grow.

Consider, for example, the importance of publishing a department or school's working papers on the web. Although it is easy to do, there is a need for caution. The credibility of a department or school's working papers has to be earned. For some institutions that has been done already, through years of striving for research excellence and publishing in high quality journals. For others it may mean departmental or school quality assurance measures are necessary before working papers are posted 'officially' on the web.

4. Some relevant research questions

Given our optimism (because of many questions, better inputs and fewer output restrictions), where can accounting researchers of capital markets help close the gap? We address this question in this section of the paper. What follows is a brief canvassing of five research areas, where capital markets-based research could lead to better informed decisions in the standards arena. Our comments are not a review of what is currently being done. Rather, they seek to illustrate what can be done.

4.1. Corporate regulation

Our first area of potential research questions is prompted by the 'new mood' in corporate regulation, which in Australia may be interpreted as a shift to de-emphasise a legal mind-set in favour of a microeconomic approach. One item on the Australian corporate regulation agenda is a sharper focus on the economic consequences of accounting standards. One of the first regulatory moves of the Howard Government was to shift responsibility for corporate law from the Attorney General's portfolio to that of the Treasurer. An outgrowth of this change was the announcement in March 1997 of a review of the Australian Accounting Standards Board.[1] Since that announcement, various proposals have surfaced to revamp the standards setting process, to focus on the costs and benefits of accounting regulation, and even to provide sunset clauses for accounting standards.[2] These proposals culminated in the release of Paper No. 1, *Accounting Standards* (CLERP 1) of the Corporate Law Economic Reform

[1] See *Chartac,* 28 March 1997.

[2] See *Legislative Instruments Bill 1997*; refer *Chartac* #245, 9 May 1997, p. 4.

Program. In that Paper, the Federal Treasurer proposed that the existing standard setting arrangements will be replaced by an Australian Accounting Standards Committee (AASC) which will be under the supervision of a Financial Reporting Council (FRC).[3] These developments provide research opportunities to explore the consequences and implications of various institutional structures for accounting standard setting.

The uniquely Australian Continuous Disclosure regime is an example of how regulation creates such an opportunity. In September 1994 the Corporations Law was amended to give legislative backing to the Australian Stock Exchange's (ASX's) listing rule 3A(1), which requires listed companies to notify the ASX promptly when a price sensitive development occurs. The legislation, which has few carve-outs (or exceptions), ushered in what is known as 'enhanced' or 'continuous' disclosure. The legislation provides for a review of its effectiveness to be commenced within 18 months, which is a relatively short time for corporations and markets to adjust. We should pause and ask, how might one measure such legislation's 'effectiveness'? A careful study of the parliamentary and community debate reveals that it largely rests upon an *unstated* proposition: 'that the imposition of statutory civil and criminal sanctions will alter the way in which the management and/or directors of listed firms will make decisions relating to corporate disclosures, especially the decision to voluntarily (that is, irregularly) disclose "value relevant" information'. This quote is from a study by Brown, Taylor and Walter.[4] They look for evidence of improved market efficiency in: an increased frequency of price-sensitive announcements by listed firms; analysts' forecasts that are more accurate and reflect a greater degree of consensus; stock prices reflecting news more rapidly; fewer major share market 'surprises'; and lower share price volatility. The evidence found by that study is mixed, most probably because, as the authors argue, the post-enhanced disclosure time period available for their study was too short. We mention this example because a similar approach may be applicable when researching the economic consequences of other financial market regulation, such as accounting standards.

4.2. International harmonisation

A second area to mention is the push to 'harmonise' accounting standards. Globalisation of financial markets (from both supply and demand viewpoints) explains much of the interest in international harmonisation. Michael Sharpe, ex-Chairman of the International Accounting Standards Committee (IASC)

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[3] See the *Australian Financial Review*, 9 September 1997, p. 3. Also see Corporate Law Economic Reform Program (1997).

[4] See Appendix 6, p. 2 of the CASAC Report.

and both a former Partner of Coopers & Lybrand and a Director of the ASX, takes the view that the 'main goal… is to bring about complete unification of the world's accounting systems: uniformity between International Accounting Standards and the national standards of all countries',[5] an objective that has far-reaching implications.

To appreciate the potential research opportunities a few background comments are helpful. Users of financial statements (that is, suppliers of capital or traders in secondary markets) and preparers (that is, the demanders of capital) have incentives to understand international differences in performance reporting, because the cost of becoming informed, or of price protection strategies to overcome a lack of information, will drive up the cost of capital. In this context, Saudagaran and Biddle (1992) ask whether a firm's decision to list on a particular foreign exchange is influenced by its financial disclosure requirements. From a study of 302 internationally traded firms in 1987, and changes in listing between 1981 and 1987, they conclude that 'stringent disclosure levels could reduce access to foreign capital and foreign investment opportunities' (p. 106). Some investment institutions (that is, users) attempt to contain those costs by developing 'translators' that convert financial statements prepared under one set of GAAP to another, with somewhat less than overwhelming success (see, for example, Choi and Levich, 1991). Baumol and Malkiel (1993) claim that income tax complexities make the task well nigh impossible, anyway. Despite these 'challenges', Barth, Brown and Clinch are currently attempting to develop computer algorithms to translate Australian financial statements into their U.K., U.S. and Japanese GAAP equivalents.

In August 1996 the ASX announced a one million dollar levy on listed entities over two years to fund a specific Australian/IASC harmonisation project. The project is being undertaken by the AASB and AARF.[6] The ASX set up a monitoring panel to oversee the project, the members being Robert Nottle (ASX), Bruce Brook (Group of 100) and Brigid Curran (Coopers & Lybrand).[7] Further impetus for the project came in April 1997, when the Wallis Inquiry into the Australian Financial System suggests in its twelfth recommendation that 'The Australian Accounting Standards Board should, where practicable, seek to harmonise Australia's accounting standards with international standards.' It was this recommendation that resulted in the proposals contained in CLERP 1. This paper not only advocates the creation of the FRC and the AASC,[8] but as part of its proposal no. 2 it submits the

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[5] *ASX Perspectives*, 2nd Quarter 1997, p. 18.

[6] See the AARF's newsletter, *The Standard*, December 1996, for more details.

[7] As an aside, it is an interesting question as to whether the composition of the oversight committee represents an example of regulatory 'capture'.

[8] See footnote 3.

suggestion that:

> 'From 1 January 1999, the AASC should issue identical exposure drafts of standards for public comment to those issued by the IASC with the objective that final standards issued by the AASC would be consistent with Australian law and be the same as those issued by the IASC, unless the Government, upon advice from the FRC, determines that to do so would not be in Australia's best interests.' (Corporate Law Economic Reform Program, 1997, p. 28).[9]

Various benefits are claimed for the harmonisation project, including increased investment, greater market liquidity and simpler and less costly financial statements. Parker (1997) summarises some of these alleged benefits as:

- 'to enhance Australia's ability to compete in the global market place'.
- 'The ASX considered that if Australian companies complied with the IASC Accounting Standards, then increased investment would flow to Australia'.
- 'The major beneficiaries, in the short term, of the Australian/IASC Harmonisation program are the Australian multinational companies. The costs in staying up to date with different accounting rules in different reporting regimes and producing various sets of general purpose financial reports for various jurisdictions in which they operate will be reduced. Foreign entities seeking listing on the ASX will not be significantly affected as they are permitted to list and report on the basis of IASC Standards or their equivalents'.

Peirson and McBride (1996) produce a similar list of alleged benefits:

- 'Harmonisation would allow investors in international capital markets to have access to better quality information and international investment would be expected to be encouraged as a result'.
- 'International harmonisation of accounting standards would simplify the reporting requirements for multinational companies and hence would reduce the cost of complying with financial reporting requirements'.

In an article in *Business Review Weekly* (26 August, 1996) it was stated that '(m)any large companies produce second sets of accounts in accordance with' U.S. GAAP.

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[9] The Federal Government has since indicated that the deadline of 1 January, 1999 is 'effectively conditional' on the FRC advising the Government that the full adoption of IASC standards is in the best interests of Australia. The Government's view is that this advice is unlikely to be forthcoming before the proposed adoption date. See the *Australian Financial Review*, 3 December 1997, p. 27.

Despite these claims, one wonders just how widespread the costs and benefits are. As part of her on-going postgraduate research, Tarca (1997) reports on a survey of Australian companies listed on overseas stock exchanges that raises doubts about the extent of any direct benefits to Australian companies. According to information provided by the ASX, at January 1997, 107 ASX-domiciled companies were listed on at least one overseas stock exchange and, with multiple listings, total listings were 154. The breakdown of these 154 listings by country is as follows:

- New Zealand, 53
- U.S., 32
- U.K., 23
- Other Europe, 20
- Canada, 15
- Asia, 10
- Africa, 1.

Tarca's (1997) review of the various reporting requirements reveals the following:

- U.S.: New York, Midwest: the U.S. Securities and Exchange Commission (SEC's) Form 20-F which requires a reconciliation to U.S. GAAP, filed (16 companies); NASDAQ, ADR: financial statements prepared according to Australian GAAP are sufficient (16 companies).
- Canada: financial statements according to Canadian GAAP are filed.
- all others (107 companies): financial statements prepared according to Australian GAAP are sufficient.

In the light of this preliminary data, for those affected by overseas requirements, the cost of complying with more than one set of accounting standards is hard to gauge. An additional complexity of course is the question, what costs are relevant? This aside, Chan and Seow (1996) report that the cost of a major U.K. or Japanese company complying with U.S. GAAP is of the order of one million U.S. dollars.

Incidentally, any uncertainty about the cost of harmonisation is not confined to preparers and users of the financial statements of multinationals. Under Watts and Zimmermans' (1979) characterisation of accounting academics as agents in the market for excuses, we ourselves might well face an uncertain future. If International Accounting Standards were imported and adopted wholesale in lieu of the local product as the ASX is alleged to advocate,[10] there would be much less demand for our research services. The accounting standard

[10] See 'Secret ASX Moves to Derail Standards Review', *Chartac,* 1 August 1997, p. 1.

setting industry might soon take a quite different form from the process and players we know today, and it bears watching closely.

A worry some people, including the FASB, have expressed in the past is that the IASs are too permissive and thereby diminish the quality of accounting reports.[11] On the other hand, if IASs do offer more choice, who is to say that firms and their stakeholders won't benefit from the freedom? It should also be noted that the IASC adopted in March 1996 an accelerated work program to issue or re-issue more rigorous standards in a set of core areas. The International Organization of Securities Commissions (IOSCO) 'agreed that successful completion of IASC's current work plan … will allow IOSCO to consider endorsing International Accounting Standards for cross-border capital raising and listing purposes in all global markets'.[12] The IASC was hoping to complete this task by March 1998.

A number of recently published papers deal with the relations between capital market variables and accounting information across countries. For instance, Harris, Lang and Möller (1994) find that the German and U.S. investment markets adjust for relative differences in their respective accounting standards. Amir, Harris and Venuti (1993) compare the value-relevance of U.S. with non-U.S. GAAP financial statements, using a self-matching design, of multiply-listed firms that were required to reconcile their domestic GAAP financials to their U.S. GAAP equivalents and to file their reconciliations with the U.S. SEC, using its Form 20-F. They find that differences in accounting standards for goodwill, asset revaluations and income tax are priced by the equity market. However, there is no share market reaction on the 20-F filing date, suggesting the market has reconstructed the differences for itself.[13] Other Form 20-F-based studies are conducted, by Barth and Clinch (1996) and Chan and Seow (1996). The latter study finds that foreign companies' earnings are more closely related to U.S. stock market prices if they are *not* translated into U.S. GAAP. We expect that the number of such papers will continue to grow; for instance, 'internationalisation' is the key theme for the 1998 *Journal of Accounting and Economics* and *Journal of Accounting Research* conferences, thereby guaranteeing a flow of such papers, at least in the short term.

[11] For instance, it has been reported that 'Warren McGregor, AARF executive director, believes the IASC is putting a likely endorsement of IOSCO [the International Organisation of Securities Commissions] at risk by adopting a 'true and fair' override in a standard on the presentation of financial statements.' *Chartac*, 29 August 1997, p. 6.

[12] See *IASC Insight*, September 1996, p. 9.

[13] Rees and Elgers (1997) extend Amir et al.'s work by analysing the initial registration statements. They conclude (p. 126): 'the value-relevant information captured in the reconciliation is fully impounded in (stock) prices prior to its disclosure.'

Given the interest in harmonisation, there will be greater research payoffs to Australasian researchers in areas where our data provide us with a natural comparative advantage, in terms of their richness or fineness, relative to data elsewhere. One obvious example is mark-to-market accounting, including asset revaluations (see, for example, Easton et al. 1993; and Barth and Clinch, 1996). Two other topics where we have a comparative advantage are accounting for research and development expenditures (R&D) and goodwill.

4.3. Research and development

The third area we review is accounting for R&D. By way of background, a story in the *Australian Financial Review* (22 May 1997, p. 11) notes that 'The Securities Institute of Australia (has) argued that Australia should move towards U.S. accounting standards, which it says are recognised as world's best practice'. It is of course arguable that U.S. GAAP is indeed world best practice. For example, Alford et al. (1993, p. 184) conclude that 'accounting earnings from Australia, France, the Netherlands, and the United Kingdom are more informative or more timely than U.S. accounting earnings'. Even if we concede that, collectively, U.S. GAAP are world's best practice, they are not necessarily the best on all counts. The FASB's Leisenring is quoted by *Chartac* (11 April 1997) as saying that 'non-U.S. standards in many ways are superior'. There are at least two areas where the superiority of U.S. GAAP is strongly contestable, asset revaluations and accounting for R&D.

In the U.S., accounting for R&D has been researched closely over the last decade, particularly by Shevlin (1991) and Lev and Sougiannis (1996).[14] The relevant U.S. standard is FAS2. Before FAS2, R&D capitalisation was permitted under some circumstances but since 1975 FAS2 requires immediate write-off, thereby effectively enforcing a 'coarseness' on U.S. R&D data. An interesting research question is this: does the Australian accounting requirement to capitalise R&D costs that are recoverable 'beyond any reasonable doubt' provide value-relevant information beyond the requirement to report total R&D costs (AASB 1011.31) ? In other words, does the added 'fineness' of the Australian accounting standard, which requires R&D costs to be partitioned into those that do and those that do not meet the recoverable amount test, result in information that seems more useful to shareholders? Australian researchers [15] have a comparative advantage over U.S. researchers (but maybe

[14] Shevlin studies the valuation implications for the general partner of its option to exploit technological developments under R&D limited partnership agreements. Lev and Sougiannis document that R&D expenditures impact on future earnings and present equity values, despite the fact that R&D does not create an asset in U.S. accounting terms.

[15] See, for example, Abrahams and Sidhu (1997) for some recent research.

not over our colleagues elsewhere, since capitalisation is not uncommon in other countries).

Within Australia, accounting practice has always been variable. McGregor (1980) reports widespread deficiencies in R&D reporting practices in the 1970s. A June 1996 study by the ASC of accounting for R&D reports that the majority of the 20 surveyed companies that deferred R&D costs in 1994/95 made inadequate disclosures.[16] It also reports that companies were moving from selective capitalisation (as required under AASB 1011) to immediate write-off. The ASC report concludes that AASB 1011 needs immediate revision and spells out areas where disclosure could be improved. The report goes on to note that international accounting standards permit direct write-off as an alternative to selective capitalisation. It then recommends that any revision of AASB 1011 should aim to ensure that it is 'compatible with principal overseas R&D accounting standards, e.g., the U.S. standard which prescribes all R&D costs are to be written off as incurred' (p. 5).

It is far from obvious, given the capital market evidence, that the move to direct writeoff could possibly be a move in the right direction. The ASC's reference to U.S. standards appears enough to persuade at least one major Australian industrial company to adopt direct write-off. This is what AWA Ltd says in its 1996 annual report: 'the Directors have considered the recommendations of the Australian Securities Commission and changed the accounting policy of the economic entity to accord with international best practice and write off research and development costs as incurred'. Of course, given AWA's recent financial history, there could be other forces at work too.

4.4. Goodwill accounting

The fourth area we review is accounting for goodwill. Australia may be fertile ground in which to investigate goodwill issues because of its history of changing accounting standards. We suggest three research questions to do with goodwill:

(1) Is reported goodwill value-relevant; and if so, how does its 'value per dollar of asset' compare with other assets, and in particular, with identifiable intangibles?

(2) Do some countries' standards for goodwill disadvantage their firms when they compete internationally, as business often claims? James (1997) seeks to address this question.

[16] Ryan and Heazlewood (1997, pp. 100–101) report 56% of 150 companies disclosed R&D costs in their 1996 annual reports. Nine companies are classified as apparently not complying with AASB 1011.

(3) Given the recent controversy on how to amortise goodwill, is there any evidence from the capital market to support the revision of AASB 1013 to impose the straight line method, thereby prohibiting the inverse sum-of-the-years'-digits (ISOYD) method, or any other cost allocation method for that matter?

Much of the relevant research to date is reviewed by Clinch (1995). He notes that the question of whether goodwill is value-relevant can be answered from any one of several approaches. For example, is the carrying value of goodwill correlated with the market value of shareholders' equity (MVE)? Or, is goodwill amortisation expense correlated with stock returns? With respect to the first approach, whether the balance sheet value for goodwill is positively associated with the MVE, overall the answer is yes but there is no clear association for manufacturing firms (see Chauvin and Hirschey, 1994). Moreover, the association for goodwill is weaker than the association for other intangibles (Chauvin and Hirschey, 1994; Muller, 1994).

One interesting research issue is whether this result is driven by greater measurement error in goodwill. Goodwill is by construction affected by any measurement error in every other item associated with an acquisition. We do know that goodwill interacts with identifiable intangibles; for example, the *Business Review Weekly* speculated in 1996 that Fosters Brewing would 'deal with' $359m goodwill on acquiring Mildara Blass by revaluing its brand names (22 July, 1996, pp. 75–76). If there is an interaction, why should we not, then, have a standard on identifiable intangibles, given we have one for goodwill? Evidence on interactions between accounting for goodwill and for identifiable intangibles may have been helpful during the debate on the ill fated ED 49, *Accounting for Identifiable Intangible Assets*.

With respect to the second approach to studying the capital market relevance of goodwill (that is, via the returns-earnings relation), it is unclear whether goodwill amortisation expense is associated with share returns. There are inconsistent findings from the two approaches (that is, the balance sheet approach versus the returns-earnings relation) which limit the usefulness of the research to standard setters. However, the news is not all bad. Rather, it leaves the door open for further research, to resolve the inconsistency.

A second research question on accounting for goodwill is whether some companies suffer a competitive disadvantage because of the goodwill standard. Choi and Lee (1991) study U.K. versus U.S. acquirers of U.S. targets. U.K. firms can take a direct write-off and thereby avoid the periodic amortisation charge that U.S. companies must book (and almost all of them do). They find that U.K. acquirers paid higher takeover premiums. These two same authors also study acquisitions by U.S., Japanese and German bidders and find that U.S. firms paid lower premiums (Lee and Choi, 1992). Similarly, Hong et al. (1978) and Davis (1990) find higher share returns over the acquisition period for firms that use the purchase method (and thereby recognise goodwill on acquisition) than firms which use the pooling method (no goodwill).

Australia may be a very good site for pursuing research on this question, of competitive advantage (or otherwise). There have been changes in the Australian goodwill standard over time, and there probably is enough takeover activity to be able to meaningfully compare, say, the premiums paid by Australian, U.K. and U.S. bidders with each other and over different standards regimes. James (1997) is engaged in research which goes some of the way in this regard.

The third goodwill research question relates to the issue of the choice of methods of amortisation. Did the Australian standard setters overreact in the light of the available evidence? Before banning alternative methods of amortisation, it might have been helpful to have some evidence on how users viewed the methods. At this point in time, we simply do not know. Moreover, it would be quite difficult to get reliable evidence, because very few Australian companies used the ISOYD method (Brown, 1995).

4.5. Equity accounting

Equity accounting is the last area we mention by way of illustrating potentially useful research questions. It is helpful to focus on the background to ED 71, *Accounting for Investments in Associates*. Gordon and Morris (1996) provide a useful account. Equity accounting seems to have been re-instated on the standard-setting agenda in 1994, apparently on the initiative of the Group of 100, Peter Day (he was, at that time, AASB Chairman), and the ASC's then front-line accountant, Stuart Grant, all of whom were to some extent concerned that Australian practice was out of line with practice overseas. ED 71 was issued and since then, the re-introduction of equity accounting has slipped relatively quietly into place. Leo (1996) gives a progress report on submissions on ED71 as at July 1996. He reports there were 30 submissions up to then,[17] of which 29 supported the standard. Is the lack of 'fuss' because equity accounting's benefits relative to the cost method can be argued easily, either by appealing to classical 'dividend irrelevance' theory (signalling issues should be largely absent in cases where the investor has significant influence and equity accounting applies), or say, by some eclectic mixture of 'matching', 'timing', 'contracting efficiency' and 'opportunism' arguments, or on the grounds of international harmonisation?[18]

The Second Corporations Law Simplification Bill Exposure Draft (issued

[17] A total of 31 submissions were finally received.

[18] Miller and Leo (1997) discuss the impact of harmonisation on the equity accounting debate in Australia.

June 1995) proposed to remove the so-called legal impediment to recognising equity accounting in the body of financial statements. As Gordon and Morris describe it (1996, p. 166), the impediment arose from a legal interpretation that, under the Companies Act, group profit should be confined to the profit of the holding company and its subsidiaries; or, in other words, the investor's share of the profits of companies that were not its subsidiaries must be excluded from the investor's profit figure. The Second Corporations Law Simplification Bill, which would have removed the claimed impediment was delayed, but the ASC used its administrative powers to clear the way for an early introduction.[19] The Australian Shareholders Association (ASA) objected to the ASC's move, not because the ASA was opposed to equity accounting as such, but because it claimed there were two standards, the real standard and a 'Clayton's standard'.[20]

What evidence do we have on the relevance of equity accounting to the shareholders of the investor? One piece of evidence is a study by Ricks and Hughes (1985) who examine the stock market behaviour of U.S. firms at the time of four key events in the Accounting Principles Board's equity accounting deliberation process around 1971, and also the market's reaction when firms whose earnings were affected by the new standard first reported those effects. Ricks and Hughes find no unusual stock market reaction to any of the four events in the lead up to the standard but they do find a significant stock market reaction when the results of switching from cost to equity accounting were first reported by affected firms. They attribute the stock market reactions to new information content from the adoption of equity accounting. Recontracting costs are discounted because they are said to be negligible.

Given the limited evidence, there are research opportunities for Australian researchers here (see, for example, Czernkowski and Loftus, 1997). Indeed, there may be an opportunity for an unusual experiment. Could one investigate whether the quality of footnote disclosure may have exceeded that of recognition during the time that equity accounting was effectively relegated to the footnotes? Such research is not without its problems because, as Bernard and Schipper (1994) caution, researching recognition versus disclosure issues via capital markets relations is extremely difficult.[21] There is no conclusive evidence that recognition and disclosure have the same pricing implications; although it is usually assumed by researchers (and by quite a few practitioners, for that matter) that the implications are identical. A view often expressed by regulators is that managers who are inclined to engage in unacceptable

[19] See the *Australian Financial Review*, 10 June 1997, p. 24.

[20] See the *Australian Financial Review*, 17 June 1997, p. 26.

[21] See also Aboody (1996b).

practices behave differently when their activities are public knowledge and it matters little how that knowledge is gained.

By way of illustration, one very difficult research design issue is how to interpret the coefficient of a typical 'balance sheet equation' approach to demonstrating value-relevance, as in say Landsman's (1986) study of pension funds (which are much the same as Australian defined benefit superannuation funds). Landsman's dependent variable is the MVE. His explanatory variables are the book values of on-balance sheet assets and liabilities, and the estimated values of off-balance sheet pension plan assets and liabilities. The hypothesised relation is fitted by OLS regression. Suppose the estimated coefficients of the on- and off-balance sheet assets are statistically different. Bernard and Schipper (1994) then ask the question, what can we safely conclude? Any measurement error in the explanatory variables will bias the coefficient estimates. Almost certainly some explanatory variables are omitted ($r^2 < 1$), so it cannot be concluded that the disclosed item (pension assets or liabilities) is itself informative, even if the coefficient is statistically significant. This is a manifestation of the correlated omitted variables problem. Even if we avoid these two matters, we do not know whether market agents are biased in their assessments, or acting irrationally in some other way. Further, they may be unbiased, but behave rationally, discounting the disclosed item because it is known with less precision (which is why it is disclosed and not recognised).

5. Crossing the great divide

What processes can be implemented so that where academics can help, they are more effective and the gap between research and practice can be narrowed? A closely related question is, if standard setters would welcome help ex ante, how can academics be more proactive, in relation to issues likely to arise in our part of the world?

One action that could be undertaken is that Australasian academics and practitioners could try to predict the next item to surface on standard setters' agendas. This is being done in the United States, where the FASB has attempted to institute an 'early warning system', to promote timely ex ante research (see Beresford and Johnson, 1995, p. 116). Topics identified so far include footnote disclosures and reporting environmental liabilities. Perhaps Australian accounting academics can work with the AARF, ASC or ASX to have them do likewise?[22]

One of the simplest ways to help bridge the gap would be to engage in 'U.S. or U.K. watching'. Beresford and Johnson (1995) make a number of useful

[22] The AAANZ has instituted a study leave register, available to a number of Australian regulatory bodies, of accounting academics wishing to work on topical accounting problems. The register is maintained by the AAANZ Vice President-Practice.

suggestions, about processes, that bear repeating, albeit in a localised form. First, standard setters do, in fact, appreciate academics' analytical skills, and so academics should not be shy in volunteering them. Second, academics can communicate their views in various ways, such as by making written submissions on exposure drafts. Many academics can and do assign 'draft a submission to the AASB/PSASB' as a task for their students, but relatively few make their own submissions. United States academics, for instance, averaged 4.4 submissions (median equals 2) over 148 documents preceding FAS Numbers 1–117 (Tandy and Wilburn, 1996, Table 3). Australian academics do somewhat better. We recently reviewed tabulations for 13 Australian exposure drafts issued since 1979. The median number of submissions from academics is six compared with a median from all sources of 53. Another written submission could be what Leisenring and Johnson call a 'thought piece' (1994, p. 78): a 'carefully argued position that uncovers logical flaws or shortcomings in previously held views'. Thought pieces 'can provide insights that are every bit as powerful as any other piece of research and scholarship'. We ask the question: is every submission always to be seen as 'lobbying'? It carries the negative connotation of trying to persuade the decision maker to adopt a position that advantages the submitter, thereby suggesting that such practice by accounting scholars is somehow *infra dig*.

A third vehicle for bridging the gap is by publishing scholarly papers. These are beneficial because leading accounting journals are monitored by regulators' staff, or by those commissioned by the regulators to write discussion papers. However, it must be acknowledged that scholarly articles are not written in a style that is used by practitioners; we write for our intended audience. As mentioned previously, it should not be overlooked that some journals *are* designed to bridge the gap, and they can be influential.

We must also acknowledge that worthwhile and important links now exist between academics and standard setters. For instance, distinguished academics (such as Bob Walker, Malcolm Miller, Jayne Godfrey) have served on the AASB or its predecessor, the Australian Standards Review Board. There are many other valuable links with the AARF, as well. The discussion papers by Hancock (1990), on financial reporting by financial intermediaries and accounting for financial instruments, and by Howieson (1997), on accounting for investment properties, are examples of other means of being involved. Further, academics serve on many professional committees, and contribute to continuing education programs.

That said, we would also like to encourage the Australasian standard setters to harness the *research* expertise more widely, as the FASB has done in recent years. For example, since 1991 the FASB has promoted Financial Reporting Research Conferences which are held annually at a major university. These conferences are sponsored by the American Accounting Association and are also supported by major accounting firms. They bring together members of the AAA, the FASB, SEC representatives, public accountants, corporate accountants and financial analysts. The Accounting Standards Forums which have been held at the beginning of each of the last three AAANZ conferences are somewhat similar in their aims. These forums are organised by the Accounting Standards Interest Group, with the assistance of the Australasian standard setters. The theme of the 1997 Forum was 'harmonisation with international accounting standards' and it included representatives of academics, accounting regulators such as members of the Urgent Issues Group, AASB, AARF, NZ Accounting Standards Board and Bob Sweiringa who, until recently, was a member of the FASB.

As an example of how successful these interactions can be, consider the FASB's research roundtable presentation on executive stock option valuation. The roundtable presentation was a one-day meeting attended by academics and others with valuation expertise (for example, investment bankers). The discussion between the various parties prompted further academic research and assisted the FASB in its deliberations. Indeed, some papers have since been published (see, for example, Hemmer et al., 1995).

Finally, there may be a role for a local equivalent of the AAA's Financial Accounting Standards Committee, which the FASB's former Chairman, Beresford, describes as very helpful. That committee routinely makes submissions to the FASB and it could serve as a model for formal interaction between Australasian academics and standard-setters.

6. Conclusions

We have reviewed a number of issues associated with the relation between capital markets research and accounting standard setting. Unlike some commentators, we are naturally optimistic about the future of this line of research and its contribution to accounting practice.

We supported our optimism by illustrating various topics to which capital markets research can contribute to standard setters' understanding and deliberations. One has only to look at the published evidence to see that there is a strong and continuing interest in capital markets research. For instance, in the editorial to the May 1997 edition of the *Journal of Accounting and Economics* there are some interesting numbers on the breakdown, by subject matter, of articles published in that journal since 1979. The totals, excluding book reviews, are as follows:

- between 1979 and 1986, a total of 78 articles were published, of which 23, or 29.5%, were empirical capital markets studies

- between 1987 and 1991 there were 86 in total of which 25, or 29.1%, were empirical capital markets studies

- and from 1992 to 1996, of the 122 articles published, 42 (34.4%) were empirical capital markets studies.

We hope that we have demonstrated that there is no lack of suitable research questions. We encourage accounting academics (and standard setters) to continue to explore the potential of capital markets research to inform and further our understanding of financial accounting practice.

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Accounting earnings and firm valuation: the French case

Pascal Dumontier
Ecole Supérieure des Affaires
Réal Labelle
Ecole des Hautes Etudes Commerciales

ABSTRACT

Considering that the level of the association between stock returns and accounting earnings provides a measure of the extent to which earnings summarize the information which is useful for firm valuation, this paper analyses the contemporaneous association between stock returns and earnings changes or earnings level of individual French stocks and portfolios for periods of one, two and five years between 1981 and 1990. The empirical findings are as follows. (a) Stock returns are more linked to earnings changes than to earnings levels indicating that earnings provide more information about changes in firm value than about firm value. (b) Earnings prepared in accordance with the French accounting principles are not less value-relevant than those prepared in accordance with US or UK GAAP. (c) A cross-sectionally and time-aggregated data procedure provides a large increase in the explanatory power of earnings for returns which is consistent with a noise-in-earnings effect probably induced by accounting measurement and valuation principles and with a recognition lag effect due to the fact that value-relevant events are not integrated into earnings exactly when they occur. These two effects are shown to be the major causes of the low association between earnings and returns generally observed in studies based on short period data for individual stocks.

1. INTRODUCTION

Several functions are commonly assigned to accounting. One of them is the provision of useful information to enable investors to value securities and make rational investment decisions. Among all accounting data, earnings are probably the ones investors study with the greatest scrutiny. As mentioned by Beaver (1989), ‘No other figure in the financial statements receives more attention by the investment community than earnings per share. This relationship between accounting earnings and security prices is probably the single

Address for correspondence
Pascal Dumontier, Ecole Supérieure des Affaires, BP 47 – 38040 Grenoble, cedex 9 – France. E-mail: dumontie@esa.upmf-grenoble.fr

 0963–8180

most important relationship in security analysis, and its prominence is reflected in the attention given to price–earning ratios.'

The price–earning association has received considerable attention in empirical accounting research since the seminal work of Ball and Brown (1968) which shed light on the informational perspective of accounting data. In their footsteps, numerous papers in the accounting literature have examined the association between accounting earnings and security prices behaviour.[1] The current study is intended to contribute to this line of research by analysing the contemporaneous association between stock returns and earnings of French firms over several periods in order to assess to what extent accounting data published by these firms reflect factors incorporated in stock prices. Following Beaver *et al*. (1980), Collins and Kothari (1989), Easton and Harris (1991) or Strong (1993), this paper focuses on the sole role of earnings without considering the usefulness of any other financial statement items for valuation purposes.[2]

Considering that the level of the association between stock returns and accounting earnings provides a measure of the extent to which earnings summarize the information which is useful for firm valuation, this paper has several purposes. First, empirical tests are performed in order to investigate whether earnings are statistically related to returns. Inasmuch as two measures of earnings (the level of earnings and the first difference in earnings) are generally assumed to be both relevant for evaluating the return–earnings association, this paper uses a rigorous likelihood ratio test to determine empirically which of these two variables has the highest explanatory power for stock returns. Although both variables appear to be statistically linked with stock returns, the results suggest that the earnings-level variable performs better than the earnings changes one in explaining returns. Second, since empirical tests of the return–earnings association based on annual returns and earnings for individual stocks exhibit a remarkably low explanatory power of earnings for returns which can be attributed to a noise-in-earnings bias and to a recognition lag bias, the paper proposes a data aggregation approach to circumvent these biases. The evidence indicates that this procedure strengthens the return–earnings association. Last, a short comparative analysis of the results obtained for France with those obtained in other countries is conducted in order to estimate the value-relevance of earnings prepared in accordance with the French accounting standard setting.

The paper is organized as follows. The next section presents some theoretical justifications for the existence of an association between security prices and accounting earnings and it examines the literature which has tested this relationship. Section 3 describes the sample and provides details on the research design. Sections 4 and 5 present empirical results from individual and aggregated data. The last section is devoted to concluding remarks.

2. PREVIOUS RESEARCH ON THE RETURN–EARNINGS ASSOCIATION

Theoretical justifications of the return–earnings association

Several models motivating association studies have been proposed in the literature. A first approach assumes that firms' market value is related to their book value. Accordingly, any change in the book value (which is equal to retained earnings because of the clean surplus condition) should be linked to a change in stock prices:[3]

$$\Delta P_{it} = \Delta BV_{it} + u_{it} = EPS_{it} - D_{it} + u_{it} \tag{1}$$

where ΔP_{it} = change in market value per share of firm i at time t; ΔV_{it} = change in book value per share of firm i at time t; $EPS_{it} - D_{it}$ (earnings per share minus dividend per share) = retained earnings of firm i at time t; u_{it} = error term.

Dividing (1) by $P_{i,t-1}$ and rearranging shows that returns are related to contemporaneous earnings levels normalized by the beginning of period stock price:

$$\frac{\Delta P_{it} + D_{it}}{P_{i,t-1}} = \frac{EPS_{it}}{P_{i,t-1}} + u'_{it} \tag{2}$$

While the book value approach stipulates that firms trade at a given market-to-book ratio, other models assume that value is measured by the earnings figure. These models are based on three critical links: a link between security prices and future dividends, a link between future dividends and future earnings and a link between future earnings and current earnings.[4] If the market value per share of firm i at time t reflects the present value of its expected future dividends, if these dividends are linked to earnings and if current earnings provide information about future earnings, then the firm's stock price (P_{it}) should be related to its earnings per share (EPS_{it}) and price changes should be a function of earnings changes:

$$\frac{P_{it} - P_{i,t-1}}{P_{i,t-1}} = \phi\left(\frac{EPS_{it} - EPS_{i,t-1}}{P_{i,t-1}}\right) \tag{3}$$

Ohlson (1991) proposes an analysis which explains why and how contemporaneous earnings levels and earnings should be both related to stock returns. His model shows that in a certainty setting returns should relate to earnings levels. Under uncertainty, earnings changes are shown to explain returns as well as contemporaneous earnings.

A survey of the empirical evidence of the return–earnings association

Empirical tests of equations (2) and (3) aim at measuring the relation between a stock price variation for a given period and an accounting measure of earnings generated during the same period. Following the book value approach which results in equation (2), stock returns (R_{it}) are regressed on *earnings levels* (EPS_{it}) deflated by the beginning of period share price:

$$R_{it} = \alpha_0 + \alpha_1 \frac{EPS_{it}}{P_{i,t-1}} + \upsilon_{it} \tag{4}$$

Following equation (3) and the approach of earnings as a measure of value, stock returns are regressed on *earnings changes* (ΔEPS_{it}) deflated by the beginning of period share price:[5]

$$R_{it} = \beta_0 + \beta_1 \frac{\Delta EPS_{it}}{P_{i,t-1}} + w_{it} \tag{5}$$

The strength of the association between earnings and stock returns is given by the coefficients of determination (R^2) of the regression models. Those are generally taken as a measure of the degree to which earnings provide relevant information concerning firm performance because of their ability to reflect value-relevant items incorporated in stock prices. The slope coefficients α_1 or β_1, frequently defined as the earnings response coefficients, measure the effect of one franc of earnings or earnings changes on stock prices.

As outlined by Lev (1989) or Cho and Jung (1991), the R^2's obtained in most studies by regressing annual security returns on annual earnings or earnings changes are very low. They rarely exceed 10%. In the US, Beaver *et al*. (1980) find an average R^2 of 7% for their year-by-year regressions of individual securities. Average R^2 coefficients obtained by Collins and Kothari (1989) or Livnat and Zarowin (1990) are respectively 6.9% and 5%. In the US, the earnings level variable appears to perform better than the earnings changes variable. Easton and Harris (1991) or Kothari (1992) observe that the average R^2 obtained with earnings levels is greater than the one obtained with earnings changes: 7.5% instead of 4% for Easton and Harris, 15% instead of 11% for Kothari. In the UK, Strong's results (1993) provide a contrast with those in the US since he finds an average R^2 of 13% for the earnings changes variable but only 9% for the earnings level one.

The above studies link annual earnings to contemporaneous annual stock returns. Indeed, most of the return–earnings analyses use yearly data, probably because they are in time with the period covered in annual reports. However, the choice of the one-year horizon may not be optimal in testing this relationship because stock price changes may be associated in a given period with events that have not met the conditions for accounting recognition, but that will be captured in subsequent periods' earnings. In order to reduce the bias due to the lag between the period in which value-relevant events occur and the period in which these events are integrated into earnings, Lev (1989), Warfield and Wild (1992), Easton *et al*. (1992) or Dechow (1994) examine whether a longer time horizon can significantly improve the return–earnings association. Their results show that the correlation between earnings and returns improves with increases in the time interval under consideration. Lev's model R^2 is 3% for a one-year interval and 35% for a five-year interval. Warfield and Wild obtain R^2's of 2.1%, 9%, and 39.8% depending on whether they use quarterly, annual or four-year data, respectively. For exactly the same time periods, Dechow's R^2's are respectively 3.24%, 16.2% and 40.26%. Easton *et al*. observe the same phenomenon: the longer the time interval, the higher the explanatory power of earnings for returns. Their average R^2 varies from 5% for one-year return to 15% for two-year returns, 33% for five-year returns and 63% for ten-year returns.

While empirical tests use accounting earnings, models of the return–earnings association refer to a theoretical economic income. Reported earnings significantly differ from this economic income and are therefore subject to measurement errors which might result from the numerous conventions that underly accounting principles or from financial reporting manipulations. Grouping is an efficient procedure commonly used to reduce this well-known problem which causes a downward bias in the estimated regression coefficients. Beaver *et al*. (1980) show that such a procedure leads to a real improvement in correlations compared to those not using portfolios. They observe R^2 coefficients which vary from 7% to 55%, 72% and 82% depending on whether they use individual stocks or whether they group these stocks into 100, 50 or 25 portfolios.

3. SAMPLE SELECTION AND RESEARCH DESIGN

Sample selection

The study covers a ten-year period from 1981 to 1990. The sampled firms meet two conditions: they are all listed on the Paris Stock Exchange during the whole period of interest and their accounting figures are available for each year of the study in the 'Desfossé' directory which contains financial statements of the firms listed on the French stock market. The market data (stock prices, dividends and adjustment factors) come from the 'Association Française de Finance-SBF' data bank. All earnings, dividends and prices are adjusted for stock splits and stock issues.

This selection results in a sample which includes the *same* 117 firms for any of the years under consideration. This restriction comes from the time aggregation procedure used in section 5, which imposes the earnings variables of each firm to be available for each year under study. This constraint is likely to bias the sample which therefore mainly includes large surviving firms. However, since the impact of this possible survivor bias on results is hard to determine *a priori*, it is supposed to be negligible following in this (Collins *et al*., 1994).

Research design

In order to determine whether the earnings level variable and the change in earnings one are value-relevant because of their ability to explain French firms stock returns, the two univariate regressions (4) and (5) are run.[6] Each regression model is estimated both for each year between 1981 and 1990 and for the pooled cross-section and time-series sample.

Since the analysis of the return–earnings association is primarily aimed at determining whether the factors that explain returns during a given period of time also explain earnings related to the same time interval, following Beaver *et al*. (1980) or Kothari and Zimmerman (1995) return intervals align exactly with the period to which the earnings figures relate, i.e. the accounting year. Accordingly, no attempt was made to include earnings' preliminary announcement dates in the period over which returns are calculated even if, as shown by Collins and Kothari (1989), this might have improved the results by increasing the degree of association between returns and earnings.[7]

When the absolute value of earnings per share or earnings changes per share deflated by initial stock prices happens to be greater than one, it is considered as an outlier and it is not taken as such in the statistics. In these cases, stock returns and deflated earnings were deleted from the sample.[8] These outliers are due to the fact that the market value of some companies is close to zero while their earnings (levels or changes) are significantly positive or negative. The exclusion of these extreme obervations is consistent with a similar practice in previous research.[9]

Market efficiency and return–earnings studies

Since this study uses stock prices as a benchmark to assess whether earnings provide a relevant measure of firm value, it relies heavily on the efficient market hypothesis in the sense that stock prices are assumed to be good estimates of this value. If prices significantly deviate from fundamentals because investors do not take into account all relevant information concerning future cash flows, then stock returns will be inadequate to judge the relevance of earnings for valuation purposes. With regard to the French stock market efficiency, the empirical evidence described by Hawawini (1984) is highly supportive.[10] Indeed, empirical tests conducted in France suggest that publicly available information concerning firms' future cash flows is instantaneously and fully reflected in prices as suggested by the efficient market hypothesis. Consistent with these findings, this study assumes that stock prices in France reflect information as efficiently as prices in countries where similar studies have previously been conducted. Stock prices are therefore considered as an appropriate benchmark to evaluate earnings' ability to reflect firm value.

4. THE RETURN–EARNINGS ASSOCIATION BASED ON ANNUAL DATA FOR INDIVIDUAL STOCKS

Regression results

The results from the two univariate regressions (4) and (5) for one-year time horizon are reported in Table 1. The first column reports results of the regression using earnings level (henceforth model 1). The second column reports results of regression using earnings changes (henceforth model 2).

The evidence indicates that security returns are significantly associated with earnings level as well as with earnings changes. The slope coefficients from model 1 and model 2 pooled regressions are statistically significant at the 1% level. As expected, each year's coefficients exhibit positive signs. Model 1 yields an average earnings response coefficient estimate of 1.38. Concerning model 2, this estimate comes to 0.98. Model 1 and model 2 pooled cross-sectional and time-series coefficients are also positive. They equal, respectively, 1.70 and 1.21. However, the association between returns and earnings is highly variable over time. Model 1 earnings response coefficients vary from 0.72 to 2.43. Concerning model 2, they fluctuate between 0.27 and 1.94. All the return–earnings studies show the same variation in earnings response coefficients. This non-constancy of earnings coefficients surely limits the operational implications of these studies since, as mentioned by Lev (1989), 'if earnings are to be useful in predicting future returns, the form of the return–earnings relationship should exhibit a certain degree of stability over time'. However, this instability of earnings coefficients does not affect the credibility of results, first, because the return–earnings theoretical models do not stipulate any permanence of these coefficients and, second, because the link between returns and earnings depends on the current and future economic conditions which are supposed to vary through time. Therefore, the temporal variation in regression coefficients should be the rule rather than the exception.[11]

The relative explanatory power of earnings level and earnings changes for stock returns

Theoretically, as has been shown previously, earnings level and earnings changes are both supposed to be related to stock prices, so that these two

Table 1 Regressions of individual stock returns on earnings level and earnings changes for one-year periods

	Model 1: earnings level			*Model 2: earnings changes*			*Model 1 vs model 2*
Years	α_0	α_1	R^2	β_0	β_1	R^2	ΔR^2
1981	−18.32	1.09	23.7%				
	(−6.31)*	(6.05)*					
1982	2.31	0.72	9.3%	11.46	0.27	1.1%	8.2%
	(0.68)	(3.43)*		(4.46)*	(1.17)		(1.01)
1983	45.78	1.17	7.1%	60.65	1.67	16.8%	−9.7%
	(6.12)*	(3.02)*		(12.27)*	(4.82)*		(−2.74)*
1984	16.63	1.41	12.5%	31.02	0.47	4.2%	8.3%
	(2.98)*	(4.12)*		(7.38)*	(2.30)		(1.53)
1985	36.94	2.43	19.1%	62.15	0.64	4.2%	14.9%
	(4.72)*	(5.28)*		(10.08)*	(2.28)		(2.63)*
1986	43.15	2.35	36.3%	58.15	1.94	33.1%	3.2%
	(7.17)*	(8.10)*		(10.43)*	(7.54)*		(0.82)
1987	−27.31	0.72	7.8%	−25.31	0.64	16.1%	−8.3%
	(−8.18)*	(3.13)*		(−9.03)*	(4.70)*		(−1.23)
1988	53.01	1.40	48.8%	69.60	1.76	44.8%	4.0%
	(9.70)*	(10.52)*		(13.43)*	(9.78)*		(1.63)
1989	27.30	1.59	14.6%	41.64	0.59	5.1%	9.5%
	(5.74)*	(4.57)*		(12.13)*	(2.49)*		(2.47)*
1990	−29.48	0.88	5.5%	−23.17	0.79	10.3%	−4.8%
	(−10.8)*	(2.59)*		(−11.8)*	(3.64)*		(−0.85)
All	11.61	1.70	21.4%	31.26	1.21	12.9%	8.5%
	(6.11)*	(18.89)*		(17.08)*	(12.47)*		(3.83)*

Notes: In columns 1 and 2, figures in parentheses denote t-statistics (* significant at $\alpha \leq 0.01$). In column 3, ΔR^2 refers to the difference between model 1 and model 2 R^2's. Figures in parentheses denote the Z-statistic from Vuong's likelihood ratio test (* significant at $\alpha \leq 0.01$).

variables are set up as competing measures to explain stock returns. Therefore, it is an empirical question to determine which variable performs better. Since the measure (either the level of earnings or the change in earnings) that has the highest association with returns can be considered as the most value-relevant one, the comparison of model 1 and model 2 R^2's is of special interest to assess the most useful variable for valuation purposes.

The results in Table 1 indicate that the level variable is more strongly correlated with stock returns than the changes one. The pooled cross-sectional and time-series models exhibit a greater R^2 for earnings level (21.4%) than that for earnings changes (12.9%). The average R^2 of the earnings level model comes to 18.5% instead of 15% for the earnings changes model. The R^2 from the earnings level model is greater than that from the earnings changes model in all but three years. Last, the annual regression coefficients are statistically significant in each of the ten years for the earnings level model and only in seven out of the ten years for the earnings changes model.

In order to formally determine whether the levels of earnings are more value-relevant than the first differences in earnings because they exhibit a stronger association with stock returns, the third column of Table 1 presents the results of a likelihood ratio test developed by Vuong (1989).[12] Vuong's Z statistic indicates which of the competing variables (earnings level or earnings changes) has relatively more explanatory power for stock returns. A positive (negative) Z statistic implies that the residuals of the earnings changes' regression are larger (smaller) than those from the earnings level one, which means that the earnings level model 1 explains more (less) of stock returns than the earnings changes model 2.

Concerning the regressions using the pooled sample of all firm-year observations, Vuong's Z statistic rejects model 2 in favour of model 1 at the 1% level. Concerning the annual cross-sectional regressions, Vuong's statistic comparing earnings level to earnings changes is not significant in all but three years. However, in these cases, the earnings changes variable is rejected in favour of the earnings level one at the 1% level in two out of the three years.[13] In accordance with Easton and Harris (1991) or Kothari (1992) in the US and contrary to Strong (1993) in the UK, these findings suggest that for France the earnings level model performs better than the earnings changes one indicating that, in compliance with the book value approach, earnings provide more information about changes in firm value than about firm value.

Differences in the return–earnings association between France and Anglo-Saxon countries

This study is not primarily aimed at comparing the return–earnings associations between US (or UK) and non-US (or non-UK) generally accepted accounting principles such as in Amir *et al*. (1993), Harris *et al*. (1994), Bandyopadhyay *et al*. (1994) or as in Chan and Seow (1996). However, since the strength of the return–earnings association (as measured by R^2's) provides insights into the value relevance of earnings, the comparison of R^2 coefficients reported in Table 1 with those generally obtained in the UK or in the US is of special interest to evaluate the ability of the French accounting system to provide relevant figures for firm valuation.[14]

One could expect the explanatory power of earnings for returns to be lower in France than in the US or in the UK for at least three reasons. First, in the UK or in the US, as in most countries influenced by the English common-law system, accounting practices traditionally rely on professional judgement. This permits discretion in the preparation of financial statements as long as they provide a 'true and fair view' of firms' position. By contrast, in France, because of the influence of the Roman codified system, accounting rules are provided by a national accounting plan defined by government-run committees. This implies a high level of standardized practices that can be in opposition with the true and fair view approach.[15] To the extent that the adoption of this approach is expected to provide more value-relevant accounting figures, the association between earnings and stock prices should be higher in the US or in the UK than in France.

Second, while the alignment of financial accounting with tax accounting is very low in the UK or in the US, the tax system has a strong influence on accounting rules and practices in France since the figures in the financial accounts form the basis for those in the tax accounts.[16] This might tend to lead firms to systematically adopt tax-minimizing reporting techniques so that earnings may not reflect economic reality, which is supposed to lower the return–earnings association.

Third, because firm financing is mainly provided by widely dispersed small shareholders in the US or in the UK, the accounting systems strongly focus on profit measures. In France, ownership being largely in the hands of family members or banks that have direct access to internal financial information and firms relying heavily on debt financing, the accounting principles mostly focus on reporting to creditors.[17] This may reduce the relevance of accounting numbers for shareholders and their association with share prices.

Contrary to expectations, earnings prepared in accordance with the French accounting principles do not appear to be less value-relevant than those of US or UK companies. R^2 values reported in Table 1 are similar or even a little higher than those observed in the US or in the UK.[18] Model 1 and model 2 pooled regressions R^2's are, respectively, 21.4% and 12.9%, the average R^2's of model 1 and model 2 are equal, respectively, to 18.5% and 15%. Recall that the model in the US Easton and Harris (1991) find pooled regressions R^2's of 7.5% for the earnings level model and 4% for the earnings changes, while in the UK Strong (1993) obtains pooled regressions R^2 values of 9% and 13% for the same models. Consequently, despite the strong influences of the legal system and of the taxation system in France, evidence suggests that the French accounting practices perform at least as well as accounting practices applied in the US or in the UK for valuation purposes.

5. THE IMPACT OF DATA AGGREGATION ON THE RETURN–EARNINGS ASSOCIATION

The weak contemporaneous return–earnings association displayed in the previous section may originate from the presence of value-irrelevant noise in earnings and from a recognition bias due to a lag between the period in which value-relevant events occur and the period in which they are integrated into earnings. If such is the case, correcting for the effects of value-irrelevant noise and recognition lag should increase the explanatory power of earnings for returns. Data aggregation is an appropriate procedure to circumvent these effects since cross-sectional aggregation should diversify value-irrelevant noise away, while temporal aggregation should increase the percentage of value-relevant events recognized in both earnings and returns.

Cross-sectional aggregation and value-irrelevant noise

Reported earnings are often viewed[19] as the sum of a value-relevant component and a noise component which is irrelevant in explaining stock returns and thus induces a measurement error in the independent variable, biasing the regression estimates. If the value-irrelevant noise is not significantly correlated across firms, while value-relevant earnings are positively cross-sectionally correlated because, for instance, of the simultaneous impact of economy-wide factors on all firms, then aggregating across firms should reduce the variance of the noise component relative to that of the value-relevant component and improve the return–earnings association.

Temporal aggregation and recognition lag

While stock prices are affected by economic events as soon as they occur because investors' future cash flows expectations are then modified, earnings recognition must await compliance with accounting recognition criteria. This often tends to delay the incorporation of major events into financial statements so that current earnings do not recognize all of the current period's economic events. Some of them will be captured only in future periods' earnings, when the conditions for accounting recognition will be satisfied. Consequently, the low contemporaneous return–earnings explanatory power generally observed might originate from a lag between the period in which value-relevant events occur and the period in which they are integrated into earnings because of accounting recognition rules. If such is the case, the return–earnings association should improve as the horizon under consideration increases since the longer the time horizon, the higher the number of economic events recognized in both earnings and returns. In other words, in as much as earnings for long periods are less subject to the effects of recognition lag, aggregating earnings and returns over long periods should increase the correlation between earnings and returns.

Regression results based on cross-sectionally aggregated data

In order to circumvent the measurement error in the earnings variable by diversifying value-irrelevant noise away, regression models 1 and 2 are tested using a portfolio aggregation procedure. Stocks in the sample are classified into portfolios including five firms each. As the sample contains 117 firms, 23 portfolios are created. Each year the highest stock return security and the lowest one are excluded from the test. Since grouping mitigates the measurement error problem only if the grouping variable is uncorrelated with the error, the sample securities are ranked according to their returns. Indeed, returns are assumed to be uncorrelated with the measurement error in earnings as rational investors are supposed to be uninfluenced by fluctuations in reported earnings due to noise.

Results based on portfolio returns for annual data are reported in Table 2. These results provide evidence of the presence of noise in earnings that causes a downward bias in the regression estimates based on individual stocks, since the aggregation procedure increases significantly earnings response estimates and leads to a real improvement in correlations compared to those not using portfolios. Concerning model 1, the average regression coefficient is 1.93 for portfolios instead of 1.37 for individual stocks. The pooled regression coefficient comes from 1.70 with individual stocks to 2.34 with portfolios. Concerning model 2, the impact of grouping on earnings coefficients is still more significant: the average and pooled regression coefficients are, respectively, 3.42 and 3.52 for portfolios instead of 0.97 and 1.21 for individual stocks.

Cross-sectional aggregation yields a serious improvement in explanatory values. Comparing the R^2's of individual stocks with those of portfolios shows a significant increase of the explanatory power of earnings for returns. The average R^2's come from 18.5% to 45.1% for model 1 which represents a 143.8% increase. It comes from 15% to 32.4% for model 2 which represents a 116% increase. The earnings level pooled regression R^2's vary from 21.4% to 26.6%, while the earnings changes time-series and cross-sectional pooled R^2's increase from 12.9% to 14.7%. These findings, supported by Vuong's statistics reported in the third column of Table 2, confirm

Table 2 Regressions of portfolio returns on earnings level and earnings changes for one-year periods

	Model 1: earnings level			*Model 2: earnings changes*			*Model 1 vs model 2*
Years	α_0	α_1	R^2	β_0	β_1	R^2	ΔR^2
1981	−16.71	0.98	55.0%				
	(−6.18)*	(5.15)*					
1982	−0.98	1.09	45.2%	11.80	1.16	40.7%	4.5%
	(0.02)	(4.13)*		(6.86)*	(3.79)*		(0.62)
1983	48.90	1.02	24.2%	59.52	2.88	20.5%	3.7%
	(7.08)*	(2.61)*		(8.42)*	(2.34)		(0.51)
1984	12.76	1.91	45.5%	30.20	2.34	27.1%	18.4%
	(2.06)	(4.24)*		(8.24)*	(2.82)*		(1.35)
1985	25.94	3.64	72.1%	60.76	5.16	30.1%	42.0%
	(3.72)*	(7.42)*		(8.97)*	(2.99)*		(2.44)*
1986	41.10	2.66	62.5%	62.18	4.95	40.0%	22.5%
	(6.07)*	(5.92)*		(8.02)*	(3.75)*		(1.89)
1987	−37.10	1.93	38.4%	−24.27	2.98	37.0%	1.4%
	(−7.42)*	(3.63)*		(−8.09)*	(3.25)		(0.13)
1988	38.82	2.79	53.7%	67.81	4.88	45.4%	8.3%
	(3.95)*	(4.98)*		(15.06)*	(4.17)*		(0.79)
1989	23.51	1.99	30.5%	41.34	3.54	24.0%	6.5%
	(3.27)*	(3.06)*		(10.21)*	(2.58)*		(0.67)
1990	−30.98	1.26	23.5%	−22.86	2.87	27.2%	−3.7%
	(−8.87)*	(2.61)*		(−11.2)*	(2.81)*		(−0.52)
All	6.30	2.34	26.6%	38.19	3.52	14.7%	11.9%
	(1.77)	(9.07)*		(13.44)*	(5.58)*		(3.2)*

Notes: In columns 1 and 2, figures in parentheses denote *t*-statistics (* significant at $\alpha \leq 0.01$). In column 3, ΔR^2 refers to the difference between model 1 and model 2 R^2's. Figures in parentheses denote the *Z*-statistic from Vuong's likelihood ratio test (* significant at $\alpha \leq 0.01$).

that for France the earnings level variable performs better than the earnings changes one for explaining stock returns.

Regression results based on time-aggregated data

In order to reduce the potential bias due to the recognition lag and to detect the impact of the time period on the explanatory power of earnings for returns, two- and five-year security returns are regressed against two- and five-year earnings levels or earnings changes, in accordance with model 1 and model 2. Long period stock returns (R_{iH}) and long period earnings (EPS_{iH})[20] are then computed as follows:

$$R_{iH} = \prod_{t=1}^{H} (1 + R_{it})^{t-1}$$

$$EPS_{iH} = \sum_{t=1}^{H} EPS_{it}$$

where $R_{it/H}$ = rate of return of firm i during year t or during period H (H is successively equal to two and five years), $EPS_{it/H}$ = earnings per share of firm i during year t or period H.

Table 3 reports a significant increase in earnings response coefficients with temporal data aggregation. The average coefficient of model 1 varies from 1.37 for one-year intervals to 1.67 for two-year intervals and to 2.51 for five-year intervals.[21] The average coefficient of model 2 increases from 0.97 to 1.56 depending on whether one-year or two-year intervals are used. As cross-sectional data aggregation, temporal aggregation does not reduce the instability of parameter estimates over time. Model 1 earnings response coefficients vary from 0.72 to 2.43 for one-year intervals, from 0.72 to 3.03 for two-year intervals and from 1.35 to 3.61 for five-year intervals. This instability is still higher for model 2 coefficients since they fluctuate between 0.27 and 1.94 for one-year intervals or between 0.67 and 2.76 for two-year intervals.

R^2 coefficients in Table 3 substantiate the hypothesis of an increase in correlations as the length of the time intervals increases. R^2's of both models are strongly affected by changing the time interval. Concerning model 1, the pooled cross-sectional and time-series regression based on five-year data yields an R^2 of 42.5% which represents a 98.6% increase in comparison with the R^2 for annual periods. This increase is also evident in the individual R^2's. They vary from 5.5% to 48.8% for one-year return periods, from 7.8% to 55.5% for two-year intervals and from 30.1% to 62% for five-year intervals. They average 43.6% for five-year periods instead of 30.4% and 18.5% for two- and one-year periods. Concerning model 2, the correlation between returns and earnings changes also improves as the return interval expands: average R^2 coefficients are, respectively, 15.1% and 27.6% for one- and two-year intervals, the pooled cross-sectional and time-series regression based on five-year data yields an R^2 of 38.6% which represents a 199.2% increase in comparison with the R^2 for annual periods.

These results support the hypothesis that annual earnings do not provide a sufficient summary measure of all value-relevant events observed by investors. Because of accounting recognition criteria, some of them will be recognized as earnings after the return period and conversely earnings will include events integrated into prices prior to the period under consideration. This suggests that the return–earnings association based on short period data might be improved by introducing additional financial variables. These variables should be selected on the basis of their ability to provide information about value-relevant events ignored by earnings.

Table 3 Regressions of individual stock returns on earnings level and earnings changes for five-year periods

	Model 1: earnings level		
Years	α_0	α_1	R^2
1981–85	81.43 (2.67)*	2.66 (7.04)*	30.1%
1982–86	167.71 (3.82)	3.61 (9.52)*	43.7%
1983–87	90.78 (2.29)	2.06 (7.84)*	34.9%
1984–88	84.31 (2.19)	2.41 (9.92)*	46.1%
1985–89	67.55 (1.83)	2.99 (13.76)*	62.1%
1986–90	17.55 (1.13)	1.35 (9.64)*	44.5%
All	82.15 (5.51)	2.56 (22.81)*	42.5%
	Model 2: earnings changes		
Years	β_0	β_1	R^2
1986–90	57.15 (4.28)	1.29 (8.54)*	38.6%

Note: *t*-statistics are provided in parentheses (* significant at $\alpha \leq 0.01$).

Regression results based on cross-sectionally and time-aggregated data

In order to correct both biases due to value-irrelevant noise in earnings and to recognition lags, the return–earnings regression models 1 and 2 are run with cross-sectionally and time-aggregated data.

Results in Table 4 are based on portfolio returns for five-year intervals. They show that temporal and cross-sectional data aggregation significantly strengthens the explanatory power of earnings for returns by diversifying value-irrelevant noise away and by reducing the lag between the period in which value-relevant events occur and the period in which they are integrated in earnings. Model 1 individual R^2's based on five-year portfolio data average 84.6% instead of 43.6% for five-year individual stock data or 18.5% for one-year individual stock data. Model 2 pooled regression R^2's increase from 12.9% for one-year individual stock data to 52.5% for five-year portfolio data. These results demonstrate that correcting both for recognition lag and for noise in earnings enhances the return–earnings association.

Table 4 Regressions of portfolio returns on earnings level and earnings changes for five-year periods

	Model 1: earnings level		
Years	α_0	α_1	R^2
1981–85	50.23 (2.33)	3.24 (11.25)*	85.7%
1982–86	175.12 (4.48)	3.61 (9.47)*	81.1%
1983–87	74.17 (4.48)	2.21 (8.91)*	78.9%
1984–88	51.2 (1.67)	2.84 (13.52)*	89.3%
1985–89	60.85 (2.17)	3.09 (15.68)*	92.1%
1986–90	−10.64 (0.58)	1.85 (9.27)*	80.3%
All	67.01 (3.94)	2.80 (19.31)*	73.0%

	Model 2: earnings changes		
Years	β_0	β_1	R^2
1986–90	55.26 (3.06)	2.59 (4.82)*	52.5%

Note: *t*-statistics are provided in parentheses (* significant at $\alpha \leq 0.01$).

6. CONCLUDING REMARKS

This paper analyses the contemporaneous association between stock returns and earnings changes or earnings level of individual French stocks and portfolios for periods of one, two and five years in order to test the ability of earnings to summarize the information which is relevant for valuation purposes (i.e. the information the market found relevant when it became available). The evidence suggests that earnings level and earnings changes are both relevant for explaining stock returns, but the level variable seems to perform better than the changes one in explaining returns, indicating that earnings are more linked with changes in firm value than with firm value.

The tests indicate that a cross-sectional data aggregation procedure yields a large increase in the explanatory power of earnings with respect to returns. This is consistent with the cross-sectionally uncorrelated noise-in-earnings hypothesis. This suggests that the weakness of the association between returns and accounting figures, usually observed in studies based on individual firms, is largely due to a noise-in-data problem probably induced by accounting measurement and valuation principles or by manipulation of reported figures. The results also support the recognition lag hypothesis since expanding the period in which the value-relevant events are recognized as earnings enhances the return–earnings association. This suggests that the return–earnings association based on yearly observations might be improved by including accounting figures other than earnings in order to take into account value-relevant events which are not recognized in the earnings of the period under consideration.

Finally, in addition to serving an aim of their own, the results reported in this paper tend to prove that the French accounting standard setting allows an association between stock returns and earnings which is similar to the one observed in most countries, in particular in the US or in the UK where most studies of this kind are frequently conducted. Accordingly, while differences exist, French accounting practices are not less efficient for valuation purposes than those prevailing in these countries.

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NOTES

1 For an analysis of association studies, see Atiase and Tse (1986) and Brennan (1991).
2 Results obtained by Ou and Penman (1989), Martikainen (1993) and Lev and Thiagarajan (1993) show that several financial statements of selected items contribute significantly to the association with security returns beyond the contribution of net earnings alone.
3 For a discussion of the book value (or clean-surplus) model see, for instance, Easton and Harris (1991), Ohlson (1991), Brennan (1991), Lyon and Schroeder (1992) and Strong (1993).
4 See for instance Atiase and Tse (1986), Collins and Kothari (1989) and Strong (1993).
5 As shown by Christie (1987), scaling accounting variables by beginning-of-period prices improves the specification of the tests.
6 Following Easton and Harris (1991), it might have been interesting to test a multivariate model including both earnings levels and earnings changes. Unfortunately, this analysis was not possible because of strong collinearity between variables: the correlation coefficients between the level variable and the changes variable vary from 43% to 77% depending on the year under consideration.
7 Collins and Kothari (1989) experimented several return intervals commencing with different months into the fiscal year. On the basis of maximizing the R^2, they showed that a fifteen-month interval beginning in August of the preceding year is optimal. However, as mentioned by Lev (1989), no theoretical or institutional reason was provided to justify this 'optimal' return interval.
8 Such deletions are very rare. They concern seventeen earnings changes (1.6% of the observations) and nine earnings levels (0.77% of the observations).
9 For instance, Easton and Harris (1991) or Strong (1993) delete observations of earnings deflated by stock prices which exceed 150% in absolute value to avoid undue influences of extreme observations. For the same reason, Collins *et al.* (1994) truncate their earnings growth variable to −200% or +200% when the growth rate exceed 200% in absolute value. Kothari and Zimmerman (1995) exclude the largest and the smallest 1% of their observations.
10 Empirical results supporting the French capital market efficiency can also be found in Dumontier (1985), Hamon and Jacquillat (1992), Hachette (1994), Mai and Tchéméni (1997).
11 The reasons for the instability of earnings coefficients are not examined here because they are beyond the scope of this paper.
12 For a discussion of Vuong's likelihood ratio test, see Dechow (1994: Appendix 2).
13 The same conclusion can be drawn from results reported in Table 2 which are based on portfolios instead of individual stocks.
14 The results obtained for France are compared to those obtained only in the US or in the UK mainly because these are the countries where most similar studies have been conducted.
15 See Most (1984) and Walton and Scheid (1987).
16 See Frylender and Pham (1996).
17 See Nobes (1991).
18 There is no reason to believe *a priori* that differences in R^2's between France and the US (or the UK) are only due to the possible survivor bias mentioned previously.
19 See for instance Beaver *et al.* (1980) or Lev (1989).

20 In order to take into account the fact that dividends may be paid during the time horizon under consideration, Easton *et al*. (1992) propose to adapt the raw return performance index and the earnings variable as follows:

$$\text{Adjusted stock performance index} = \frac{P_T - P_0 + \sum_{t=1}^{T} D_t(1 + R_t)^{T-t}}{P_0}$$

where

$$\text{Adjusted earnings variable} = \frac{\sum_{t=1}^{T} EPS_t + \sum_{t=1}^{T} D_t(R_t)^{T-t}}{P_0}$$

where

$$\sum_{t=1}^{T} D_t(1 + R_t)^{T-t}$$

is the future value of dividends reinvested at the risk-free rate R_t, P_0 is the beginning-of-period stock price, P_T is the end-of-period price. However, this procedure is not used here since Easton *et al*. show that it has no significant impact on their results.

21 Complete results for two-year intervals are not included in the paper; they can be obtained from the authors by request.

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Corporate Disclosure Policy and Analyst Behavior

Mark H. Lang
University of North Carolina at Chapel Hill
Russell J. Lundholm
University of Michigan

ABSTRACT: This paper examines the relations between the disclosure practices of firms, the number of analysts following each firm and properties of the analysts' earnings forecasts. Using data from the *Report of the Financial Analysts Federation Corporate Information Committee* (FAF Report 1985–89), we provide evidence that firms with more informative disclosure policies have a larger analyst following, more accurate analyst earnings forecasts, less dispersion among individual analyst forecasts and less volatility in forecast revisions. The results enhance our understanding of the role of analysts in capital markets. Further, they suggest that potential benefits to disclosure include increased investor following, reduced estimation risk and reduced information asymmetry, each of which have been shown to reduce a firm's cost of capital in theoretical research.

Key Words: *Financial analysts, Discretionary disclosure, Analysts' forecasts, Capital markets.*

Data Availability: *The FAF data used in this study are available from the authors on request.*

I. INTRODUCTION

Financial analysts are an integral part of the capital market, providing earnings forecasts, buy/sell recommendations and other information to brokers, money managers and institutional investors. Much of the information analysts use in their evaluations is

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provided directly by the firm.[1] Although all publicly traded firms must meet minimum disclosure requirements set by the SEC, firms vary substantially in the amount of additional information they provide to the capital markets. Even for mandatory disclosures, such as those found in annual financial statements, firms have substantial discretion in the informativeness of the disclosures and the amount of detail provided.[2] Discretion in disclosure is even more pronounced for press releases and direct contact with analysts. In this paper, we investigate the association between disclosure practices and the number of analysts following the firm and the properties of their forecasts. We document significant associations and interpret those associations to suggest that analysts respond to firms' disclosure practices. Our conclusions suggest that firms can attract analysts, improve the accuracy of market expectations, reduce information asymmetries and limit market surprises by adopting more forthcoming disclosure practices. Although not addressed directly by this study, theory indicates that such results may be associated with a lower cost of capital for firms adopting those strategies.

We use data from the FAF Report (1985–89) as a comprehensive measure of the informativeness of a firm's disclosure policy.[3] In the FAF report, analysts evaluate the complete range of a firm's disclosures, summarizing their evaluations by a score in each of three categories: annual published information, other published information (including quarterly filings, press releases and proxy statements) and investor relations. Our dependent variables are the number of analysts following the firm and the accuracy, dispersion and variability of their forecasts. We control for other variables that previous research has shown to be related to our variables of interest and find that, within their industry, firms with more forthcoming disclosure practices have a larger analyst following, more accurate analyst earnings forecasts, less dispersion among individual analyst forecasts and less volatility in forecast revisions. In addition, these results hold after controlling for potential simultaneity between firms' disclosure choices and analysts' following.

Overall, our results indicate that company-provided disclosure is an important determinant of analyst following and the characteristics of their forecasts. In addition, our finding that more analysts follow firms with more informative disclosure practices is consistent with the notion that firm-provided information is not a substitute for analyst services. Finding greater consensus among analysts for firms with more informative disclosure practices suggests that different analysts make different forecasts primarily because of differences in non-firm-provided information, rather than differences in interpretation of common information.

Nichols (1989) and Schipper (1991) suggest that the behavior of analysts provides insight into the activities and beliefs of investors that cannot be observed directly. To the extent that analysts may be viewed as either representing or influencing investor beliefs, our results also provide insight into the effect of disclosure on investor following and the characteristics of their

[1] Based on surveys of financial analysts, Lees (1981) finds their sources of information, in order of importance, are: (1) interviews with company executives, (2) 10-Ks and other reports to the SEC, (3) annual and interim stockholders' reports, (4) management forecasts (if disclosed), and (5) formal presentations by company executives. Knutson (1992) also argues that companies are a primary source of information for analysts and identifies various communication channels.

[2] As an example, firms have discretion in the number of segments they report, how they aggregate operations into segments and whether they include segmental data in quarterly reports.

[3] We use the term "disclosure policy" to refer to the overall informativeness of a firm's discretionary disclosures, as measured by their score in the FAF Report. The FAF Report (1985–89) measures "the firm's effectiveness in communicating with investors" and the extent to which the firm provides information "so that investors have the information necessary to make informed judgments" across all types of disclosure. Section IV contains a more complete discussion of the data.

beliefs.[4] The effects of enhanced disclosures are of interest to accounting professionals who are involved in preparing and attesting to firm-provided disclosures, corporate managers and regulators. Benefits described by the AICPA Special Committee on Financial Reporting (AICPA 1993), and echoed by investor relations authors Marcus and Wallace (1991) and Mahoney (1991), include reduced uncertainty, lower information asymmetry among stock market participants, fewer extreme earnings surprises and greater investor following. Theoretical research echoes similar benefits to disclosure, including increased investor following (Merton 1987), reduced estimation risk (Barry and Brown 1985), and reduced information asymmetry (Glosten and Milgrom 1985), each of which reduces the cost of capital. Our results suggest that increased disclosure is associated with increases in analyst following and forecast accuracy, reductions in forecast revision volatility and dispersion and which hence, may reduce the cost of capital.

In the next section we discuss the related literature, and in section III we present our hypotheses. In section IV, we present the data and empirical analysis and, in section V, summarize our results and conclusions.

II. RELATED LITERATURE

Our research is related to two streams of the extant literature: (1) research on determinants of analyst following, and (2) research on the determinants of forecast accuracy and dispersion. Most of the empirical research on the determinants of analyst following focuses on firm characteristics other than disclosure policy. In a cross-sectional study, Bhushan (1989) finds that the number of analysts following a firm is increasing in firm size, institutional ownership, and return variability. In a time-series study, O'Brien and Bhushan (1990) find that analyst following increases when a firm's return volatility has declined, increases more for firms with smaller prior analyst following, and increases more for firms in industries with more stringent disclosure requirements and increasing numbers of firms. Brennan and Hughes (1991) find that analyst following is greater for firms with lower share prices after controlling for size, return variability and past returns, and that the number of analysts increases after a stock split. Perhaps closest to our study, Byrd et al. (1993) document a short-term increase in analyst following after CEO presentations to analyst societies and Healy et al. (1994) find that firms in the top quintile of FAF ratings' changes over a 12-year period experience a significant increase in their analyst following, although the firms in the bottom quintile of ratings' changes do not experience a significant decrease in their analyst following. Healy et al. (1994) also find that the firms in the top quintile of FAF ratings' increases are more likely to experience management changes, undertake major business restructurings, access capital markets, repurchase stock and announce stock splits, making it difficult to attribute the increase in analysts solely to the increase in disclosure.

Although there is substantial literature on the properties of analyst forecasts (see Brown et al. 1985 and Brown 1993 for reviews), relatively few papers consider how discretionary disclosure affects analysts' forecasts. Baginski and Hassell (1990) and Jennings (1987) provide evidence that analysts revise their forecasts in response to management earnings forecasts, and Williams (1996) suggests that the magnitude of the adjustment is a function of the usefulness of

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[4] Survey evidence in SRI International (1987) suggests that analyst reports are a primary source of information to buy-side investors, and Marcus and Wallace (1991) argue that analysts are an important source of information for individual investors, either directly or through brokers. This view underlies the use of analyst expectations as a proxy for investor expectations in a large body of capital markets research (see Brown (1993) for an overview).

managements' previous forecasts. Similarly, Waymire (1986) finds that the accuracy of analyst earnings forecasts increases slightly after a management earnings forecast is released. While management earnings forecasts have the advantage of being concrete disclosure events, the FAF data represent a more comprehensive measure of firm disclosure by incorporating important aspects of disclosure which are difficult to quantify (e.g., new product announcements, management discussion and analysis, qualitative discussions with management) and reflect the perceptions of some of the primary users of financial statement data.[5] As an alternative to management earnings forecasts, Kross et al. (1990) use inches of print in the *Wall Street Journal Index* to test whether the accuracy of analyst forecasts increases as the amount of media coverage increases. However, media coverage captures the impact of exogenous events and editorial policy as well as the effect of disclosure policy.[6]

III. HYPOTHESES

We focus on two aspects of analysts' behavior—their choice of which firms to follow as measured by the number of analysts providing earnings forecasts for a firm, and characteristics of their earnings forecasts as measured by the forecast accuracy, the degree of dispersion among forecasts and the variability of forecast revisions during the year.[7]

Disclosure and Analyst Following

In Bhushan (1989), the equilibrium number of analysts is determined by the intersection of the aggregate demand and supply curves for analyst services. The model describes how various firm characteristics affect the intersection of these curves and, consequently, the equilibrium supply of analysts. Applied to our study, the issue is how firm-provided information affects the supply and demand for analyst services.

If it is less costly to receive information from the firm than to acquire it independently from other sources, increased disclosure will shift the analyst supply curve to the right, increasing aggregate supply. All else equal, this effect increases the equilibrium number of analysts.[8] The effect of additional disclosure on the demand for analyst services depends on the role that analysts play in the capital market. If analysts are primarily *information intermediaries*—the principle flow of information goes from the firm to the analysts, who process the information and transmit

[5] It is not clear whether management earnings forecasts are representative of other types of disclosure. The *ex post* accuracy of earnings forecasts is publicly validated or refuted in relatively short order while the validity of other types of disclosure is not as easily assessed. As a result, managers perceive more legal risk associated with earnings forecasts than with other types of disclosure (Lees 1981). Skinner (1994) suggests that concern about potential litigation creates incentives to issue earnings forecasts preempting bad earnings news; however, incentives for "softer" disclosure which is not validated as quickly or precisely are not as clear.

[6] In terms of mandatory disclosures, Brown and Han (1992) find that the consensus of analyst long-range forecasts increases around earnings announcements, and Swaminathan (1991) finds that consensus increases following the adoption of segmental reporting requirements. Baldwin (1984) finds that analysts' forecast accuracy increases for multisegment firms after the adoption of segmental reporting requirements. Brown and Rozeff (1979) find that analyst forecasts of annual earnings become more accurate following interim accounting reports, and Critchfield et al. (1978) find that forecast accuracy increases through the fiscal year but the dispersion among analysts' forecasts remains unchanged. Finally, Brown et al. (1987) show that forecast accuracy (relative to a random walk) is positively associated with firm size and negatively associated with the dispersion of analyst forecasts.

[7] By focusing on earnings forecasts, we ignore other functions of analysts such as issuing buy/sell recommendations and generating trades. It is unclear how analysts weight these different activities, but we assume that the choice of which firms to cover and what to forecast for earnings is a significant part of their job.

[8] In an investor relations context, Nichols (1989) describes how a lack of disclosure leads to a low supply of analyst services. He quotes Robert Dunlap of Irving Trust, "I don't follow Pullman because they won't tell you enough about their business to allow you to get a handle on it.... If they change and become more open with the street, there is no doubt that I'd take more of an interest in Pullman."

it to the capital market—then an increase in firm-provided information means the analyst has a more valuable report to sell. In this case, increased disclosure increases aggregate demand for analyst services. This effect in isolation will increase the equilibrium number of analysts.[9] Consistent with this prediction, the analyst community has consistently come out in favor of increased firm-provided disclosure.[10]

However, if analysts are primarily *information providers* who compete with firm-provided disclosures made directly to investors, then an increase in firm-provided information will substitute for the analyst report. In this case, increased disclosure reduces the aggregate demand for analyst services. This effect in isolation will decrease the equilibrium number of analysts.

In sum, increased firm-provided disclosure is expected to increase the supply of analyst services, but it may either increase or decrease the demand for analysts, so the net effect depends on the relative importance of these potentially competing forces. An observed negative relation between disclosure levels and the number of analysts implies that analysts are primarily information providers, and firm-provided disclosure is a substitute for their services.[11] An observed positive relation implies that either analysts are primarily information intermediaries or else, if they are information providers, the effect of reduced information production costs outweighs the effect of reduced demand.

Since the direction of the effect of disclosure on analyst following is unclear, we test the following non-directional hypothesis (stated in the null form):

H1: The number of analysts following a firm is unrelated to the informativeness of the firm's disclosure policy.

The direction of causality between a firm's disclosure level and the number of analysts is debatable. Specifically, an observed positive relation could reflect either the fact that analysts are attracted to firms which disclose more or that analysts are able to apply pressure on firms which they follow for other reasons to increase their disclosure levels. Evidence presented in Section IV suggests that the direction of causality runs from disclosure policy to analyst following.

Disclosure Policy and Forecast Characteristics

In addition to affecting the number of analysts following the firm, additional disclosure is likely to affect the properties of analysts' earnings forecasts. We consider three characteristics—forecast dispersion, accuracy and volatility.

Dispersion

The effect of increased disclosure on the dispersion of analyst forecasts depends on whether differences in forecasts are due to differences in information or differences in forecasting models. If analysts have a common forecasting model and observe the same firm-provided disclosures but possess different private information, they will place less weight on their private information as the informativeness of firm-provided disclosure increases, increasing the consensus among their forecasts. Alternatively, if analysts have the same firm-provided and private information but

[9] Fishman and Hagerty (1989) and Merton (1987) make similar predictions for investor following. In these models, investors can only follow a limited number of firms and prefer to follow firms that provide the most valuable information.

[10] Knutson (1992) and AICPA (1993), for example, discuss analysts' positions on increased disclosure.

[11] To the extent that firms have an incentive to increase analyst following (as they would in Merton (1987) and Fishman and Hagerty (1989)), it may seem unlikely that they would engage in discretionary disclosure that reduces analyst following. However, as discussed in the introduction, other incentives for disclosure exist (e.g., reductions in information asymmetry, risk, earnings surprises, etc.) which would be balanced in determining disclosure policy.

differ in the weights they place on components of firm-provided disclosure in forecasting earnings, additional disclosure may increase the dispersion of analyst forecasts.[12]

Therefore, an observed negative relation between disclosure and forecast dispersion implies that analysts differ primarily in their private information. Observing a positive association implies that analysts have different forecasting models, so they draw different conclusions from the same observed disclosures and, as the disclosures become more precise, their forecasts become more dispersed. Since the direction of the effect of disclosure on dispersion in analyst forecasts is unclear, we test the following non-directional hypothesis (stated in the null form):

H2: The dispersion of analysts' earnings forecasts is unrelated to the informativeness of a firm's disclosure policy.

Accuracy

The likely relation between disclosure and forecast accuracy is more clear. To the extent that firm-provided disclosure is informative about future earnings, analysts' forecast accuracy will increase with the informativeness of a firm's disclosure policy. Although a firm's disclosures may be useful to analysts without providing information about next period's earnings, it is difficult to imagine scenarios (short of fraudulently misleading disclosures) in which additional disclosure systematically reduces the accuracy of analysts' earnings forecasts. However, the strength of the relation between firm-provided disclosures and the accuracy of analysts' forecasts is an empirical issue. This leads to the following hypothesis:

H3: The accuracy of analysts' earnings forecasts is positively associated with the informativeness of a firm's disclosure policy.

Revision Volatility

The volatility of forecast revisions in the time period leading up to an earnings announcement is likely to be reduced by a more forthcoming disclosure policy. In assessing the informativeness of a firm's disclosure practice, the FAF considers the timeliness of information releases and firms that disclose information on an ongoing basis are judged to have more informative disclosure practices than those that withhold information until a mandatory disclosure is required. Over time, events occur with implications for the firm's future earnings. The firm has the option of disclosing them as they occur (with analyst revisions made after each announcement) or waiting and disclosing them all at once (with only one analyst revision). The latter will result in more extreme expectation revisions when the information is disclosed. The notion that more timely disclosure may be valuable in reducing the magnitude of forecast revisions is consistent with Mahoney (1991) who argues that disclosure is beneficial, in part, because it reduces the incidence of significant surprises for investors and analysts.[13] Our fourth hypothesis (stated in alternate form) is:

H4: The volatility of analyst earnings forecast revisions is negatively associated with a firm's disclosure policy.

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[12]Harris and Raviv (1993) and Kandel and Pearson (1995) present models in which investors differ in their interpretation of publicly-disclosed data, and in which additional disclosure can result in divergence of beliefs.

[13]Mahoney (1991) states that "surprises are anathema to analysts and investors, and thus to investor relations practitioners as well. They are to be avoided. How? By keeping analysts and investors informed..."

IV. EMPIRICAL ANALYSIS

Disclosure Data

The informativeness of firms' disclosures is measured by FAF ratings. The analysis in the FAF Report (1985–89) is conducted by industry-specific subcommittees composed of leading analysts and contains evaluations of the informativeness of a firm's disclosures along three dimensions: annual published information, quarterly and other published information, and investor relations and related aspects.[14] The assessment factors include both the content of a firm's disclosure and its timeliness. Briefly, in the "Annual Published Information" category, analysts assess the clarity and candor of the financial highlights and president's letter, the amount of detail about the corporate officers, the corporation's goals and product and geographic segments, and the overall level of detail in the financial statements and footnotes. In the "Quarterly and Other Published Information" category, analysts consider the depth of coverage in quarterly reports and the availability and timeliness of other written material, such as press releases, proxy statements, summaries of the annual meeting proceedings and presentations to analyst groups, and statistical supplements. In the "Investor Relations" category, analysts assess how knowledgeable and responsive the company contact is to analyst questions, the accessibility of management and their candor in discussing corporate developments, and the frequency and content of presentations to analysts.

The industry subcommittees meet first to agree on the firms to be reviewed and the criteria and weights to be applied in evaluating companies in the industry. The larger firms in the industry are generally reviewed, and the set remains relatively constant over time. Individual committee members later complete evaluations of each firm, which are returned to the subcommittee chairperson. The subcommittees generally meet a second time to summarize the scores, prepare a written explanation and decide whether to recommend any companies for an "Award for Excellence in Corporate Reporting." Each subcommittee report is reviewed by the Corporate Information Committee for consistency and fairness, and a final report is prepared containing a detailed evaluation of each firm. The evaluation assigns a score in each category and a total company score which is a weighted combination of the three category scores. The report is mailed to all the firms surveyed, the FASB, the SEC and other interested parties. In many cases, the subcommittee meets individually with company representatives to discuss the results.[15] A typical year's report covers 460 firms in 27 industries, with an average of 13 analysts in each industry providing the evaluations.

Our primary sample of FAF ratings is taken from the 1985–89 FAF reports. For the investor relations, other publications and total score categories, we use these data as our measure of disclosure that took place during the company's fiscal year. However, the annual report is not

[14]A comparison of the analysts included on the subcommittees with those selected for the *Institutional Investor* All-American Research Team (1988) suggests a substantial overlap. For example, in 1988, 3 of the 5 airline subcommittee analysts and 10 of the 18 chemical subcommittee analysts were members of the 1988 All-American Research Team. In discussions with analysts, a primary motive for serving on a subcommittee is visibility and an indication of status in the analyst community.

[15]The stated goal of the evaluation process is to measure the forthcomingness and effectiveness of communicating with investors. The FAF's "Checklist of Criteria for Evaluating Financial Communications Effort" emphasizes that the evaluation is based on communication with both analysts and shareholders. However, since the evaluation is conducted by analysts (although both the buy and sell sides are included), the criteria may reflect the effectiveness in communicating with analysts more than with investors. Given that our dependent variables are based on analyst followings and characteristics of their forecasts, a disclosure measure which focuses on the ability of disclosure to satisfy analysts' needs is appropriate.

released until after the company's fiscal year end, so for this disclosure category we use the FAF annual report ratings from 1984–1988, matching the analyst dependent variables for a fiscal year to the lagged disclosure data.[16] Descriptive statistics on the disclosure data are based on 1985–1989.

The FAF data represent a cross-section of industries, including service, manufacturing, financial, transportation and extraction.[17] Because approximately nineteen percent of the industry subcommittees (covering 38 percent of the firms) report only the overall company scores, the composition of the sample varies depending on whether the total score or individual category scores are used.[18] Re-estimating the results for the total score variable including only those industries with complete data on each of the disclosure components yields similar conclusions to those reported.

Although disclosure policy is likely to be correlated across the three categories, we include each separately, as well as the total score, because firms may vary in their choice of disclosure media and because the effect of disclosure policy may vary by the media employed.[19] For example, because much of the disclosure included in the investor relations category is targeted specifically at analysts, this category may have the most influence on the willingness of analysts to follow the firm but, to the extent that periodic press releases are important sources of information on material developments for the firm, the other publications category may be a more important determinant of forecast accuracy.

The FAF data contain a potential sample of 751 firms (732 with COMPUSTAT data) that are rated in at least one of the five FAF reports during 1985–1989. In total, there are 2272 firm-years in the sample, with each firm evaluated approximately three times in the five year period. Panel A of table 1 provides descriptive statistics for the three category scores and the total company score as a percentage of total available points. As seen in the table, each category has considerable variation; the difference between the 1st and 99th percentiles is highest for the investor relations variable (75 percent) and lowest for the annual report variable (58 percent), which may suggest that firms can more clearly differentiate their investor relations efforts than their annual report disclosures, perhaps because annual reports are more closely regulated.

A primary advantage of the FAF data is that the scores capture all aspects of disclosure which are viewed as important by analysts rather than focusing on a single aspect, such as the existence of a management earnings forecast. Further, the scores quantify qualitative disclosure (e.g., management's discussion and analysis) and disclosure which may not have been reflected in published financial statements or the media (e.g., conference calls to analysts). In addition, the measures are prepared by analysts who are primary users of financial statements, are familiar with the firms' disclosures through their use of them during the year and invest substantial time and effort in preparing the FAF reports.

A potential problem with the FAF data is that the scores reflect analysts' perceptions of firms' disclosure policies rather than the disclosure policies themselves. However, the FAF is clearly aware of this possibility and the FAF's evaluation process is specifically designed to enhance the objectivity of the evaluations in several ways. First, only summary measures for a subcommittee

[16] For example, we use the 1988 FAF annual report score and 1989 FAF investor relations, other publications and total scores as explanatory variables for 1989 analyst following and forecast characteristics.

[17] See table 1 in Lang and Lundholm (1993) for a summary of industries.

[18] Most prominently, the banking industry provides 20 percent of the total score observations, but this industry subcommittee does not report individual category scores. As a result, the banking industry affects the analysis of total scores, but not the individual disclosure categories.

[19] Marcus and Wallace (1991) and Mahoney (1991) discuss the relative advantages and disadvantages of various disclosure media.

TABLE 1
Descriptive Statistics for the Raw FAF Disclosure Scores, Analyst Dependent Variables and Control Variables

Panel A: Disclosure Variables

			percentile				
Variable	*n*	*mean*	*1%*	*25%*	*50%*	*75%*	*99%*
Annual Report	1324	.73	.37	.64	.75	.83	.95
Other Publications	1392	.70	.30	.60	.72	.83	.96
Investor Relations	1392	.74	.25	.64	.77	.87	1.00
Total Score	2272	.70	.32	.62	.72	.80	.95

Panel B: Dependent Variables

			percentile				
Variable	*n*	*mean*	*1%*	*25%*	*50%*	*75%*	*99%*
Number of Analysts	2175	17.6	2.4	9.9	16.7	24.3	39.8
Standard Deviation of Forecasts	2141	.014	.001	.003	.005	.010	.150
Accuracy	2164	–.042	–.619	–.025	–.008	–.003	.000
Revision Volatility	2211	.010	.000	.001	.002	.005	.137

Panel C: Control Variables

			percentile				
Variable	*n*	*mean*	*1%*	*25%*	*50%*	*75%*	*99%*
Market Value ($ millions)	2215	2438	33	433	1072	2538	20794
Std(Return on Equity)	2022	.021	.001	.005	.015	.028	.111
Return-Earnings Correlation	1952	.316	–.590	.090	.360	.590	.895
Earnings Surprise	2166	.076	.000	.009	.019	.044	.842
Percentage New Forecasts	2169	.267	.102	.208	.263	.318	.457

The four disclosure variables are the analysts' ratings of disclosure from the FAF report measured as the percent of possible points received in each category. The dependent variables, percentage of new forecasts and earnings surprise are all calculated from the IBES Summary Tape. Other control variables are from COMPUSTAT. In total there are 751 firms with at least one year of FAF data during the years 1985 through 1989.

are presented, thereby reducing the opportunity for individual analysts to curry management's favor by providing a more positive evaluation than is warranted. Second, a primary motive for having subcommittee members meet both before and after the evaluation process is to reduce subjectivity and ensure that all members use the same basic criteria in their evaluations. Further, because each subcommittee report includes a written justification of each firm's score, and the report is frequently presented to the firm orally, subcommittee members cannot capriciously make their evaluations. Finally, the Corporate Information Committee's review of the subcommittee reports helps ensure fairness and consistency.

Because each industry is evaluated by a different set of analysts, we industry-adjust the dependent and independent variables. Therefore, the tests explain intra-industry variation in the number of analysts and their forecast properties by the intra-industry variation in the disclosure and control variables. This approach controls for potential cross-industry variation in scores due to differences in subcommittee composition, but ignores cross-industry variation in scores due to legitimate differences in disclosure policy across industries. The results for measures that are not industry-adjusted are consistent with those reported in the paper.[20]

Dependent Variables

All analyst data are taken from the IBES Summary Tape. The four dependent variables we consider are:

Number of Analysts	=	the number of analysts providing an annual earnings forecast;
Std. Dev. of Forecasts	=	the inter-analyst standard deviation of forecasts deflated by stock price;
Forecast Accuracy	=	the negative of the absolute value of the analyst forecast error, deflated by stock price (i.e., $-(\lvert EPS_t - AF_t \rvert)/P_t$, where EPS_t, AF_t and P_t are earnings per share, the median analyst forecast of earning per share and price per share in period t, respectively); and
Revision Volatility	=	the standard deviation of the changes over the fiscal year in the median forecast from the preceding month, deflated by the stock price as of the beginning of the fiscal year.

We deflate the forecast measures by the stock price to facilitate comparisons across firms. We define forecast accuracy as the negative of the (scaled) absolute forecast error so that more accurate forecasts are represented by higher values. The revision volatility measures the smoothness with which analysts' expectations change during the period.[21]

We are interested in assessing the impact of disclosure generally, rather than at a particular announcement date. Further, there is no single time during the year when one would expect investor relations or other publication disclosures to have the most significant effect on analysts. Even though the annual report is issued at a single point in time, it is difficult to identify the date

[20]A related concern is that the individual analysts in a subcommittee may vary across years so that scores may not be strictly comparable across years. The FAF formalizes the evaluation process in part to mitigate such variation. To the extent that it remains, it will add noise to the disclosure variables. Results are consistent when estimated on a year-by-year basis, suggesting that variation in committee composition over time is not of serious concern.

[21]Disclosure policies might also affect the bias in analyst forecasts. For example, analysts might bias earnings forecasts to reward firms who were particularly forthcoming. However, Lang and Lundholm (1993) provide evidence that positive forecast errors are associated with more disclosure. Although this result could imply that analysts bias their forecasts downward for firms who disclose more, a more likely explanation is that firms are more willing to report good news than bad news.

on which the annual report information reaches the market, and the informativeness of the annual report will influence the forecast accuracy and other variables over the entire year. Consequently, the number of analysts, the standard deviation of forecasts and the forecast accuracy are computed as the simple average of the measure across the twelve monthly reporting periods on the IBES tape during the company's fiscal year. Revision volatility is computed as the standard deviation of forecast changes over the twelve months of the fiscal year. Each dependent variable is based on forecasts of annual earnings made during the fiscal year to which the forecasts pertain.[22] As a practical matter, results are robust to changes in the period over which the dependent variables are measured and are very similar using measures computed based on data for a single month computed at fiscal year-end or at six months prior to fiscal year-end.

Panel B of table 1 reports descriptive statistics on the dependent variables. The median firm-year in the sample is followed by 16.7 analysts, has a standard deviation of forecasts equal to 0.5% of its share price, has an analyst forecast error that is 0.8% of its share price and a standard deviation of forecast revisions equal to 0.2% of its share price. Each variable also exhibits considerable variation across the sample, as evidenced by the inter-quartile ranges.

Control Variables

The hypothesized relations between disclosure and the analyst variables are based on the assumption that other variables are held constant. In practice, however, other factors are likely to vary systematically with both the dependent variables and disclosure scores, creating the possibility of an omitted/correlated variable problem. For example, firm size has been shown to be related to both the number of analysts and a firm's FAF disclosure score. If we did not control for firm size in the regression, a significant relation between the number of analysts and disclosure could be observed even if size were the true explanatory variable. Therefore, in addition to simple correlations, we also estimate multiple regressions including five control variables which prior research suggests may affect analyst following and forecast properties, and may be correlated with the variables of interest.

For the analyst-following regression, we include firm size, the standard deviation of return on equity and the historical returns-earnings correlation as control variables. Bhushan (1989) and Brennan and Hughes (1991) provide empirical evidence of a positive association between the number of analysts following a firm and both firm size and performance variability. Waymire (1986) and Lang and Lundholm (1993) suggest that firm size and performance variability are also likely to be correlated with disclosure policy. King et al. (1990) argue that analyst following is likely to be positively associated with returns-earnings correlation because it is easier to predict future stock price based on earnings forecasts for those firms. Lang and Lundholm (1993) document a negative correlation between the level of return-earnings correlation and the firm's disclosure level, with the interpretation that a low returns-earnings correlation indicates that earnings does a relatively poor job of capturing valuation-relevant information, so additional forms of disclosure are necessary.

[22] For example, the number of analysts following a December 31 year-end firm for the 1985 observation is computed as the sum of the number of analysts providing forecasts of 1985 annual earnings at the IBES reporting date for each of the months January through December 1985, divided by 12. As a result, forecasts of 1985 earnings made prior to the announcement of 1984 results may not be strictly comparable with those made later in the year because, for example, some analysts may only begin forecasting 1985 earnings when 1984 results are known. However, the predicted relation between disclosure and analyst behavior holds regardless of whether the forecast variables are measured before or after 1984 results are announced.

The control variables for the number-of-analysts regressions, computed from COMPUSTAT, are:

Market Value	=	the market value of the firm's equity at the beginning of the fiscal year;
Std. Dev. of ROE	=	the historical standard deviation of return on equity computed over the preceding ten years; and
Return-Earnings Correlation	=	the historical correlation between annual returns and earnings computed over the preceding ten years.

We also include the preceding control variables in the regressions examining the forecast dispersion, accuracy and revision volatility. Firm size, returns-earnings correlation and standard deviation of ROE are likely to affect forecast characteristics because, as argued above, they affect analysts' incentives to gather information about the firm and, consequently, are likely to affect their forecast characteristics.[23]

In addition to the control variables listed above, we include additional control variables, earnings surprise and the percent of new forecasts, in our forecast characteristic regressions. The earnings surprise, measured as the random walk forecast error deflated by price, controls for the fact that forecast characteristics are likely to be affected by the magnitude of the earnings information to be disclosed. Consider a firm's introduction of a major new product. Realized earnings are likely to deviate substantially from expected earnings, consensus among analysts is likely to be low, and there are likely to be significant revisions in analyst forecasts. Inclusion of a measure of earnings surprise as an independent variable should control for such factors.

The percentage of new forecasts mitigates the possible effect of stale IBES forecasts. Analyst forecasts which were not updated in a given month are still included in IBES's computation of summary statistics on analyst forecasts, and it is not possible to determine whether the forecast was not revised because it still reflected the analyst's best estimate or because the analyst opted to not reestimate earnings. As a partial control for cross-sectional differences in the staleness of forecasts, we include the average monthly percentage of new forecasts for the year. Controlling for the percentage of new forecasts should reduce any systematic variation across observations in the IBES forecast characteristics which is due solely to differences in the proportion of recently revised forecasts.[24]

We define earnings surprise and percent new forecasts as follows:

Earnings Surprise	=	the absolute value of the difference between the current year's earnings per share and last year's earnings per share, divided by the price at the beginning of the fiscal year; and
Percent New Forecasts	=	the number of forecasts revised during the month plus the number of first-time forecasts issued during the month divided by the number of forecasts at the month-end, averaged over the twelve months in the firm's fiscal year.

[23]We also performed three specification checks for alternative control variables in the number-of-analysts regressions. First, we included the number of institutional investors and the percent of shares outstanding held by institutions in 1987, reflecting Bhushan's (1989) evidence that analyst following is increasing in institutional ownership. Second, we included the firm's share price, based on Brennan and Hughes' (1991) result that the number of analysts is higher for firms with lower share prices. Finally, we included the other three dependent variables as independent variables in each regression. The results are not sensitive to any of these variations.

[24]We have also conducted the analysis for the quartile of observations with the highest percentage of new forecasts (where staleness should be less of an issue) and find consistent results. However, the possibility of stale forecasts cannot be dismissed entirely.

Panel C of table 1 presents descriptive statistics on the control variables. The sample firms are generally large, as indicated by a median firm-year market value in excess of $1 billion; however, market value ranges from $33 million in the 1st percentile to over $20 billion in the 99th percentile.[25] For the median firm-year, the standard deviation of return on equity is 1.5%, the earnings/returns correlation is 36.0%, the absolute value of the change in earnings per share from the previous year is 1.9% of the share price, and 26.3% of the forecasts are new each month.

Simple Correlations

Because we do not predict a particular functional form for the relation between the dependent and independent variables, we base our analysis on ranked data. We rank the dependent and independent variables within their industry-year and convert the ranks to percentiles: (rank – 1)/(number of firms – 1). The conversion yields the percentile of the firm's rank within its industry-year, so the lowest-ranking firm receives a zero and the highest-ranking firm receives a one.

Table 2 presents correlations between pairs of independent variables after they have been converted into percentiles. As one would expect if firms coordinate disclosure policy across media, the three disclosure categories are positively correlated at levels ranging from 0.46 to 0.83. Disclosure categories have correlations that are considerably less than one, suggesting that different categories may capture different aspects of disclosure. The correlations among the control variables are relatively low, ranging from 0.28 to –0.25, as are the correlations between the disclosure variables and the control variables, suggesting that multicollinearity among disclosure and control variables is not likely to be a significant issue in the multiple regressions. As reported in Lang and Lundholm (1993), firms with higher disclosure scores are generally characterized by larger market values, lower standard deviations of past return on equity, and lower past return/earnings correlations. Further, higher disclosure scores are associated with a larger proportion of forecast revisions, suggesting that a more forthcoming disclosure policy is associated with more frequent forecast revisions.

Table 3 presents simple correlations between pairs of analyst variables, and between pairs of analyst variables and independent variables. Panel A displays the associations of primary interest in this study, the relations among analyst following and forecast characteristics and the disclosure variables. The associations are consistent across all three disclosure categories, with correlations significant at the 0.01 level. The number of analysts is positively correlated with the informativeness of a firm's disclosure practices, and firms with more informative disclosure practices have less dispersion in analyst forecasts, the forecasts are more accurate, and there is less volatility in the sequence of forecast revisions.

Table 3, panel B reports the correlations between the analyst variables and the control variables. The number of analysts is most closely associated with market value (0.70). The standard deviation of forecasts and the revision volatility are both highly positively correlated with the earnings surprise and the standard deviation of past return on equity suggesting that, for firm-years with high past and present uncertainty, there is more dispersion and volatility in analysts' forecasts. Similarly, forecast accuracy is negatively correlated with earnings surprise, suggesting that analysts are less accurate when there has been a significant change from last period's earnings.

[25]Because the sample firms are large on average, care should be taken in generalizing the results to other populations. Marcus and Wallace (1991) and Mahoney (1991) suggest that, because of the competition for analyst attention and limited alternate sources of information, disclosure policy is likely to have a greater impact for small firms than for large firms.

TABLE 2
Correlations among the FAF Disclosure Score Variables and Control Variables

	Disclosure Variables			Control Variables				
	Other Pub.	*Inv. Rel.*	*Total Score*	*Mkt. Value*	*SD of ROE*	*R-E Corr*	*Earnings Surprise*	*Percent New*
Disclosure Variables:								
Annual Report	.622	.463	.825	.230	–.113	–.115	–.073	.048
	.0001	.0001	.0001	.0001	.0001	.0001	.0100	.0906
Other Publications		.494	.804	.169	–.079	–.106	–.017	.069
		.0001	.0001	.0001	.0050	.0002	.5451	.0121
Investor Relations			.737	.188	–.101	–.099	–.031	.009
			.0001	.0001	.0003	.0005	.2657	.7560
Total Score				.245	–.085	–.083	–.018	.031
				.0001	.0002	.0003	.4079	.1525
Control Variables:								
Market Value					–.247	–.113	–.125	.061
					.0001	.0001	.0001	.0050
Std. Dev. of ROE						.111	.186	.058
						.0001	.0001	.0099
Returns-Earnings Correlation							.126	.038
							.0001	.0949
Earnings Surprise								.275
								.0001

All variables are computed by ranking the unranked variables in table 1 within their industry-year and converting the ranks to percentiles: (rank – 1)/(number of firms – 1). Listed below each correlation is the p value. The number of observations ranges from 1047 to 2125.

TABLE 3

Correlations Among the Dependent Analyst Variables and the FAF Disclosure Score Variables and Control Variables

	Dependent Variables			
	Number of Analysts	*Std. Dev. of Forecasts*	*Forecast Accuracy*	*Revision Volatility*
Panel A: Disclosure Variables				
Annual Report	.267	–.174	.081	–.142
	.0001	.0001	.0080	.0001
Other Publications	.228	–.095	.086	–.113
	.0001	.0005	.0018	.0001
Investor Relations	.267	–.177	.156	–.200
	.0001	.0001	.0001	.0001
Total Score	.331	–.123	.106	–.146
	.0001	.0001	.0001	.0001
Panel B: Control Variables				
Market Value	.701	–.255	.182	–.270
	.0001	.0001	.0001	.0001
Std. Dev. of ROE	–.190	.303	–.172	.267
	.0001	.0001	.0001	.0001
Return-Earnings Correlation	–.116	.152	–.128	.107
	.0001	.0001	.0001	.0001
Earnings Surprise	–.071	.454	–.458	.404
	.0009	.0001	.0001	.0001
Percent New Forecasts	.079	.407	–.475	.507
	.0002	.0001	.0001	.0001
Panel C: Dependent Variables				
Std. Dev. of Forecasts	–.149			
	.0001			
Forecast Accuracy	.131	–.615		
	.0001	.0001		
Revision Volatility	–.197	.764	–.670	
	.0001	.0001	.0001	

All variables are computed by ranking the unranked variables in table 1 within their industry-year and converting the ranks to percentiles: (rank – 1)/(number of firms – 1). Listed below each correlation is the p value. The number of observations ranges from 1047 to 2125.

Table 3, panel C reports the correlations between the dependent variables. The highest correlation is between forecast revision volatility and standard deviation of forecasts (0.76) suggesting that forecast revisions tend to be more volatile in cases in which there is less consensus among analysts. Forecast accuracy is positively correlated with the number of analysts, possibly because the median forecast becomes a more accurate estimator as the number of observations increases.

Given the relatively high correlations among the analyst following and forecast characteristic variables, the control variables and the disclosure variables noted above, inference drawn from the simple correlations may be misleading. Specifically, our interest is in the marginal effect of disclosure on analyst following and forecast characteristics. In the next section, we assess the marginal effect of disclosure holding other variables constant.

Regression Results

Table 4 reports the results of regressions of the number of analysts on the control and disclosure variables.[26] With respect to H1, results for the total score category indicate a significant relation between disclosure policy and analyst following, suggesting that analyst following is a function of disclosure policy.[27]

To test whether each category has explanatory power incremental to that in the other categories, we estimate the regression including all three categories together. The collinearity among the disclosure variables discussed earlier can result in inflated sampling variances and unstable coefficient estimates. Nevertheless, when all three components of disclosure are included, coefficients on both the other publications and investor relations categories are significantly positive, while the coefficient on the annual report variable is insignificant.[28] The significant positive coefficients for the investor relations and other publications variables are consistent with Lees' (1981) survey finding that analysts rely heavily on direct contact with firms and with the notion that, although the securities laws prohibit disclosure of material nonpublic information to selective subsets of the analyst population, a firm's willingness to communicate with analysts is an important factor in their willingness to follow a firm.[29] The significant result when the annual report variable is included separately and the correlations across disclosure categories suggest that increased disclosure in the annual report is part of an overall disclosure strategy that increases analyst following. However, the fact that annual report loses significance when all three categories are included indicates that the other disclosure variables capture the

[26]Iman and Conover (1979) provide a discussion of rank regression. This ranking mechanism produces larger differences between percentiles for small industries than for large industries. For example, in an industry with only two firms, one will have a disclosure score of 1.0 and the other of 0.0 where, if those firms were in an industry with many firms, their values would probably be less extreme. As a result, observations in industries with fewer firms will tend to have slightly higher variances. We have re-estimated the regressions with unranked data and with data ranked across all firms (not adjusted for industry) with similar results to those reported in the paper, suggesting that this effect does not affect our conclusions.

[27]Significance levels should be interpreted with caution because some firms are included in the analysis for consecutive years, which may induce auto-correlation in the residuals. We have conducted specification checks which take first order auto-correlation into account with very similar results. As a more extreme check, we also conducted the analysis using only one observation per firm with very similar results. A firm appears in our sample on average three times, so at most the number of independent observations is overstated by a factor of three, causing the t-statistics to be overstated by at most a factor equal to the square root of 3. Unless otherwise stated, we refer to a result as "significant" if the p-value for a two-tailed test is less than 0.01.

[28]Collinearity between disclosure categories is an issue in all of the sets of regressions which follow. In every case, each disclosure category is statistically significant with a consistent sign in explaining forecast characteristics when included alone, but generally one or more are not significant when the other categories of disclosure are included.

[29]The fact that the coefficient on the total score is higher than that on any of the components reflects the fact that the relation tends to be stronger for the industries for which the subcommittees did not provide scores for the individual disclosure categories (principally banking).

TABLE 4
Regression of the Number of Analysts Following the Firm on Disclosure Scores and Control Variables

$$\textit{Number of Analysts} = \alpha + \beta_1 \textit{Annual Report} + \beta_2 \textit{Other Publications} + \beta_3 \textit{Investor Relations} + \beta_4 \textit{Total Score} + \beta_5 \textit{Market Value} + \beta_6 \textit{Standard Deviation of ROE} + \beta_7 \textit{Return-Earnings Correlation} + \varepsilon$$

α	β_1	β_2	β_3	β_4	β_5	β_6	β_7	N	R^2
0.11				0.17	0.66	–0.01	–0.02	1868	0.52
(6.2)				(10.1)	(38.6)	(–0.8)	(–1.5)		
0.17	0.02	0.07	0.10		0.59	–0.05	–0.06	998	0.45
(6.1)	(0.8)	(2.3)	(3.5)		(23.0)	(–1.8)	(–2.7)		

Regressions are estimated using ordinary least squares, with all variables ranked and then computed as percentiles within the industry-year. T-statistics are noted in parentheses below each coefficient estimate. Annual Report, Other Publications, Investor Relations and Total Score are the annual report, other publications, investor relations and total score, respectively, based on the FAF scores for each category of disclosure. Number of Analysts is the average number of analysts on IBES providing an estimate of annual earnings over the 12 months of the company's fiscal year. Market Value is the market value of outstanding equity at the beginning of the fiscal year. Standard Deviation of ROE is standard deviation of net income divided by shareholders' equity and Returns-Earnings Correlation is the correlation between annual returns and earnings, each calculated over the 10 years prior to the observation. N is the number of observations and R^2 is the adjusted R^2 for the regression.

effect of the disclosure strategy, and the score for the annual report does not have incremental explanatory power.[30]

The positive relation between the number of analysts and the FAF scores suggests that firm-provided disclosures complement rather than substitute for analyst activities. Consequently, information intermediation (processing firm-provided information) appears to be a significant aspect of the analyst function in capital markets. As argued earlier, if analysts were primarily information providers—in competition with firm disclosures provided directly to investors—then more firm-provided disclosures should diminish the value of analyst services and the number of analysts following the firm.

The coefficient on firm size is positive and significant, consistent with the results reported by Bhushan (1989). The standard deviation of past return on equity and the correlation between annual returns and earnings are significantly negative in the regression including all three categories of disclosure separately but are not significant in the regression including only the total disclosure score, providing weak evidence that analysts are more likely to follow firms with low performance variability and firms for which earnings are not highly correlated with returns. The negative coefficient estimate for performance variability in the regressions including all three

[30]The fact that we measure analyst following as an average over 12 months while the annual report is released at one point in time may bias against results for the annual report variable. However, results are not sensitive to time period over which the analyst-following variable (or other analyst variables) are measured.

categories of disclosure is consistent with that documented by Bhushan (1989) and Brennan and Hughes (1991), but the negative association between analyst following and the return-earnings correlation runs counter to the intuition from King et al. (1990) that the incentives for private information acquisition will be greater when the returns-earnings correlation is high. The explanatory power of the regressions is substantial, with an adjusted R^2 of 0.52 for the regression including the total score and 0.45 for the regression including all three of the disclosure categories.

Direction of Causality

Our hypotheses assume firms choose their disclosure policies partly to influence the activities of analysts. Thus, we view the informativeness of disclosure as "causing" the observed level of analyst following. It is possible, however, that the direction of causality is the opposite (i.e., a larger analyst following causes the firm to increase its disclosures) or that analyst following and the informativeness of disclosures are simultaneously determined by other exogenous variables.

One approach to investigating the direction of causality is to examine the association between changes in disclosure scores and changes in the lead and lag number of analysts. There are several problems with this approach. First, while the FAF attempts to maintain consistency from year to year, the evaluation process is designed to make comparisons among firms at a point in time, rather than comparisons of the same firm through time. The composition of the industry subcommittees and the specific criteria and weights vary from year to year, so changes in disclosure scores may reflect changes in subcommittees or criteria over time. Second, the disclosure policy of a firm and the number of analysts following it are likely to change only slowly over time because of the fixed costs to a firm of substantially changing disclosure policies or the fixed cost to an analyst of adding or deleting a firm. Therefore, we include changes computed over time periods of up to four years. However, because a given firm may have been evaluated in only a subset of the sample years, the number of observations for longer intervals is significantly reduced.

We compute the rank-order correlations between changes in disclosure scores and changes in both lead and lag analyst following. The change in lead (lag) analyst following is the change in the number of analysts following the firm computed over the time period following (preceding) the period over which the change in disclosure is computed. If changes in the number of analysts following the firm *precede* changes in disclosure policy, then the correlation between changes in disclosure and changes in the lagged number of analysts should be positive; if changes in the number of analysts *follow* changes in disclosure policy, then the correlation between changes in disclosure and changes in the lead number of analysts should be positive. As seen in table 5, all but one of the correlations for the lagged number of analysts are negative (although many are not significant), rejecting the hypothesis that changes in the number of analysts precede changes in disclosure. In addition, all the correlations for the lead number of analysts are positive, (although only a subset are significant) supporting the hypothesis that changes in the number of analysts follow changes in disclosure. Although a chronological ordering of events does not conclusively establish causality, these results provide limited evidence that disclosure policy changes cause changes in the number of analysts; we observe no evidence that causality runs in the opposite direction.

An alternate approach is to estimate a simultaneous equations model to investigate whether a firm's disclosure score and the number of analysts following the firm are jointly determined by a set of exogenous variables. The simultaneous equations approach potentially controls for bias in the OLS estimates when the error term is correlated with the independent variables, as is the case when a truly endogenous variable is treated as an exogenous (independent) variable. To implement this model, we estimate a first stage regression of FAF scores on a set of instrumental

TABLE 5
Correlations between Changes in FAF Disclosure Score Variables and Lag 1 and Lead 1 Changes in the Number of Analysts Following the Firm, Computed over Window Lengths of 1 to 4 Years

4 Year Window

	ΔAnnual Report	ΔOther Pubs	ΔInvestor Relations	ΔTotal Score	
Δ in lead 1	0.11908	0.29018	0.11076	0.23833	correlation
# of analysts	0.1494	0.0003	0.1802	0.0001	p value
	148	148	148	265	number of obs.
Δ in lag 1	–0.00767	0.05087	–0.13693	–0.01944	
# of analysts	0.9270	0.5435	0.1005	0.7569	
	145	145	145	256	

3 Year Window

	ΔAnnual Report	ΔOther Pubs	ΔInvestor Relations	ΔTotal Score
Δ in lead 1	0.02421	0.14201	0.04560	0.05948
# of analysts	0.6578	0.0083	0.3985	0.1594
	337	345	345	561
Δ in lag 1	–0.04320	–0.02268	–0.11085	–0.08039
# of analysts	0.4300	0.6751	0.0399	0.0607
	336	344	344	545

2 Year Window

	ΔAnnual Report	ΔOther Pubs	ΔInvestor Relations	ΔTotal Score
Δ in lead 1	0.11373	0.17181	0.05293	0.07938
# of analysts	0.0091	0.0001	0.2135	0.0171
	525	554	554	902
Δ in lag 1	–0.03703	–0.01245	–0.10952	–0.05556
# of analysts	0.3972	0.7708	0.0102	0.0999
	525	550	550	878

1 Year Window

	ΔAnnual Report	ΔOther Pubs	ΔInvestor Relations	ΔTotal Score
Δ in lead 1	0.05136	0.06131	0.00597	0.02076
# of analysts	0.1461	0.0715	0.8608	0.4361
	802	865	865	1409
Δ in lag 1	–0.04702	–0.02555	–0.03657	–0.03731
# of analysts	0.1846	0.4561	0.2861	0.1680
	798	853	853	1367

ΔAnnual Report, ΔOther Pubs, ΔInvestor Relations and ΔTotal Score are the changes in the annual report, other publications, investor relations and total disclosure scores from the FAF data. Δ in lead 1 # of analysts and Δ in lag 1 # of analysts are the changes in the number of analysts over the period following and over the period preceding the window over which the change in disclosure scores is computed respectively. The window over which both variables are computed is noted at the top of each panel.

variables; we then use the predicted value from this regression in place of the actual disclosure score in the number-of-analysts regression. Whether the coefficient estimates from this approach are more or less biased than the OLS estimates depends on whether the instrument variables are indeed exogenous (i.e., independent of the error term) and the portion of the variation in disclosure score that is captured in the first stage regression (Bound et al. 1993). In the context of our analysis, the difficulty is identifying instrumental variables that are highly correlated with FAF scores, but are uncorrelated with the error from the number of analysts regression.

Our source of instruments is Lang and Lundholm (1993), who model disclosure scores as a function of the firm's structural environment (market value and standard deviation of past return on equity), performance (market-adjusted returns and analysts' earnings forecast errors) and activity in the public capital market (security offering in the current or following two years). While the explanatory variables are statistically significant, the resulting first-stage regressions have very low adjusted R^2s, ranging from 0.05 to 0.09, which suggests that significant measurement error may have been introduced in the first stage of the analysis.

To assess statistically whether the two equations are simultaneously determined, we apply the Hausman test (Hausman 1978). We regress the number of analysts on the exogenous variables (i.e., the control variables), the instrument for disclosure score (i.e., the predicted value from the first-stage regression) and the actual disclosure score. If the disclosure score is truly exogenous, the coefficient on the instrumented disclosure score will equal zero. The results from this test fail to reject the hypothesis that the coefficient is zero for all four disclosure score variables, suggesting that simultaneity is not an issue. The p-value for two-tailed t-test is 0.19 for the annual report, 0.18 for other publications, 0.62 for investor relations and 0.77 for the total score.

Results from estimating the second-stage regressions using the instruments estimated in the first stage (not reported) are consistent with those reported earlier. While the statistical significance of the disclosure scores is reduced somewhat relative to the results in table 4, all remain significant at less than the 0.10 level. The reduced significance may reflect the effects of simultaneity, but it also likely reflects the low R^2 in the first-stage regressions.

In summary, the analysis for number of analysts suggests a significant relation between the firm's disclosure policy and the number of analysts following the firm. Further, there is limited evidence that changes in firms' disclosure policies cause changes in analyst following; there is no evidence of the opposite direction of causality.[31]

Forecast Dispersion and Disclosure

Table 6, panel A provides evidence on H2 with respect to the relation between forecast dispersion and disclosure. In the regression including the total disclosure score, the coefficient on the total score is significantly negative, suggesting that more forthcoming disclosures decrease dispersion among analyst forecasts. This result is consistent with additional disclosure reducing the divergence of beliefs across analysts by increasing the precision of their shared information. In the regression including all three categories of disclosure, coefficients on both the annual report and investor relations variables are significantly negative, but the other publications variable is not significant.

The relation between the standard deviation of analyst forecasts and market value is negative, indicating that analyst dispersion is lower for larger firms. The relations between the standard

[31]We do not control for simultaneity of other dependent variables because forecast characteristics in a given period are unlikely to affect contemporaneous disclosure ratings (e.g., firms are unlikely to increase disclosure because analyst forecasts are very accurate). It is possible that analysts' perceptions of disclosure are affected by forecast characteristics, but the FAF designs the evaluation process to mitigate this bias.

TABLE 6
Regression of Forecast Characteristics on Disclosure Scores and Control Variables

Forecast Characteristics = $\alpha + \beta_1$*Annual Report* + β_2*Other Publications* + β_3*Investor Relations* + β_4*Total Score* + β_5*Market Value* + β_6*Standard Deviation of ROE* + β_7*Returns-Earnings Correlation* + β_8*Earnings Surprise* + β_9*% New Forecasts* + ε

Panel A: Standard Deviation of Analyst Forecasts

α	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9	N	R^2
0.19				–0.07	–0.18	0.17	0.06	0.31	0.33	1850	0.38
(8.7)				(–3.6)	(–9.1)	(8.8)	(3.3)	(15.9)	(17.4)		
0.28	–0.08	0.01	–0.06		–0.25	0.18	0.07	0.27	0.33	989	0.42
(8.6)	(–2.7)	(0.2)	(–2.2)		(–9.2)	(6.7)	(2.6)	(10.5)	(13.0)		

Panel B: Forecast Accuracy

α	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9	N	R^2
0.79				0.06	0.14	–0.03	–0.05	–0.33	–0.40	1858	0.38
(35.4)				(3.4)	(7.2)	(–1.4)	(–2.5)	(–17.0)	(–20.6)		
0.73	–0.01	0.06	0.07		0.19	–0.02	–0.03	–0.32	–0.41	994	0.38
(21.4)	(–0.4)	(1.9)	(2.3)		(6.5)	(–0.7)	(–1.2)	(–12.2)	(–15.7)		

(*Continued*)

TABLE 6 (*Continued*)

Panel C: Volatility of Forecasts Revisions

α	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9	N	R^2
0.24				–0.09	–0.21	0.12	0.02	0.23	0.45	1858	0.41
(11.0)				(–5.1)	(–10.8)	(6.6)	(1.0)	(12.0)	(24.5)		
0.33	–0.03	0.01	–0.10		–0.27	0.12	0.02	0.19	0.44	994	0.42
(9.9)	(–1.1)	(–0.4)	(–3.4)		(–9.9)	(4.5)	(1.0)	(7.6)	(17.5)		

Panel title indicates the forecast characteristic dependent variable in the regression. Regressions are estimated using ordinary least squares, with all variables ranked and then computed as percentiles within the industry-year. T-statistics are noted in parentheses below each coefficient estimate. N is the number of observations and R^2 is the adjusted R^2 for the regression.

deviation of forecasts and the standard deviation of past ROE, the past returns-earnings correlation, earnings surprise and the percentage of new forecasts are all significantly positive, suggesting that the dispersion among analysts is higher when the past earnings series is volatile and strongly related to past returns, and when there is a large earnings surprise and frequent forecast revisions. The proportion of variation explained in the regressions is substantial, with adjusted R^2s of 0.38 for the regression including total score and 0.42 for the regression including all three disclosure categories.

Forecast Accuracy and Disclosure

Table 6, panel B presents results from the regressions of forecast accuracy on the disclosure scores, providing evidence on H3. The coefficient on the total disclosure score is significantly positive when it is included as an explanatory variable, confirming that firm disclosure is an important determinant of the accuracy of analyst forecasts. When all three disclosure categories are included, coefficients on both the other publications and investor relations categories are significantly positive, consistent with the notion that ongoing communication with companies is an important source of information to analysts in forecasting earnings.

Accuracy is positively associated with market value, suggesting that analysts' forecasts are relatively more accurate for larger firms. The coefficients on the standard deviation of past return on equity are negative but insignificant. The standard deviation of past forecasts was significantly negatively correlated with accuracy in the simple correlations, so it appears that inclusion of other measures of uncertainty such as earnings surprise and market value have rendered this variable insignificant. Coefficients on the earnings-return correlation, earnings surprise and percent of new forecasts are generally significantly negative, suggesting that forecasts tend to be less accurate in cases when there is a large earnings surprise, when analysts are frequently revising their forecasts and when the past association between returns and earnings is low. The significant negative coefficients on the percent of new forecasts suggest that its inclusion is, at best, a partial control for stale forecasts. The regression explains a significant proportion of the variation in forecast accuracy, with adjusted R^2s of 0.38 for both the regression with total score and the regression including all three categories of disclosure.

Volatility of Forecast Revisions and Disclosure

Table 6, panel C presents evidence on H4 from the regression of forecast revision volatility on disclosure scores. The coefficient on the total score is significantly negative when it is included in the regression. When all three disclosure categories are included, only investor relations is significant, consistent with the notion that a firm can reduce the likelihood of large revisions in analysts' expectations through its investor relations effort.

The volatility of forecast revisions is decreasing in market value, suggesting that there are fewer extreme expectation revisions for large companies. The relation between variability of forecast revisions and the standard deviation of past ROE, earnings surprise and percentage of new forecasts are all positive, suggesting that revisions in expectations tend to be volatile when there is a large earnings surprise, there are frequent forecast revisions and the past earnings series is volatile. The coefficient on the correlation between returns and earnings is insignificant, suggesting that the past relation between returns and earnings is not a significant determinant of forecast revision volatility. The explanatory power of the regressions is high, with adjusted R^2s of 0.41 for the regression with the total disclosure score and 0.42 for the regression including all three categories of disclosure.

V. CONCLUSIONS

The results of this paper indicate that, after controlling for size, the earnings surprise and other attributes of the information environment, firms with more forthcoming disclosures in their industry have a greater analyst following, more consensus among analysts' earnings forecasts, more accurate forecasts and less variable forecast revisions. Of the three categories of disclosure considered, investor relations is consistently a significant determinant of analyst behavior even after controlling for other categories of disclosure, confirming existing survey and anecdotal evidence that direct contact with the company is a primary source of information for analysts.

Overall, these results are consistent with the view that more forthcoming disclosure policies, particularly in the investor relations area, attract more analysts, either because these disclosures increase the demand for analyst reports or because they reduce analysts' costs of supplying them. The fact that an increase in firm-provided information increases analyst following suggests that analysts are not in direct competition with firm disclosures provided directly to investors. The results are also consistent with the view that analysts possess both firm-provided and privately-acquired information, but that increases in disclosure and timeliness reduce the weight analysts place on other information in their forecasting models and smooth the forecast revision process by expediting the resolution of uncertainty.

To the extent that the behavior of analysts captures that of investors more generally, these results are consistent with motivations for disclosure given in the investor relations literature and have implications for management as it sets disclosure policy, for the SEC and Congress as they establish securities laws and for the FASB as it proceeds with its project on "Disclosure Effectiveness." While there has been a great deal of discussion about the costs of increased disclosure, potential benefits have received less attention.[32] Although the evidence is indirect, this study finds relationships between firms' disclosure policies and factors that have been linked to a reduced cost of capital. The results for analyst following suggest that firms that disclose more have a larger pool of potential investors; the results for forecast accuracy suggest that their investors have more accurate beliefs about future performance; the results for forecast dispersion suggest that there is less asymmetry in investors beliefs about their performance; and the results for revision volatility suggest that investor expectations about their earnings change more smoothly over the year.

[32]The FASB laments in SFAS No. 1 that, "the benefits from financial information are usually difficult or impossible to measure objectively, and the costs often are."

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GREG CLINCH

Accounting Measurement and Capital Markets Research

Measurement of financial statement elements is a fundamental concern of financial accounting.

The difficulty experienced in seeking consensus on the many accounting measurement questions suggests that no single perspective is likely to provide all of the answers. Nevertheless, there is reason to expect that capital markets research has the potential, at least, to shed some light on accounting measurement issues. In particular, the importance of capital market participants as a class of financial statement users suggests that studying their behaviour (indirectly) through various market metrics is a promising research direction. And the large volume of capital markets research suggests also the potential to inform the many debates surrounding a wide range of accounting measurement questions.[1]

Despite this initial promise, my main conclusion is that the contribution of capital markets research to our understanding of measurement questions to date has been quite modest. In particular, the present "state of the art" in capital markets research allows conclusions concerning whether a particular accounting number measures *something* that is relevant to investors, but little more. Questions concerning precisely what is being measured by the accounting number, whether the measurement object is a suitable target in the first place and how well it is being measured are not yet easily addressed using capital markets-based research approaches. Although this is a disappointing conclusion, I suggest that it reflects an early stage of development in the research literature rather than an inability *per se* to address these questions successfully. In light of recent and continuing theoretical advances relating accounting (and other) information to capital market outcomes, I remain optimistic that a capital markets research perspective has more to offer in the future.

There are at least two broad questions relating to accounting measurement that are important to address:

1. For a specific financial statement element, what is the appropriate object of measurement? For exam-

Numerous controversies — from goodwill amortisation to the appropriateness of fair value accounting — illustrate both the importance of measurement questions, and the difficulty often encountered in devising accounting measurement "solutions" that are widely accepted. This paper discusses what might be learned about accounting measurement questions from the perspective of capital markets-based research. While this field of inquiry is not well developed, there are indications that further research from the capital markets perspective could provide useful conclusions about accounting measurement.

ple, in the case of non-current assets is the "preferred" approach to measure the assets at cost, cost after deducting suitable charges for amortisation (ie, amortised cost), amortised cost subject to an impairment test, market value, value in use, or some other alternative?

2. Given a specific measurement object, how should the object be measured and what are the properties of alternative measurement approaches or estimates? For example, if amortised cost is chosen as the appropriate object for measurement, what amortisation method will result in a "better" measure? Or, if an impairment test is viewed as appropriate, should it be subject to a discounted or non-discounted realisable value benchmark?

The first question relates in part to whether a proposed and (typically) unobservable object for measurement is likely to be relevant to financial statement users, including investors. How well, or reliably, the object is measured by a particular set of measurement rules is the target of the second question.[2] The issue addressed in this paper is to what extent capital markets-based accounting research can assist in answering these questions.

Broadly defined, capital markets-based research investigates various aspects of the operation of capital markets, including the role of differing market structures, the behaviour of market participants and the role of information in the market. A large subset of capital markets research investigates the association between various dimensions of market activity — such as share prices, volume of trade and bid-ask spreads — and specific information available to market participants.[3] It is built on the assumption that observable market activity reflects the aggregation of individual market participants' investment and trading decisions. More specifically, to the extent that investors employ accounting information in their investment and trading decisions, it is assumed that this is (potentially) detectable in market-wide indicators such as share prices. Under this assumption, the association between share prices (or other market indicators) and accounting information might be used to infer market participants' perceptions of the properties of accounting measures — including their relevance and reliability.

IT IS BUILT ON THE ASSUMPTION THAT OBSERVABLE MARKET ACTIVITY REFLECTS THE AGGREGATION OF INDIVIDUAL MARKET PARTICIPANTS' INVESTMENT AND TRADING DECISIONS.

Since the research focuses primarily on one class of financial statement user — investors — and the interests of differing classes of users need not agree, it cannot fully answer the two accounting measurement questions above. In particular, it is not able (or designed) to answer prescriptive questions requiring the balancing of different interests. However, it can potentially provide input that is important in addressing these issues, particularly given the importance attached to investors as a major class of financial statement users.

WHAT MIGHT BE LEARNED FROM THE CURRENT STATE OF CAPITAL MARKETS RESEARCH?

The example of non-current asset measurement and some of the related capital markets research can provide a useful illustration of the issues for at least two reasons:

- The appropriate measurement of non-current assets remains an unresolved question, with various measurement bases such as unamortised cost (with and without impairment tests), voluntary revaluations and sometimes fair values being allowed or required in different regulatory jurisdictions.
- There is a reasonable, and growing, body of capital markets-based research related to this question — much of it quite recent.[4]

The research indicates that for most major classes of non-current assets, firms' market values appear to be positively associated with asset carrying values measured at cost, at revalued amount, and where available fair value. However, it is not yet clear which (if any) of the asset measurement approaches is more strongly associated with firms' values, and whether this varies between asset classes.[5]

In terms of the two measurement questions posed above, the mere association between share values and asset carrying amounts provides only a little guidance. The first question, regarding what is an appropriate measurement object for non-current assets, is not answered at all since an association between firm market values and the various measurement alternatives alone implies nothing about any benefits to investors of such an association. There are several reasons for this.

First, an association need not mean that investors actually use the information in making their investment and trading decisions; it may simply reflect some common information with other accounting (or non-accounting) measures that are used by investors.[6] In these circumstances, the specific accounting measure might be removed with little or no impact on investor welfare. Second, an association with firm values need not mean investors are made better (or worse) off, even if the information is being used by investors. This is a long and well established result in the research literature relating to the economics of information.[7] Finally, the fact that the research indicates that alternative measurement bases (eg, cost or revalued amount) are all associated with firm market values does little to help choose *among* the bases. However, the observed associations do suggest a minimal conclusion: that each of the measurement bases reflects *something* that is relevant to investors. If the measurement bases reflected no useful information, it is unlikely they would be associated with investors' decisions and reflected in share price.

The second measurement question, regarding the reliability of accounting measures, also receives only a modest answer: associations between firm market values and accounting measures such as amortised cost or revalued amount suggest that the accounting measure in question is sufficiently reliable for the measures to reflect *something* of potential interest to investors. However, identifying precisely what is being measured remains elusive. This is because the reason the accounting measure is associated with price is typically not explicitly described (or tested) in the research. In particular, it is possible for the accounting measure to reflect information very different from that implied by the particular measurement object.[8] This makes inferences about measurement properties less clear.[9] Also, comparing measurement properties (such as reliability) across competing accounting measures is difficult.[10]

In summary, the inferences presently available from capital markets-based accounting research regarding accounting measurement questions are quite limited. Certainly the existence of an association between firm market values and an accounting measure suggests the measure is relevant and reliable enough in reflecting some (unstated) aspect of companies' activities of interest to market participants for the association to be detectable. However, assessing levels of relevance or reliability, and comparing these across competing measures with any great confidence is not yet possible.

WHAT IS NEEDED TO EXTEND THE INFERENCES AVAILABLE?

The minimal inferences presently available from capital markets research regarding accounting measurement questions are hardly satisfactory. However, I believe these inferences can eventually be extended in future research, particularly regarding the properties (eg, reliability) of specific accounting measures.

The inability of capital markets research to determine appropriate measurement objects — eg, whether assets should be measured at amortised cost, revalued amount or on some other basis — is not surprising. Such a question is prescriptive, and requires agreement on what are appropriate objectives for financial reporting and how conflicting interests among financial statement users, preparers and other interested parties are to be balanced.

In contrast, the second measurement question, regarding the properties of particular accounting measures, is potentially well suited to capital markets research approaches since it is essentially a descriptive question. The failure to make much progress with this question in capital markets research is not because of the nature of the question, but because of a lack of ingredients necessary to properly address the question. In particular, the major deficiency is the unavailability of sufficiently developed theory linking observable capital market indicators (such as market value) with information available to investors. Instead, almost all research has avoided specifying this link, leading to the limited inferences discussed earlier.[11]

Despite this shortcoming in existing research, there have been recent theoretical developments in at least two areas that will assist future capital markets research into accounting measurement properties:

- The model by Ohlson (1995) and subsequent refinements, in, for example, Feltham and Ohlson (1995), provide a framework linking measurement properties of accounting numbers and share valuation. The model has focused on aggregate accounting numbers such as a firm's net book value and earnings and how they can be linked to firm values. However, it provides the foundation for potential future extensions based on specific financial statement elements.
- Recent research using rational expectations models of capital markets has begun to investigate accounting questions such as the impact of international accounting harmonisation (eg, Barth, Clinch and Shibano 1999 and Huddart, Hughes and Brunnermeier 1999), and the impact of recognition and disclosure (eg, Barth, Clinch and Shibano 2000) on the operation of capital markets. Although this research does not directly address the accounting measurement questions discussed in this paper, it does incorporate measurement issues in the models developed.[12] This is a potential precursor to future research directed specifically at accounting measurement questions relating to particular financial statement elements.

Each of these approaches potentially provides the foundation for future research linking measurement properties of accounting numbers with market activity, although from differing modelling perspectives.[13] The challenge is to further develop the models at the level of specific financial statement elements. This will allow the theories to specify more precisely how measurement properties of specific accounting measures will be reflected in capital market activity.[14] Only then will there be a sufficient basis for extending the inferences regarding accounting measurement from a capital markets-based research perspective. Otherwise, the contribution of the research to answering measurement questions in accounting is likely to remain modest.

Greg Clinch is professor of accounting in the Australian Graduate School of Management, Universities of New South Wales and Sydney. *The author thanks Baljit Sidhu and Malcolm Miller for helpful comments on an earlier draft.*

NOTES

1 I do not here attempt to provide a comprehensive review of capital markets-based research in financial accounting generally, or even the majority of research related to measurement questions. Instead, I focus on a small number of relevant research papers to illustrate some of the issues involved and questions raised. For more comprehensive reviews of the relevant literature, together with a discussion of implications for standard setting, see, for example, Barth (2000) or Brown and Howieson (1998).

2 This approach places specific meanings on "relevance" and "reliability" — terms used frequently to describe desirable attributes of accounting measurements. In particular, I employ relevance as a property of the underlying object being measured — eg, if the object could be measured without error would it be relevant to investors' trading and investment decisions — and reliability as a property of the actual outcome of a set of measurement rules applied to estimate the object. These meanings do not necessarily accord perfectly with those used or implied elsewhere.

3 Although I restrict my attention here to accounting-related information, the research literature is much broader than this. Accounting measures that have been investigated using capital markets-based approaches range from broadly defined performance measures such as earnings numbers (eg, Ball and Brown 1968) to specific elements of financial statements such as capitalised R&D expenditure (eg, Abrahams and Sidhu 1998). For broad surveys of this literature see, for example, Lev and Ohlson (1982), Brown (1994), Barth (2000) and Holthausen and Watts (2000).

4 For example, recent capital markets-based research relating to asset revaluations includes Easton, Eddey and Harris (1993), Easton and Eddey (1997), Barth and Clinch (1996, 1998), Aboody, Barth and Kasznik (1999) and Cotter and Zimmer (2000). There exist similar strands of research relating to asset impairment tests and fair values for various classes of assets.

5 For example, there is some evidence that revalued tangible and intangible non-current assets are less strongly associated with firm market values than tangibles and intangibles carried at cost for industrial firms. However, this result does not extend to financial non-current assets, nor does it extend to other industry groups such as mining companies (Barth and Clinch 1998).

6 An example of this relating to asset measurement might be the availability of information regarding property markets that potentially could make redundant asset revaluations recorded in firms' balance sheets.

7 This result relates to the idea that the availability of information can have wealth distributive effects that do not make all economic agents better off even if they use the information in their decisions. See, for example, Verrecchia (1982) for a review of early related research in accounting.

8 For example, voluntary revaluations of non-current assets might reveal to investors something about the incentives managers are responding to (eg, the need to strengthen the balance sheet prior to raising capital) rather than the value *per se* being recognised.

9 Recent research (Barth and Clinch 1998, Aboody, Barth and Kasznik 1999) has begun to respond to this challenge by also investigating the association between accounting measures and indicators of future company performance such as earnings or cashflows. This provides a better indication of what information the relevant accounting number might be conveying to market participants.

10 There has been a temptation in the existing research literature to employ the strength or magnitude of the association between firm market values and competing accounting measures as an indication of measurement reliability. However, as discussed in this paper, I believe such attempts to be premature. That is, capital markets research can indicate sufficient reliability in a particular measure for there to be a detectable association between firm value and the accounting measure, but it cannot confidently be used to gauge the level of reliability beyond this.

11 There are some examples of research where explicit "pricing theories" are employed to assist in generating inferences regarding measurement properties of accounting numbers. For example, Barth (1991) assumes a simple link between share prices and investor perceptions of pension assets and liabilities together with an explicit specification of the measurement structure of accounting disclosures relating to pensions by US firms. Similarly, Barth and Clinch (1996) provide a simple model in their appendix linking explicitly prices, unobservable valuation relevant characteristics and accounting disclosures about those characteristics. They use the model to assist their interpretation of the measurement properties of various international accounting measurement differences. However, the models used in these papers have been very simple and their descriptive validity may be questioned.

12 For example, Barth, Clinch and Shibano (2000) investigate the impact of recognition versus disclosure of accounting amounts across differing levels of relevance and reliability of the accounting measures.

13 For example, the Ohlson (1995) model assumes a simple pricing approach based on homogenous investors assessing expected future dividends, but incorporates accounting features such as clean surplus and the evolution of accounting numbers over time. In contrast, the rational expectations models incorporate less of the specific accounting characteristics but allow a more complex pricing approach with potentially heterogeneous investors.

14 To illustrate, in the case of asset valuation, the Ohlson (1995) model might be extended to decompose book value and earnings into asset-valuation-related and other components. Suitable information dynamics related to each component could be developed/conjectured for alternative measurement bases that reflect the expected characteristics of each basis. These could then be used to derive "predictions" about the link between firm values and the asset-valuation-related components under alternative measurement bases that could guide the design and interpretation of subsequent empirical research.

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A review of the empirical disclosure literature: discussion☆

John E. Core*

The Wharton School, University of Pennsylvania, 2400 Steinberg-Dietrich Hall, Philadelphia, PA 19104-6365, USA

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Abstract

Healy and Palepu, J. Account. Econ. (2001), this issue, provide a broad review of the empirical disclosure literature. This discussion focuses on the empirical voluntary disclosure literature, and assumes firms' disclosure policies are endogenously determined by the same forces that shape firms' governance structures and management incentives. This provides not only a more focused view of the literature, but also alternative explanations for some of the results discussed in *Review* and specific suggestions for future research. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

Healy and Palepu (2001, hereafter, "*Review*") provide a broad overview of the empirical disclosure literature and ask big-picture questions about:

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*Corresponding author. Tel.: +1-215-898-4821; fax: +1-215-573-2054.

E-mail address: jcore@wharton.upenn.edu (J.E. Core).

PII: S0165-4101(01)00036-2

accounting information; the firms that produce it and use it to evaluate their employees; the persons who use this information in allocating capital to firms; and the persons who produce, verify, regulate and interpret this information. These questions are important, and much research remains to be done before we can confidently answer them.

In this discussion, I focus on *Review*'s analysis of the empirical voluntary disclosure literature for two reasons. First, other literature covered by *Review* is also covered by other conference surveys and discussions. More important, the voluntary disclosure literature appears to offer the greatest opportunity for large increases in our understanding of the role of accounting information in firm valuation and corporate finance.

Because of its broad perspective, *Review* does not specify an economic theory of voluntary disclosure, does not analyze the empirical literature in detail, and offers few specific suggestions for future research. This discussion attempts to complement *Review* by using a specific framework based on the economic theory of the firm. Briefly, this framework assumes that the relation between disclosure, managers, individual and institutional investors, and analysts is endogenously determined by the same forces that shape firms' governance structures and management incentives. This framework provides the basis for: (1) a more focused view of the literature; (2) alternative explanations for some of the results discussed in *Review*; and (3) specific suggestions for future research.

I present this framework in Section 2.1, and in Section 2.2 use it to analyze one of *Review's* hypothesized determinants of voluntary disclosure and to suggest an alternative interpretation of the evidence. Section 2.3 discusses literature on the association between institutional investors and disclosure, which is not examined in *Review*. I conclude Section 2 by briefly reviewing research on the economic consequences of voluntary disclosure with a focus on identifying needs for future research. Section 3 suggests that research efforts be concentrated on: (1) better understanding the link between information asymmetry and the cost of capital; (2) creating better measures of the information asymmetry component of the cost of capital; (3) and creating better measures of disclosure quality. Section 4 provides a summary and conclusion.

2. Discussion

2.1. Disclosure quality, disclosure credibility, and corporate finance theory

Corporate finance theory predicts that shareholders endogenously optimize disclosure policy, corporate governance, and management incentives in order to maximize firm value. This choice involves trading off the reduction in the information asymmetry component of the cost of capital that results from increased disclosure quality against the costs of reduced incentives (e.g., Evans and Sridhar, 1996), litigation costs (Skinner, 1994), and proprietary costs (Verrecchia, 1983). As a simple example of how this trade-off works in cross-section, assume that growth opportunities and the quality of mandated disclosure are exogenous, and consider whether firms provide voluntary disclosure to reduce information asymmetry.[1] For a firm without growth opportunities, mandated disclosure might be of sufficiently high quality to produce low information asymmetry. Because this firm has no need for external finance and has low litigation, incentive, and proprietary costs, it has little need for voluntary disclosure. For firms with high growth opportunities, mandated disclosure is low quality and information asymmetry is high. For these firms, some reduction in information asymmetry through voluntary disclosure is optimal, and the optimum is determined as a function of the quality of mandated disclosure and a trade-off of lower capital and litigation costs against higher proprietary and incentive costs. After this optimal choice, high-growth firms use more voluntary disclosure, but they likely still have greater information asymmetry than low-growth firms.

Perfectly credible (or, equivalently, completely unbiased) disclosure is not optimal because it is too costly:

> … Not all managerial accounting manipulation will be eliminated. It may be too costly … to eliminate all such manipulation … In labor and capital markets characterized by rational expectations, managers will not, on average, gain from such manipulation (Watts and Zimmerman, 1986, p. 205).

The statement that it is too costly to eliminate all manipulation means that managers can add some bias to disclosure at a low personal cost. If it is known that all managers wish to bias disclosure in the same direction and if disclosure is costly, the theory discussed in *Review* suggests that a "lemons" equilibrium can occur in which no firm discloses. However, if shareholders are uncertain about the direction of managers' incentives to bias disclosure, a pooling equilibrium occurs in which there is disclosure, and some disclosure contains bias (e.g., Dye, 1988; Fischer and Verrecchia, 2000).[2] Accordingly, theory predicts that even though disclosure contains some bias, in equilibrium it is still

[1] I follow previous research and define any disclosure above the mandated minimum as "voluntary" disclosure. For simplicity, I assume that the mandated minimum level of disclosure quality is exogenous. *Review* discusses how this minimum may evolve endogenously.

[2] Lang and Lundholm's (2001) study provides an example: Because shareholders do not know which firms intend to make stock offerings, and because not all firms that make offerings bias their disclosure, some firms can temporarily increase their stock prices through increased, "hyped" disclosure. However, once the offering is announced, the stock price falls dramatically for the firms with increased disclosure, but very little for firms without unusual disclosure increases.

credible. Therefore, all empirical studies of disclosure credibility will find disclosure to be credible; interesting studies explore cross-sectional variation in the bias in disclosure (e.g., Lang and Lundholm, 2001).

While the optimal disclosure policy allows some managerial manipulation of disclosure, it is the governance structure that constrains the manager to follow the optimal policy (e.g., Shleifer and Vishny, 1997; Zingales, 1998). Accordingly, cross-sectional differences in firms' disclosure policies result from cross-sectional differences in: (1) the optimal disclosure policy; and (2) the ability of firms' governance to enforce the optimal policy.[3] In summary, theory predicts an endogenous relation between information asymmetry, disclosure quality, managerial incentives, and corporate governance.

In contrast, *Review* uses a broad framework based on the intuition provided by Akerlof's (1970) illustration of adverse selection costs. This framework provides macro-economic intuition for why lack of disclosure is costly for firms, for the existence of financial and information intermediaries, and for why there may be a demand for disclosure regulation. While this framework confirms our intuition that we live in a world of partial disclosure, it is not specific enough to give satisfying explanations for cross-sectional differences in firms' disclosure policies. All of the managerial motives for voluntary disclosure described in *Review* assume that disclosure policy, corporate governance, and management incentives are exogenous at the time a manager makes a disclosure choice. Each of the following three sub-sections examines different contexts in which this simplifying assumption causes interpretation problems. Section 2.2 uses the more specific theory described above to reinterpret *Review's* hypothesized association between stock compensation and disclosure. Section 2.3 discusses the inter-relation between analysts, institutional investors, and information asymmetry, and Section 2.4 provides a brief alternative view of the evidence on the economic consequences of voluntary disclosure.

2.2. The endogenous relation between disclosure policy and management incentives

Because it does not explicitly recognize endogenous relations, *Review* does not always give a thorough and critical evaluation of the research it discusses. I choose to discuss in detail the following example, because I think that the

[3] That there is variation in disclosure policies around the optimum means that well-designed cross-sectional tests can avoid the problem of spurious correlation between disclosure quality and information asymmetry illustrated above and in Sections 2.2 and 2.4 below. For example, if industry membership is the primary endogenous determinant of an optimal disclosure policy, within-industry variation in disclosure policy can be considered exogenous in a test of the predicted negative effect of disclosure quality on the cost of capital (e.g., Botosan, 1997).

reader could be misled by the short discussion in *Review* of the evidence for the "stock compensation hypothesis:"

> Consistent with this hypothesis, Noe (1999) provides evidence that the incidence of management forecasts is positively associated with trading by insiders in the firm's stock. Aboody and Kasznik (2000) find that firms delay disclosure of good news and accelerate the release of bad news prior to stock option award periods, consistent with managers making disclosure decisions to increase stock-based compensation. Miller and Piotroski (2000) find that managers of firms in turnaround situations are more likely to provide earnings forecasts if they have higher stock option compensation at risk (Section 3.3.2).

At a superficial level, Noe's (1999) evidence supports the unsurprising result that managers follow the law and either disclose or abstain from trading. An alternative, more interesting, interpretation of the evidence in both Noe (1999) and Aboody and Kasznik (2000) is that managers selectively time trading and disclosures at the expense of other stockholders. This interpretation contradicts *Review's* hypothesis that managers use disclosure to reduce contracting costs, although it is consistent with the theory discussed above that it is too costly to eliminate all managerial manipulation. In addition, both Noe (p. 325) and Aboody and Kasznik (p. 98) are careful to point out that their evidence is consistent with managers acting in shareholders' interests. For example, because the incentives to increase stock-price volatility created by an in-the-money option are lower than those created by an at-the-money option (Lambert et al., 1991), firms may wish to issue in-the-money options but prefer to avoid the accounting cost of such options. To accomplish this objective, they allow managers to time disclosures.

Miller and Piotroski (2000) find that sample firms with more shares *reserved* for options (as a percentage of shares outstanding) make more forecasts.[4] Because their tests do not recognize that options use, disclosure quality, and information asymmetry are simultaneously determined, Miller and Piotroski provide no support for the hypothesis that option compensation motivates managers to provide more voluntary disclosure. Firms with greater information asymmetry use more stock and option incentives (Demsetz and Lehn,

[4] The percentage of shares *reserved* for options outstanding and future grants is an extremely weak proxy for managers' "stock option compensation at risk." Managers care about their dollar wealth, not their percentage ownership. It is well known that managers of larger firms have fewer options as a fraction of shares outstanding, but the dollar value of these options holdings is much higher than those of small firms (Baker and Hall, 1998). Further, options owned by the executives who are likely to make disclosure decisions constitute a small fraction of shares reserved for options (Core and Guay, 2001).

1985; Smith and Watts, 1992; Core and Guay, 1999; Bryan et al., 2000), and greater information asymmetry is associated with more voluntary disclosure (Lang and Lundholm, 1993). Therefore, as suggested above, we would expect an association between managers' equity incentives and voluntary disclosure, as they are both associated with information asymmetry, but this does not mean that options use causes disclosure.

2.3. The relation between voluntary disclosure, institutional investors, and financial analysts

Given the focus of *Review* on the role of intermediaries, it is odd that there is no analysis of empirical research on the relation between disclosure and institutional investors.[5] Healy et al. (1999) find that increases in disclosure are associated with increases in institutional ownership. Bushee and Noe (2001) confirm this association, but find that increases in "transient" institutional investors (institutions that trade aggressively) are associated with increases in stock price volatility. Assuming that increases in stock price volatility are costly, this finding is consistent with the intuition that partial disclosure is optimal, and that too much disclosure can be as costly as too little disclosure.

Tasker (1998) finds that firms with greater analyst following and greater institutional ownership are less likely to have conference calls, and Bushee et al. (2001) find that firms with greater analyst following and greater institutional ownership are less likely to have conference calls that provide open access to all investors. This evidence is consistent with the intuition that informed investors prefer less disclosure, but is also consistent with the notion that analysts and institutions produce information, and reduce information asymmetry and the need for conference calls.

Review discusses the endogenous relation between disclosure quality, information asymmetry, and financial analysts explored in Lang and Lundholm (1996). Brennan and Subrahmanyam's (1995) simultaneous-equations model provides evidence of this endogenous relation. One equation shows that the number of analysts reduces information asymmetry (proxied by the information asymmetry component "IAC" of the bid-asked spread). A second equation shows that the causality also runs in the opposite direction, that is, reductions in information asymmetry increase the number of analysts. Brennan and Subrahmanyam's (1995) predictions are based on a theory

[5] *Review* does mention the theoretical prediction of Diamond and Verrecchia (1991) and Kim and Verrecchia (1994) that disclosure attracts institutional investors: "In addition, these studies argue that expanded disclosure and stock liquidity will be associated with increased institutional ownership" (Section 3.4.2).

relating information asymmetry to informed trading, and they test the theory using analysts as a proxy for informed traders. The same theory predicts a simultaneous relation between information asymmetry and institutional investors, who are also informed.[6]

The interpretation of any evidence involving buy-side institutions or sell-side analysts is clouded because of the known, but not well understood, endogenous relation between these two intermediaries (e.g., O'Brien and Bhushan, 1990). The imbalance between the small amount of research on *buy-side* analysts and the vast amount of research on *sell-side* analysts suggests much opportunity for useful future research. While it is unclear how one would address such a broad question as "how effective are financial analysts as information intermediaries?" (Table 1, *Review*), there is no satisfying answer to this question that does not involve a theory of how the buy-side is related to the sell-side. For example, knowing how institutional investors interpret analysts' forecasts is likely to help us understand whether analyst optimism is a statistical artifact or whether it is an economically important phenomenon.[7] Clearly we want to understand how well the number of sell-side analysts and the number of institutional investors proxies for the degree of information asymmetry and the cost of capital, but can we know this without a better understanding of the joint relation between sell-side analysts and institutional investors?

One way of shedding light on these questions is to examine the extent to which buy-side analysts agree with (or disagree with) the sell-side's recommendations and earnings forecasts. For example, Krische and Lee (2000) provide indirect evidence that quantitative, "anomalies-based" trading firms use an information set that is mostly orthogonal to the recommendations of sell-side analysts. An extension of Ali et al. (2000) could provide more direct evidence on whether return variation associated with changes in institutional holdings is correlated with analysts' recommendations. Another way of addressing this question would be to compare the performance of industry-sector mutual funds to the weighted post-commission performance of the recommendations of the sell-side analysts who cover these industries (by extending the method of Barber et al., 2001). Evidence that the returns to these sector funds are correlated (uncorrelated) with the returns to the sell-side analysts' recommendations would be consistent with the hypothesis that buy-side analysts agree with (disagree with) the sell-side's recommendations.

[6] Brennan and Subrahmanyam ignore this theory, as they use institutional investors as a determinant for the number of analysts, but not as a determinant of the IAC of the bid-asked spread.

[7] While *Review* notes intertemporal differences in levels of analyst optimism, it does not discuss research that questions whether optimism tells us anything about analysts' abilities or incentives. For example, Abarbanell and Lehavy (2000) suggest that apparent differences in optimism are artifacts of data problems, and Gu and Wu (2000) suggest that optimism can be an outcome of a rational and unbiased forecasting process.

Understanding these correlations would in turn shed additional light on the interrelation between buy-side institutions, sell-side analysts, disclosure quality, and information asymmetry.

2.4. Empirical evidence on the consequences of voluntary disclosure

As *Review* alludes to in Section 3.3.2, disclosure quality is an *ex ante* commitment or policy to provide voluntary disclosure over time, and this endogenously determined policy affects the level of information asymmetry. When a manager receives information at a point in time, the manager may *ex post* choose to withhold or provide this information in order to correct mis-valuation (e.g., Healy and Palepu, 1995). If the manager chooses to disclose this information, this disclosure will change the stock price. However, firms with higher disclosure quality withhold less information. Therefore, there are two effects: (1) disclosure quality, which is the firm's ongoing *ex ante* commitment to provide disclosure; and (2) "discretionary" disclosure, which is an *ex post* realization of this *ex ante* commitment.

2.4.1. Discretionary disclosure

Because discretionary disclosure is a particular realization of a firm's disclosure policy, cross-sectional studies of discretionary disclosure are essentially equivalent to cross-sectional studies of disclosure quality. Accordingly, if the research design is not careful to control for the endogenous determinants of disclosure policy, there is the potential for spurious inference about the discretionary disclosure under study.

As an example, consider the Kasznik and Lev (1995) finding that firms that warn investors of bad earnings news experience significantly more negative returns per unit of unexpected earnings than firms that do not warn. This finding suggests that firms are penalized for disclosing bad news early. Shu (2000) argues that this apparently puzzling difference in returns occurs because of a failure to model firms' disclosure policies. Suppose that firms with high disclosure quality have policies to "disclose bad earnings news early." *Ceteris paribus*, firms with high disclosure quality have high earnings quality, which means that their earnings surprises contain more information about future cash flows. Therefore, the market reaction to the disclosure of earnings information will be higher for firms with higher disclosure quality. If firms that warn have higher disclosure quality, the market reaction per unit of unexpected earnings is greater, and the Kasznik and Lev finding is not puzzling, but what one would expect.

As a second example, consider Francis, Philbrick and Schipper (FPS, 1994), whom *Review* cites as mixed evidence on the litigation cost hypothesis. Firms in the FPS litigation sample were more likely to pre-announce bad news than firms in the no litigation sample. This greater incidence of litigation is interpreted by *Review* as evidence that pre-disclosure is ineffective. However, FPS are careful to point out that their litigation sample is about ten times larger than the no litigation sample, and subsequent research shows that firm size is a significant determinant of litigation risk. Therefore, an alternative interpretation is that the FPS evidence is completely consistent with firms' optimally using disclosure to minimize litigation costs. Larger firms expect to be sued more frequently, and their choice to pre-disclose more frequently lowers the conditional costs of these suits (Skinner, 1997).

2.4.2. Disclosure quality

Because a firm's optimal disclosure policy will trade-off its need for a low cost of capital against other costs, *ceteris paribus* one expects to find a negative relation between disclosure and the cost of capital. As discussed in *Review*, researchers examine how disclosure affects two separate components of the cost of capital: (1) liquidity costs such as the IAC of the bid-asked spread, which increase trading costs and reduce the net proceeds of a stock offering, and (2) the equity discount rate. In addition to the endogeneity problems discussed in *Review* and discussed above (e.g., the simultaneous relation between financial analysts and information quality), two additional factors complicate this research. First, there are measurement problems both with the proxies for disclosure quality (discussed by *Review*) and with the proxies for the cost of capital. These measurement problems both weaken the tests and also exacerbate the potential for endogeneity problems to cause spurious inference. Second, tests of a link between disclosure quality and the cost of capital are *joint* tests of a theory linking disclosure quality to information asymmetry *and* a theory linking information asymmetry to a cost of capital.

For example, the tests in Botosan and Plumlee (2000) are joint tests of the hypothesis that disclosure quality affects information asymmetry and the hypothesis that information asymmetry affects the equity discount rate (proxied by the cost of capital implied by inverting various dividend discount models). Assuming that information asymmetry affects discount rates, such a test can fail to find an association because of unsystematic error in the proxies for disclosure quality and the cost of capital. On the other hand, systematic error, such as biases in the analysts' disclosure ratings and in the analysts' forecasts on which the cost of capital are based, can show evidence of a non-existent relation.

3. Future research

It seems important to create better measures for the information asymmetry component of the cost of capital and for disclosure quality, and these are discussed below in Sections 3.2 and 3.3. First, however, we must establish whether information asymmetry only affects stock liquidity or if it also affects equity discount rates. This assessment will point to where disclosure quality can have an economically important effect on the cost of capital, where research efforts should be focused, and how to interpret prior research.

3.1. How does information asymmetry affect the cost of capital?

There seems to be consensus both in the theoretical and empirical market micro-structure literature that greater information asymmetry reduces stock liquidity (e.g., Brennan and Subrahmanyam, 1995; Verrecchia, 2001). However, conference participants noted that changes in the structure of US stock markets have resulted in bid-asked spreads that are economically negligible as a fraction of most firms' stock prices. Therefore, if the IAC of the bid-asked spread is the only means by which the cost of information asymmetry manifests itself, one would conclude, as do Leuz and Verrecchia (2001), that the US disclosure environment is already so rich that it would be difficult to find strong disclosure-related effects in broad cross-sections of US firms.[8] In this case, the effect of disclosure is likely to be a subtle, second-order, effect for most US firms, and this effect would only be detected in samples where there are large changes in disclosure policy such as in Healy et al. (1999), Lang and Lundholm (2001), and Leuz and Verrecchia (2001).

On the other hand, if information asymmetry affects expected returns, disclosure choices can have a first-order economic effect by reducing information asymmetry and lowering firms' equity discount rates, and this effect would be detected in broad samples. In this case, strong disclosure-related effects could be found in US return data, and it would be worthwhile to use more sophisticated measures for the cost of capital and to validate carefully prior results on US data before proceeding abroad where institutions and market-making are known to be quite different.

Recent finance literature shows that three proxies for information asymmetry appear to explain cross-sectional returns in excess of the three Fama and French (1992) factors. Brennan and Subrahmanyam (1996) find that firms with a lower IAC of the bid-asked spread have lower expected returns. In addition, lower information asymmetry is associated with higher volume, and recent empirical evidence suggests that higher-volume stocks have lower

[8] In this case, an additional interpretation suggested by *Review* is that there is too much disclosure regulation in the US, and that market participants would be willing to accept larger IAC (and larger spreads) in exchange for firms spending less cash on information production.

expected returns (Brennan et al., 1998; Chordia et al., 2001).[9] Finally, Easley, Hvidkjaer, and O'Hara, 2000 (EHO, 2000) proxy for information asymmetry using the Easley et al. (1996) probability of informed trade (PIN) metric. EHO find that firms with higher PINs have higher excess returns, and interpret this result as evidence that information risk increases expected returns.

Each of these three proxies for information asymmetry has been shown to be related to disclosure policy. For example, Leuz and Verrecchia (2001) show that a commitment to increased disclosure lowers bid-asked spreads and increases volume, and note that Easley et al. (1996) show a negative correlation between the PIN metric and volume. Finally, in research-in-progress, Brown et al. (2000) examine the association between the PIN metric and disclosure quality as measured by the AIMR scores for a cross-section of 200 firms in 1995. Preliminary results indicate that there is a significant negative correlation between the two variables.

Even if strong links from various proxies for information asymmetry to expected returns could be established, there remains the challenge of establishing strong links from disclosure quality to the information asymmetry proxies. If this can be accomplished, research could then seek to establish a direct link from disclosure quality to expected returns. This work would have the potential "added benefit of explaining why it is that some accounting data appear to be informative for asset pricing" (EHO, 2000, Section 6). However, to answer these questions requires better understanding of the various proxies for information asymmetry and for disclosure quality.

3.2. Measuring the information asymmetry component of the cost of capital

There is little research guidance as to which of the noisy proxies for the information asymmetry component of the cost of capital are likely to be more accurate. Researchers indirectly address measurement problems with the cost of capital by repeating their tests on different proxies for the cost of capital (e.g., Healy et al., 1999; Leuz and Verrecchia, 2001). However, because these tests are not independent, it is difficult to assess significance.

Moreover, when one has several noisy proxies, one can construct a more powerful test by using a weighted combination of the proxies in a single regression, where the weights are derived in order to diversify away the measurement error (see Ittner and Larcker, 2001). For example, consider the hypothesis that information asymmetry affects expected returns. One would expect that the three measures discussed above (the IAC of the bid-asked

[9] Findings in Brennan, Chordia, and Subrahmanyam suggest that the negative relation between firm size and expected returns (Fama and French, 1992) can be interpreted as size proxying for liquidity effects. When a more direct proxy for liquidity, dollar volume, is included in a regression of excess returns, it is significantly negative, and size becomes insignificant.

spread, volume, and the PIN metric) are noisy proxies for information asymmetry, and that power could be gained by aggregating the proxies into a single measure.

A large sample study could assess the measurement properties of various proxies for the cost of capital. Correlation analysis and factor analysis would shed light on the relative amounts of error in the proxies, and would suggest combinations of proxies that could be weighted together to create more powerful tests. Because they require the analysis of intra-day trading data, it is very expensive to compute some proxies such as the PIN metric and the IAC of the bid-asked spread. Another useful contribution would be to create a "good enough" measure for the information asymmetry component of the cost of capital. Such a measure would consist of easily-computed proxies and would be highly correlated with the most precise, but more expensive, measure.

3.3. Measures of disclosure quality

Improved measures of disclosure quality also need to be developed. The AIMR discontinued its disclosure rankings in 1997 (after ranking fiscal year 1995). There may be some small problems of judgment error in the metrics constructed by Botosan (1997), Lang and Lundholm (2001), and Miller (1999), but the real problem with these measures is that they are so labor-intensive that they are feasible only for small samples.

Here, I conjecture that researchers can substantially lower the cost of computing these metrics by importing techniques in natural language processing from fields like computer science, linguistics, and artificial intelligence. An example of a widespread natural language processing technology is the grammar-checking device provided with many word-processing programs. This device provides information on the frequency of use of the passive tense. Little (1998, pp. 96-98) identifies the passive tense as one of a number of linguistic devices for hiding meaning that are examined in the law and linguistics literature.

These programs also provide other readability statistics, and one would expect to see a correlation between these readability statistics and the AIMR ratings, which are analysts' ratings of written disclosure. It seems worthwhile to investigate whether more sophisticated natural language processing technology could be used to replicate ratings by the AIMR and ratings by researchers. If this can be accomplished, it would significantly reduce the cost of creating disclosure quality indices from firm reports and press releases. Assuming good voice-recognition technology, it would be possible to machine-code conference call disclosure as well.

Natural language processing programs could be also used to create proxies for the "tone" of disclosure (Lang and Lundholm, 2001) and proxies for the precision and bias of the information that is conveyed. Healy and Palepu (1993, 1995, 2001) emphasize the important idea that managers communicate with investors. Managers use natural language for this communication, and we can advance work in accounting by using research from other fields to find ways to machine-code the precision of this language and any bias contained in it.

4. Conclusion

This paper discusses *Review* and uses corporate finance theory to expand on and to provide an alternative analysis of the voluntary disclosure literature. The endogeneity problems and the measurement error problems that make this literature difficult are also what make this literature an especially promising area for future research. As discussed above and in Bushman and Smith (2001), the voluntary disclosure literature is interlinked with the literature on corporate governance and the literature on management incentives. Each of these literatures has endogeneity problems, and there is uncertainty and active debate on how to measure governance quality (e.g., Bushman et al., 2000) and how to measure incentives (e.g., Core and Guay, 1999).

A major contribution can be made to the voluntary disclosure literature by establishing how information asymmetry affects the cost of capital, and in particular determining whether information asymmetry affects expected returns. A second contribution can be made by creating more precise measures of the information asymmetry component of the cost of capital. A final contribution can be made by using computer technology to lower the cost of computing disclosure quality indices. These measures would add power to most disclosure-related research designs, as well as help address more general issues of fundamental interest to accounting researchers. Specifically, researchers could employ these measures to shed light on many of the broader questions proposed in *Review*.

Potentially the most interesting question for future research is to examine the firm's simultaneous choice of disclosure quality, management incentives, and corporate governance structure. Bushman et al. (2000) make an important start in this area by documenting that lower accounting quality (measured by a returns-earnings correlation) is associated with more costly corporate governance mechanisms. Future research can build on these results by examining whether firms with low accounting quality improve their disclosure quality through voluntary disclosures. In this case, one would expect an association between the level of voluntary disclosure and the firm's level of managerial equity incentives. This association would simply reflect firms' optimal choices, and would not provide evidence of a stock compensation hypothesis.

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Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature ☆

Paul M. Healy*, Krishna G. Palepu

Graduate School of Business, Harvard University, Boston, MA 02446, USA

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Abstract

Financial reporting and disclosure are potentially important means for management to communicate firm performance and governance to outside investors. We provide a framework for analyzing managers' reporting and disclosure decisions in a capital markets setting, and identify key research questions. We then review current empirical research on disclosure regulation, information intermediaries, and the determinants and economic consequences of corporate disclosure. Our survey concludes that current research has generated a number of useful insights. We identify many fundamental questions that remain unanswered, and changes in the economic environment that raise new questions for research. © 2001 Published by Elsevier Science B.V.

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*Corresponding author. Tel.: +1-617-495-1283; fax: +1-617-496-7387.

E-mail address: phealy@hbs.edu (P.M. Healy).

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1. Introduction

Corporate disclosure is critical for the functioning of an efficient capital market.[1] Firms provide disclosure through regulated financial reports, including the financial statements, footnotes, management discussion and analysis, and other regulatory filings. In addition, some firms engage in voluntary communication, such as management forecasts, analysts' presentations and conference calls, press releases, internet sites, and other corporate reports. Finally, there are disclosures about firms by information intermediaries, such as financial analysts, industry experts, and the financial press.

In this paper we review research on financial reporting and voluntary disclosure of information by management, summarize key research findings, and identify areas for future work. Section 2 examines the forces that give rise to demand for disclosure in a modern capital-market economy, and the institutions that increase the credibility of disclosures. We argue that demand for financial reporting and disclosure arises from information asymmetry and agency conflicts between managers and outside investors. The credibility of management disclosures is enhanced by regulators, standard setters, auditors and other capital market intermediaries. We use the disclosure framework to identify important questions for research, and review available empirical evidence.

Section 3 reviews the findings on the regulation of financial reporting and disclosure. Much of this research documents that earnings, book values, and other required financial statement information is "value relevant". However, fundamental questions about the demand for, and effectiveness of, financial reporting and disclosure regulation in the economy remain unanswered.

Research on effectiveness of auditors and information intermediaries is discussed in Section 4. There is evidence that financial analysts generate valuable new information through their earnings forecasts and stock recommendations. However, there are systematic biases in financial analysts' outputs, potentially arising from the conflicting incentives that they face. While theory suggests that auditors enhance the credibility of financial reports, empirical research has provided surprisingly little evidence to substantiate it.

Section 5 reviews the economic determinants of managers' financial reporting and disclosure decisions. Research using the contracting perspective finds that accounting decisions are influenced by compensation and lending contracts, as well as political cost considerations. Research using the capital market perspective documents that voluntary disclosure decisions are related to capital market transactions, corporate control contests, stock-based compensation, shareholder litigation, and proprietary costs. There is also

[1] Corporate disclosure can also be directed to stakeholders other than investors. However, there has been relatively little research on these types of voluntary disclosures. Consequently, we focus in this paper on investor communication.

evidence that investors view voluntary disclosures, such as management forecasts, as credible information. In Section 6, we discuss the capital market consequences of managers' financial reporting and disclosure decisions. Studies document that voluntary disclosures are associated with stock performance, bid-ask spreads, cost of capital, analyst coverage and institutional ownership. However, many of the studies discussed in Sections 5 and 6 suffer from significant endogeneity and measurement error problems, making it difficult to interpret their findings.

We believe that financial reporting and disclosure will continue to be a rich field of empirical enquiry. Throughout the paper, we identify a number of unanswered questions. Further, as we discuss in Section 7, there are significant changes in the economic environment—rapid technological innovation, the emergence of network organizations, changes in the business economics of audit firms and financial analysts, and the globalization of capital markets. These changes have the potential to alter the nature of financial reporting and disclosure, creating rich new opportunities for research.

2. The role of disclosure in capital markets

In this section, we examine the role of disclosure in modern capital markets. Information and incentive problems impede the efficient allocation of resources in a capital market economy. Disclosure and the institutions created to facilitate credible disclosure between managers and investors play an important role in mitigating these problems. The framework for disclosure that we discuss in this section is then used to develop implications for research.

A critical challenge for any economy is the optimal allocation of savings to investment opportunities. There are usually many new entrepreneurs and existing companies that would like to attract household savings, which are typically widely distributed, to fund their business ideas. While both savers and entrepreneurs would like to do business with each other, matching savings to business investment opportunities is complicated for at least two reasons. First, entrepreneurs typically have better information than savers about the value of business investment opportunities and incentives to overstate their value. Savers, therefore, face an "information problem" when they make investments in business ventures. Second, once savers have invested in their business ventures, entrepreneurs have an incentive to expropriate their savings, creating an "agency problem".

2.1. Information problem

The information or "lemons" problem arises from information differences and conflicting incentives between entrepreneurs and savers. It can potentially lead to a breakdown in the functioning of the capital market (see Akerlof, 1970). For example, consider a situation where half the business ideas are "good" and the other half are "bad". Both investors and entrepreneurs are rational and value investments conditional on their own information. If investors cannot distinguish between the two types of business ideas, entrepreneurs with "bad" ideas will try to claim that their ideas are as valuable as the "good" ideas. Realizing this possibility, investors will value both good and bad ideas at an average level. Therefore, if the lemons problem is not fully resolved, the capital market will rationally undervalue some good ideas and overvalue some bad ideas relative to the information available to entrepreneurs.

There are several well-known solutions to the lemons problem. Optimal contracts between entrepreneurs and investors will provide incentives for full disclosure of private information, thus mitigating the misvaluation problem (see Kreps, 1990, Chapters 17 and 18). Another potential solution to the information asymmetry problem is regulation that requires managers to fully disclose their private information. Finally, because of the lemons problem, there is a demand for information intermediaries, such as financial analysts and rating agencies, who engage in private information production to uncover managers' superior information.

Fig. 1 provides a schematic of the role of disclosure, and information and financial intermediaries in the working of capital markets. The left side of Fig. 1 presents the flow of capital from savers to firms. Capital can flow to business ideas in two ways. First, it can flow directly from savers to businesses.

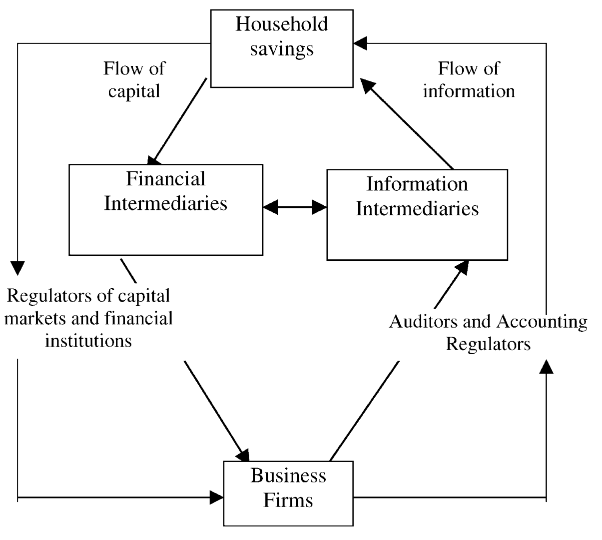

Fig. 1. Financial and information flows in a capital market economy.

Examples include private equity and angel financing. A second and more typical way for capital to flow from savers to businesses is through financial intermediaries, such as banks, venture capital funds, and insurance companies. The right side of the figure presents the flow of information from businesses to savers and intermediaries. Firms can communicate directly with investors through such media as financial reports and press releases. They also communicate with financial intermediaries or through information intermediaries, such as financial analysts.

A variety of economic and institutional factors determine whether contracting, regulation and information intermediaries eliminate information asymmetry, or leave some residual information problem. These factors include the ability to write, monitor, and enforce optimal contracts, proprietary costs that might make full disclosure costly for investors, regulatory imperfections, and potential incentive problems for intermediaries themselves. Research on corporate disclosure, therefore, focuses on cross-sectional variation in these factors and their economic consequences.[2]

2.2. Agency problem

The agency problem arises because savers that invest in a business venture typically do not intend to play an active role in its management—that responsibility is delegated to the entrepreneur. Consequently, once savers have invested their funds in a business venture, the self-interested entrepreneur has an incentive to make decisions that expropriate savers' funds. For example, if savers acquire an equity stake in a firm, the entrepreneur can use those funds to acquire perquisites, pay excessive compensation, or make investment or operating decisions that are harmful to the interests of outside investors (see Jensen and Meckling, 1976).

Alternatively, if savers acquire a debt stake in a firm, the entrepreneur can expropriate the value of the investment by issuing additional more senior claims, by paying out the cash received from savers as a dividend, or by taking on high risk capital projects (see Smith and Warner, 1979). The issuance of new senior debt and payment of dividends reduces the likelihood that there will be sufficient resources available to fully repay existing or lower priority debt in the event of financial distress, benefiting the entrepreneur. High risk capital projects increase the likelihood of both good outcomes that disproportionately benefit the entrepreneur, and bad outcomes that are disproportionately borne by debtholders.

There are several solutions to the agency problem. Optimal contracts between entrepreneurs and investors, such as compensation agreements and

[2] A similar approach is used by finance scholars to study corporate finance issues such as capital structure, dividends/stock repurchases and private equity financing (see, for example, Myers and Majluf, 1984).

debt contracts, seek to align the interests of the entrepreneur with those of external equity and debt claimants. These contracts frequently require entrepreneurs to disclose relevant information that enables investors to monitor compliance with contractual agreements and to evaluate whether entrepreneurs have managed the firm's resources in the interests of external owners. A second mechanism for reducing agency problems is the board of directors, whose role is to monitor and discipline management on behalf of external owners. Finally, information intermediaries, such as financial analysts and rating agencies, engage in private information production to uncover any manager misuse of firm resources. The market for corporate control, which includes the threat of hostile takeovers and proxy contests, also mitigates agency problems between corporate insiders and outside shareholders.

Whether contracting, disclosure, corporate governance, information intermediaries, and corporate control contests eliminate agency problems is an empirical question. A variety of economic and institutional factors determine their effectiveness, including the ability to write and enforce optimal contracts, potential incentive problems for corporate boards and intermediaries, and the nature of the corporate control market. As discussed below, empirical research on financial reporting and disclosure has focused primarily on cross-sectional variation in contracting variables to explain management's financial reporting decisions.

2.3. Research implications

The information and agency frameworks raise a number of important questions for financial reporting and disclosure researchers. These include questions on (i) the role of disclosure and financial reporting regulation in mitigating information and agency problems, (ii) the effectiveness of auditors and information intermediaries as a means of increasing the credibility of management disclosures and uncovering new information, (iii) factors affecting decisions by managers on financial reporting and disclosure, and (iv) the economic consequences of disclosure. Table 1 summarizes these questions. The remainder of this paper discusses the findings and limitations of research on these questions, as well as opportunities for future research. We focus on empirical research; analytical research is covered by other papers in this issue (see Verrecchia, 2001; Dye, 2001; Lambert, 2001).

3. Regulation of disclosure and financial reporting

3.1. Regulation of disclosure

There are significant regulations governing corporate reporting and disclosure in all countries around the world. For example, in the US,

Table 1
Research questions implied by disclosure framework

Topic	Questions
Regulation of disclosure	Why is there a need for regulation of disclosure in capital markets? What types of disclosures should be regulated and which should not? How effective are accounting standards in facilitating credible communication between managers and outside investors? What factors determine their effectiveness? Which mandated disclosures should be recognized directly in the financial statements and which should be included as supplemental disclosures?
Auditing/intermediaries and disclosure	How effective are auditors in enhancing the credibility of financial statements? What factors influence auditors' effectiveness? How effective are financial analysts as information intermediaries? What factors influence their effectiveness? How does corporate disclosure affect analyst coverage of firms?
Managers disclosure decisions	What factors affect management's disclosure choices? What is the relation between disclosure, corporate governance, and management incentives? What role do boards and audit committees play in the disclosure process?
Capital market consequences of disclosure	How do investors respond to corporate disclosures? Are firm disclosures made outside the financial statements credible? Do investors evaluate disclosures that are included directly in the financial statements differently from those that are included as supplemental disclosures? What factors influence investors' perception of the quality of capital market disclosures across economies? How does disclosure affect resource allocation in the economy?

companies accessing capital markets are required to follow disclosure rules set by the Securities and Exchange Commission (SEC). A long-standing research question is what economic rationale justifies regulating corporate disclosure. An equally important question is the effectiveness of disclosure regulation in solving the information and agency problems in capital markets.

Absent market imperfections or externalities, firms have incentives to optimally trade off the costs and benefits of voluntary disclosure, and to produce the efficient level of information for investors in the economy. Researchers, therefore, attempted to identify potential market imperfections that might justify the prevalence of disclosure regulations around the world. Leftwich (1980), Watts and Zimmerman (1986), and Beaver (1998) note that accounting information can be viewed as a public good since existing stockholders implicitly pay for its production but cannot charge potential investors for their use of the information. Prospective investors, therefore, free ride on information paid for by existing shareholders, leading to the potential underproduction of information in the economy.

A second explanation for regulation, also discussed by Leftwich (1980), Watts and Zimmerman (1986), and Beaver (1998), proposes that disclosure regulation is motivated by concerns other than market failures. For example, regulators may be concerned about the welfare of financially unsophisticated investors. By creating minimum disclosure requirements, regulators reduce the information gap between informed and uninformed. This explanation for disclosure implies that the objective of disclosure regulation is to redistribute wealth, rather than to improve economic efficiency. After all, unsophisticated investors could choose to reduce the information gap by investing in financial knowledge or hiring the services of sophisticated intermediaries.

Both the above arguments for regulation leave many unanswered questions. For example, are potential market failures in disclosure significant? Does regulation of disclosure materially improve the situation? Are there potential negative consequences of regulation? For example, Posner (1974) argues that regulators tend to become captured by those they regulate (see also Watts and Zimmerman, 1986). Is this an important problem for disclosure? How critical is disclosure regulation for the development of capital markets? Is disclosure regulation necessary for the functioning of capital markets even when there are sophisticated capital market intermediaries? Finally, if regulation is effective in increasing economic efficiency, what types of disclosure should be required by regulation and what should be left to the discretion of management?

Whether there is a market failure for disclosure and whether it is corrected through regulation are empirical questions. However, empirical research on the regulation of disclosure is virtually non-existent. This is surprising given the central role regulation plays in disclosure, and the limitations of the economic arguments supporting regulation.

3.2. Regulation of financial reporting choices

Accounting standards regulate the reporting choices available to managers in presenting the firm's financial statements. This type of regulation potentially reduces processing costs for financial statement users by providing a commonly accepted language that managers can use to communicate with investors.

Several questions arise about the regulation of financial reporting methods. First, what are standard setters' objectives? How do they decide to examine certain reporting issues and not others? Second, what are optimal forms of organization and due process for standard setting bodies? These issues have become highly relevant in the recent debate on the organizational structure of the IASC. Third, do accounting standards add value for investors or other stakeholders?

Accounting research has largely focused on the third question. This research has taken two forms. In the "capital markets" research, studies examine the relation between accounting information and security prices. This research is extensively reviewed by Kothari (2001). The most significant conclusion is that regulated financial reports provide new and relevant information to investors. Further, this research documents that the informativeness of required accounting varies systematically with firm and country characteristics (see Collins and Kothari, 1989; Easton and Zmijewski, 1989; Alford et al., 1993; Ball et al., 2000a). Several recent studies document a decline in the level of relevance of earnings and other financial statement items over the last 20 years. Using a variety of different research designs, Chang (1998), Lev and Zarowin (1999), and Brown et al. (1999) find that, in the US, the relations between stock returns and earnings, and between stock prices, earnings and book values have deteriorated over time.[3]

The above evidence suggests that regulated financial information provides valuable information to investors. However, because this research does not compare the relative informativeness of regulated and unregulated financial information, it does not necessarily imply that regulation is superior to a free market approach to disclosure. The finding that the value of regulated accounting data varies systematically based on firm characteristics, time-dependent variables, and country-specific institutions is also subject to alternative interpretations. Do the differences reflect the influence of systematic economic factors that make regulation more or less effective? Or, is the variation driven by correlated omitted variables such as firm- and country-growth, or risk?

Another branch of accounting research examines the value relevance of information presented under proposed new financial reporting standards. This research uses the association between earnings and stock prices or returns as a measure of value relevance. The evidence from this literature indicates that most recent standards generate accounting information that is value relevant. One notable exception is inflation accounting, where no relation to stock prices or returns is observed (see Beaver et al., 1980; Gheyara and Boatsman, 1980; Ro, 1980). A more comprehensive discussion of this literature is provided by Holthausen and Watts (2001), who criticize the use of value relevance as a metric for evaluating accounting standards, and Barth et al. (2001) who offer an alternative viewpoint on the subject.

[3] Collins et al. (1997), Francis and Schipper (1999), and Ely and Waymire (1999) examine the relation between returns, earnings and book values. They conclude that the relation between returns and earnings has deteriorated, but that this has been offset by an increase in the value-relevance of book values. However, Chang (1998) argues that these findings are sensitive to the authors' research design choices.

We identify four areas where we believe additional research on the role of standard setting is warranted. First, do current accounting standards provide timely information to investors or simply confirm information that is already available to them through other sources? Event study tests of the information content of particular accounting methods attempt to evaluate the timeliness of alternative methods.

Second, studies that evaluate the benefits of alternative reporting methods under consideration by standard setters are more likely to provide useful evidence if they examine costs and benefits of all of the alternatives considered. This has usually been difficult to accomplish since researchers do not have access to the inside information required to estimate performance under different reporting alternatives. Several studies attempt to mitigate this problem. Barth (1991) evaluates alternative metrics for pension liabilities using public disclosures available prior to the release of the new accounting standard. Healy et al. (1999b) develop a simulation model for a pharmaceutical firm, allowing them to compare the value relevance of alternative measures of R&D performance.

A third area for future research in the standard setting arena is to assess which types of standards are likely to be most useful for investors and other stakeholders. For example, on average do bright-line rules produce information that is more useful than rules that require managers to exercise judgment in selecting reporting methods? Under what conditions do bright-line rules dominate those that require management judgment and vice versa?

Finally, future research on standard setting can examine optimal standards across countries. There is currently heated debate about the merits of global standards. Global standards, however, are only likely to be optimal if the institutions that monitor and enforce adherence to standards work equally well across countries. In the US, auditors provide assurance that the financial statements comply with accounting regulations, and the SEC has enforcement authority. Dechow et al. (1996) and Beneish (1999) find that US companies face a significant stock price penalty if the SEC decides to pursue them for violating accounting standards. However, the magnitude of type one and type two errors in SEC enforcement actions is unclear. The effectiveness of monitoring and the penalties from enforcement of standards in other countries, particularly those that are only beginning to develop capital markets, is even more open to question.[4] For example, these countries typically lack established financial reporting and auditing standards, and well-trained business professionals required for effective auditing and investment banking.

In summary, surprisingly little is known about why financial reporting and disclosure is regulated in the capital market. Is there a significant market

[4] See DeFond et al. (1999), Ball et al. (2000a, b), and Eccher and Healy (2000) for studies that begin to examine this issue.

imperfection or externality that regulation attempts to resolve? If so, how effective is disclosure regulation in resolving this problem?

4. Role of auditors and intermediaries in the disclosure process

4.1. Auditors

Auditors provide investors with independent assurance that the firm's financial statements conform to GAAP. The fact that stock prices react to earnings announcements (see Kothari, 2001) suggests that overall investors regard accounting information as credible. However, does credibility arise from assurance provided by auditors or from other sources, such as managers' potential legal liability for providing misleading disclosures?

Studies of audit effectiveness examine whether audit qualifications add value for investors and whether auditors' actions are independent of the interests of their clients. Research shows that capital providers require firms to hire an independent auditor as a condition of financing, even when it is not required by regulation. For example, Leftwich (1983) finds that banks require firms to present audited financial information, even for private companies. This implies that capital providers regard auditors as enhancing credibility.

To our knowledge, there is no research that examines directly whether or not auditors significantly enhance the credibility of reported financial statements. Available evidence suggests that auditor qualifications do not provide timely signals to the capital market. For example, studies of the stock market reaction to audit qualifications show that qualified opinions do not provide new information to investors, in part because they can be anticipated (see Dodd et al., 1984, 1986; Dopuch et al., 1986, 1987). This evidence suggests that audit qualifications at best confirm information already available to investors. Choi and Jeter (1992) report that subsequent to qualifications, firms show lower stock price responses to earnings. However, since the study does not control for the unusual performance of firms with qualifications, it is difficult to attribute the decline in earnings response coefficients to reduced credibility.

There are several potential explanations for the paucity of evidence on the value of auditor opinions to investors. Watts and Zimmerman (1981a, b) posit that auditors act in the interest of the managers that hire them, rather than in the interest of the firms' investors. They report evidence that is weakly consistent with this hypothesis using data on auditors' responses to proposed new accounting standards. An alternative explanation is that auditors provide formal assurance only on the annual report, making it difficult for them to provide timely signals to the capital markets. A third explanation is that auditors are concerned about minimizing their legal liability, rather than enhancing the credibility of financial reports. Accordingly, they lobby for standards that reduce their own risk, even though such standards reduce the value of financial reports to investors. Future research may be able to distinguish between these explanations.

Several additional questions arise about the value of audit opinions. First, how do consulting services provided to audit clients affect auditors' perceived and actual independence, and the value of their audit report? Several large audit firms have recently spun-off their consulting operations, providing an opportunity to examine whether their clients have more credible financial statements than those for clients of competitors that continue to provide both audit and consulting services.

Second, there have been a number of important changes in the audit environment in the late 1990s. Legal and organizational changes have limited auditors' liability for audit failures. Also, several of the large audit firms have recently made significant changes in their audit methodology, focusing on a business audit rather than a transactions audit. What impact do these changes have on audit failures and the credibility of financial statements?

Third, what factors influence the credibility of audit reports and financial statements across countries? Factors that are likely to affect credibility could include differences in audit standards, the legal framework governing the audit profession, enforcement of standards and rules, and differences in professional training requirements. DeFond et al. (1999) examine the effect of new auditing standards that improved auditor independence in China. They find that the new standards increased the frequency of qualified opinions, but that this was accompanied by a "flight from audit quality". However, in general the role of auditors and auditing standards in emerging markets has been unexplored in the literature.

4.2. Intermediaries

Studies of the value of intermediaries largely focus on financial analysts. Financial analysts collect information from public and private sources, evaluate the current performance of firms that they follow, make forecasts about their future prospects, and recommend that investors buy, hold or sell the stock. Academic studies focus on information provided to investors from two summary measures produced by analysts, earnings forecasts and buy/hold/sell recommendations. Overall, this evidence indicates that financial analysts add value in the capital market. Their earnings forecasts are more accurate than time-series models of earnings, presumably in part because they are able to incorporate more timely firm and economy news into their forecasts than time-series models (see Brown and Rozeff, 1978; Brown et al., 1987; Givoly, 1982). Also, analysts' earnings forecasts and recommendations affect stock prices (see Givoly and Lakonishok, 1979; Lys and Sohn, 1990; Francis and Soffer, 1997).

There is also evidence of analyst bias in forecasting and making recommendations. Early evidence on bias indicated that analyst earnings forecasts tended to be optimistic, and that their recommendations were almost exclusively for buys (see Brown et al., 1985). However, recent evidence indicates a change in the pattern of analysts' earnings forecasts in the late 1990s. In this period there has been a marked decline in analyst optimism (see Brown, 1997; Matsumoto, 2000).

Research on the role of financial analysts in capital markets indicates that they play a valuable role in improving market efficiency. For example, Barth and Hutton (2000) find that stock prices for firms with higher analyst following more rapidly incorporate information on accruals and cash flows than prices of less followed firms.

Recent research on analysts attempts to improve our understanding of their cross-sectional performance. Two factors are examined, cross-sectional variation in analysts' incentives and expertise. Studies on incentives note that analysts are rewarded for providing information that generates trading volume and investment banking fees for their brokerage houses. Thus, analysts have incentives to make optimistic forecasts and recommendations when their brokerage house has been hired to underwrite or is being considered to underwrite a new securities issue (see Lin and McNichols, 1998; Dechow et al., 2000).

Studies of the role of analysts' expertise examine factors likely to influence their aptitude, such as experience, brokerage affiliation, and company or industry assignments. Jacob et al. (1999) find that analyst forecast accuracy is affected by innate ability, company assignments, brokerage affiliation, and industry specialization. There appears to be little benefit from experience. Gilson et al. (2000) find that, for focused companies, analysts that specialize by industry issue more precise forecasts than non-specialist analysts.

Academic research on financial analysts also examines whether there is any relation between management's disclosure decisions, and analyst decisions to cover firms. Bhushan (1989a, b) and Lang and Lundholm (1993) argue that voluntary disclosure lowers the cost of information acquisition for analysts and hence increases their supply. However, the effect of voluntary disclosure on demand for analysts' services is ambiguous. Expanded disclosure potentially enables financial analysts to create valuable new information, such as superior forecasts and buy/sell recommendations, thereby increasing demand for their services. However, public voluntary disclosure also pre-empts analysts' ability to distribute managers' private information to investors, leading to a decline in demand for their services.

Lang and Lundholm (1993) find that firms with more informative disclosures have larger analyst following, less dispersion in analyst forecasts, and less volatility in forecast revisions. Healy et al. (1999a) show that firms with increased analyst ratings of disclosure have lower analyst coverage than their industry peers in the pre-event period. After the increase in disclosure, however, analyst coverage for the sample firms reverts to the same level as other firms in the industry. Finally, Francis et al. (1998) find that there is an increase in analyst coverage for firms making conference calls.

Studies of intermediaries other than financial analysts include tests of the value provided by business journalists that analyze and evaluate companies' financial reporting decisions, and bond-rating agencies. Foster (1979, 1987) examined stock price reactions to the publication by Barrons of articles by Abraham Briloff, an academic accountant who periodically questioned firms' accounting decisions. Foster found that firms whose accounting was challenged by Briloff on average suffered an 8% decline in stock price when the article was released. He concluded that this reaction probably reflected Briloff's superior insights and analysis.

Studies of the value provided by bond-rating agencies (see Holthausen and Leftwich, 1986; Hand et al., 1992) conclude that rating downgrades provide new information to investors, but that upgrades are already reflected in stock and bond prices when they are announced.

In summary, there has been considerable academic research on the value provided by auditors and financial intermediaries in reviewing firm's disclosures and in making their own disclosures on the firm. This evidence shows that at least some of the disclosures made by financial analysts, the business press, and bond-rating agencies affect stock prices. However, there remain important gaps in our knowledge about the incentives of auditors and intermediaries, and the impact on their credibility.

Among all the areas of research reviewed in this paper, we view the research on financial analysts as the most advanced. Nonetheless, there are several opportunities for research in this area. First, how does Regulation Full Disclosure recently issued by the SEC affect financial analysts' forecasting performance? Second, what was the role of financial analysts and other information intermediaries in the recent dramatic run-up and decline in stock prices of US technology stocks?

5. Managers' reporting decisions

Research on managers' reporting decisions has focused on two areas. The first area, often called positive accounting theory, focuses on management's financial reporting choices. We provide a brief review of this literature; Fields et al. (2001) provide a more comprehensive survey of recent research in this area. The second area, the voluntary disclosure literature, focuses on management disclosure decisions.

5.1. Positive accounting theory literature

The positive accounting theory literature focuses on management's motives for making accounting choices when markets are semi-strong form efficient, there are significant costs in writing and enforcing contracts, and there are political costs arising out of the regulatory process (see Watts and Zimmerman, 1978, 1986). The central focus of this literature is to examine the role of contracting and political considerations in explaining management accounting choices when there are agency costs and information asymmetry. Two types of contracts are examined, contracts between the firm and its creditors (debt contracts), and contracts between management and shareholders (compensation contracts). Political considerations include management's concern about attracting explicit or implicit taxes, or regulatory actions.

Contracts are not the only mechanisms for dealing with information asymmetry discussed in the positive accounting literature. For example, Watts and Zimmerman (1983, 1986) discuss the role of reputation as a mechanism for resolving information problems in the context of auditing.

Empirical studies of positive accounting theory test whether managers make accounting method changes or accrual estimates to reduce the costs of violating bond covenants written in terms of accounting numbers, to increase the value of earnings-based bonuses under compensation contracts, or to reduce the likelihood of implicit or explicit taxes. Findings indicate that firms that use accounting methods to accelerate earnings are small and have relatively high leverage. Also, firms' accrual decisions appear to be affected by compensation contracts.

While a majority of positive accounting studies focus on analyzing post-contracting opportunistic accounting choices, some studies view the choice of accounting and disclosure as part of the contracting process itself. Holthausen and Leftwich (1983), Watts and Zimmerman (1990), Smith and Watts (1992), and Skinner (1993) argue that the use of accounting information in lending and compensation contracts should be viewed as endogenous. Consequently, the nature of a firm's assets and its investment opportunity set simultaneously determine its optimal contracting relations and its accounting method choices. Watts and Zimmerman (1983) examine the role of voluntary interim reporting as an ex ante contracting part of corporate governance. The ex ante role of accounting in the contracting process is also examined by Zimmer (1986), Christie and Zimmerman (1994), and Skinner (1993).

Although positive accounting theory studies generated several interesting empirical regularities regarding firms' accounting decisions, there is ambiguity about how to interpret this evidence (see reviews by Holthausen and Leftwich, 1983; Watts and Zimmerman, 1990). For example, size is typically viewed as a proxy for political sensitivity, but is likely to proxy for many other factors. Also, as Palepu (1987), Healy and Palepu (1990), and DeAngelo et al. (1996)

suggest, accounting decisions by managers of highly leveraged firms in financial distress may in part reflect an attempt to conserve cash, or changes in investment opportunities.

5.2. *Voluntary disclosure literature*

Research on voluntary disclosure focuses on the information role of financial reporting for capital markets (see Healy and Palepu, 1993, 1995). This research supplements the positive accounting literature by focusing on stock market motives for accounting and disclosure decisions.

Disclosure studies assume that, even in an efficient capital market, managers have superior information to outside investors on their firms' expected future performance. If auditing and accounting regulations work perfectly, managers' accounting decisions and disclosures communicate changes in their firm's business economics to outside investors. Alternatively, if accounting regulation and auditing are imperfect, a more likely possibility, managers trade off between making accounting decisions and disclosures to communicate their superior knowledge of firm's performance to investors, and to manage reported performance for contracting, political or corporate governance reasons. Management motives for making voluntary disclosure and their credibility are, therefore, interesting empirical questions. Below, we discuss empirical evidence on these questions. We also separately analyze potential limitations of the research, many of which are shared across studies.

5.2.1. *Motives for voluntary disclosure*

Researchers discuss six forces that affect managers' disclosure decisions for capital market reasons: capital market transactions, corporate control contests, stock compensation, litigation, proprietary costs, and management talent signaling.

(a) *Capital markets transactions hypothesis*

Theory. Healy and Palepu (1993, 1995) hypothesize that investors' perceptions of a firm are important to corporate managers expecting to issue public debt or equity or to acquire another company in a stock transaction. Consider a firm whose managers have superior information to outside investors regarding the firm's future prospects. Myers and Majluf (1984) point out that if this information asymmetry cannot be resolved, such firms will view making public equity or debt offers to be costly for existing shareholders. Consequently, managers who anticipate making capital market transactions have incentives to provide voluntary disclosure to reduce the information asymmetry problem, thereby reducing the firm's cost of external financing.

Barry and Brown (1985, 1986) and Merton (1987) reach a similar conclusion by modeling the premium that investors demand for bearing information risk when there is an information asymmetry between managers and outside investors. Managers can reduce their cost of capital by reducing information risk through increased voluntary disclosure. A corner solution is not possible because of costs associated with credible voluntary disclosure.

Evidence. Several studies provide evidence on voluntary disclosure policies of firms issuing new capital. In a comprehensive study of corporate disclosure, Lang and Lundholm (1993) document that analysts' ratings of disclosures are higher for firms issuing securities in the current or future periods. In a subsequent paper, Lang and Lundholm (1997) analyze disclosures specifically for firms that make equity offerings and find that there is a significant increase in disclosure beginning six months before the offering, particularly for the categories of disclosure over which firms have the most discretion. Finally, Healy et al. (1999a) find that firms with increased analyst ratings of disclosures have an abnormally high frequency of subsequent public debt offers.[5] However, as discussed below, debt and equity offers are not isolated events, making it difficult to assess whether managers' disclosure strategies are caused by public capital market transactions or by omitted related factors.

(b) *Corporate control contest hypothesis*

Theory. This hypothesis is motivated by evidence that boards of directors and investors hold managers accountable for current stock performance. Warner et al. (1988), and Weisbach (1988) show that CEO turnover is associated with poor stock performance. Poor stock price performance is also associated with the probability of hostile takeovers, which results in high CEO turnover (see Palepu, 1986; Morck et al., 1990). DeAngelo (1988) finds that dissident shareholders who wage a proxy fight for board representation frequently cite poor earnings performance as justification for proposed management changes. Voluntary disclosure theory hypothesizes that, given the risk of job loss accompanying poor stock and earnings performance, managers use corporate disclosures to reduce the likelihood of undervaluation and to explain away poor earnings performance.

One limitation is that this analysis does not take account of multi-period considerations. For example, if managers expect that a commitment to provide extensive disclosure today could be used to hold them more accountable for any subsequent poor performance, managers of firms subject to corporate control actions may not wish to expand disclosure in a period of poor performance.

Evidence. There has been relatively little research on voluntary disclosures accompanying hostile takeovers or for target firms engaged in proxy contests.

[5] Frankel et al. (1995) find that firms that raise new capital are not more likely to provide management forecasts in the period immediately prior to the offering than at other times. However, this finding is not surprising given that securities laws restrict managers from making forward-looking statements prior to equity offerings.

One recent exception is Brennan (1999), who finds that targets are more likely to make management earnings forecasts during contested takeover bids.

(c) *Stock compensation hypothesis*

Theory. Managers are also directly rewarded using a variety of stock-based compensation plans, such as stock option grants, and stock appreciation rights. These types of compensation schemes provide incentives for managers to engage in voluntary disclosures for several reasons.

First, managers interested in trading their stock holdings have incentives to disclose private information to meet restrictions imposed by insider trading rules and to increase liquidity of the firm's stock. Restrictions on insider trading also provide managers with incentives to make voluntary disclosures to correct any perceived undervaluation (relative to their own information set) prior to the expiration of stock option awards.[6]

Second, managers acting in the interests of existing shareholders have incentives to provide voluntary disclosures to reduce contracting costs associated with stock compensation for new employees. Stock compensation is more likely to be an efficient form of remuneration for managers and owners if stock prices are a precise estimate of firm values. Otherwise, managers will demand additional compensation to reward them for bearing any risk associated with misvaluation. Firms that use stock compensation extensively are therefore likely to provide additional disclosure to reduce the risk of misvaluation.[7]

Evidence. Consistent with this hypothesis, Noe (1999) finds that the incidence of management forecasts is positively associated with trading by insiders in the firm's stock. Aboody and Kasznik (2000) show that firms delay disclosure of good news and accelerate the release of bad news prior to stock option award periods, consistent with managers making disclosure decisions to increase stock-based compensation. Miller and Piotroski (2000) find that managers of firms in turnaround situations are more likely to provide earnings forecasts if they have higher stock option compensation at risk.

(d) *Litigation cost hypothesis*

Theory. The threat of shareholder litigation can have two effects on managers' disclosure decisions. First, legal actions against managers for inadequate or untimely disclosures can encourage firms to increase voluntary

[6] In the absence of insider trading restrictions, managers may benefit from the undervaluation by buying shares rather than making disclosures to enhance the value of their stock options.

[7] As discussed in Section 2, we use the term misvaluation to refer to the gap between the value of the firm conditional on managers' information set and on investors' information set. This gap arises when there is information asymmetry between managers and investors that is not fully resolved. Throughout our analysis, we assume that both managers and investors are rational, and that stock prices fully incorporate all public information.

disclosure. Second, litigation can potentially reduce managers' incentives to provide disclosure, particularly of forward-looking information.

Skinner (1994) examines the first of these effects and hypothesizes that managers of firms with bad earnings news have an incentive to pre-disclose that information to reduce the cost of litigation. This hypothesis presumes that in the absence of litigation managers have an incentive to time the disclosure of good and bad news symmetrically. Litigants and courts, therefore, rationally focus on whether there were delays in bad news announcements.

One question that arises about the litigation hypothesis is why pre-disclosure of poor performance reduces the risk of litigation. Is it because delaying bad news until a *required* earnings announcement is prima facie evidence that management did not *voluntarily* disclose information to investors in a timely manner? Alternatively, some suggest that pre-disclosure of bad news is beneficial because it spreads the stock price decline over multiple dates, thereby reducing the likelihood of being detected in screens used to identify claims. Of course, this presumes that investors do not make an unbiased assessment of the bad news conveyed by a pre-announcement of earnings. The price drop would then occur at the pre-release date rather than the subsequent earnings announcement, and would continue to hit the screen used to identify potential claims.

Litigation potentially reduces incentives to provide disclosure, particularly of forward-looking information, if managers believe that the legal system penalizes forecasts made in good faith because it cannot effectively distinguish between unexpected forecast errors due to chance and those due to deliberate management bias.

Evidence. The empirical evidence on the litigation hypothesis is mixed. Skinner (1994, 1997) finds that firms with bad earnings news are more than twice as likely to pre-disclose the poor earnings performance than are firms with good news. In addition, firms with negative earnings news are more likely to be subject to litigation. Finally, he finds weak evidence that litigation costs are lower for firms that pre-disclose earnings than for those that do not.

In contrast, Francis et al. (1994) find that 62% of the firms in their litigation sample were sued over earnings forecasts or pre-emptive earnings disclosures. In contrast, 87% of their sample of no-litigation firms with comparable stock price declines pre-announced an earnings decline. They concluded that pre-disclosure does not appear to be a deterrent to litigation.

Empirical evidence also suggests that litigation risk is not just relevant for firms with bad news, but also those with good news. For example, Miller and Piotroski (2000) report that managers of turnaround firms in industries subject to high litigation risk are more likely to make management forecasts of positive future earnings information than firms in low risk industries. However, this conclusion should be interpreted with caution because the study only examines the forecasting behavior of firms that ex post experienced a turnaround. It is unclear whether the findings can be extended to firms that were ex ante expected by managers to show a turn around, but failed to do so ex post.

(e) *Management talent signaling hypothesis*

Theory. Trueman (1986) argues that talented managers have an incentive to make voluntary earnings forecasts to reveal their type. A firm's market value is a function of investors' perceptions of its managers' ability to anticipate and respond to future changes in the firm's economic environment. The earlier that investors infer that the manager has received information, the more favorable will be their assessment of the manager's ability to anticipate future changes and the higher will be the firm's market value. To the best of our knowledge, there is no evidence to either support or refute this hypothesis.

(f) *Proprietary cost hypothesis*

Theory. Several researchers hypothesize that firms' decisions to disclose information to investors is influenced by concern that such disclosures can damage their competitive position in product markets. (see Verrecchia, 1983; Darrough and Stoughton, 1990; Wagenhofer, 1990; Feltham and Xie, 1992; Newman and Sansing, 1993; Darrough, 1993; Gigler, 1994). These studies conclude that firms have an incentive not to disclose information that will reduce their competitive position, even if it makes it more costly to raise additional equity. However, this incentive appears to be sensitive to the nature of the competition, in particular whether firms face existing competitors or merely the threat of entry, and on whether firms compete primarily on the basis of price or long-run capacity decisions.

This literature is extensively reviewed in Verrecchia (2001) and Dye (2001). Unlike the previous five hypotheses on voluntary disclosure, the proprietary cost hypothesis assumes there are no conflicts of interest between managers and shareholders. As a result, this literature predicts that voluntary disclosure will always be credible. The focus of this literature, therefore, is on examining the economic forces that constrain full disclosure.

Hayes and Lundholm (1996) argue that proprietary costs induce firms to provide disaggregated data only when they have similarly performing business segments. Firms with widely varying performance across business segments have incentives to conceal these performance differences from competitors by only reporting aggregate performance.

Evidence. There has been relatively little direct evidence on the proprietary cost hypothesis. Piotroski (1999a) examines firms' decisions to provide additional segment disclosures. He concludes that firms with declining profitability and with less variability in profitability across industry segments are more likely to increase segment disclosures, consistent with the proprietary cost hypothesis.

The proprietary cost hypothesis can be potentially extended to include other externalities from information disclosure. For example, Watts and Zimmerman (1986) argue that firms are concerned about potential political and contracting costs from financial disclosures, which may in turn affect their voluntary disclosure.

5.2.2. Credibility of voluntary disclosure

The extent to which voluntary disclosure mitigates resource misallocation in the capital market depends on the degree of credibility of information on the firm's economics that is not available from other sources, including required disclosures. Because managers have incentives to make self-serving voluntary disclosures, it is unclear whether management disclosures are credible.

There are potentially two mechanisms for increasing the credibility of voluntary disclosures. First, third-party intermediaries can provide assurance about the quality of management's disclosures. Second, there can be validation of prior voluntary disclosures through required financial reporting itself.[8] For example, managers' forecasts of revenues and earnings can be verified using actual realizations. This mechanism will be effective in making disclosures credible if there are adequate penalties for managers that knowingly make disclosures that are subsequently proven false. The legal system and board monitoring play an important role in imposing such penalties.

Much of the evidence on the credibility of voluntary disclosures focuses on the accuracy and stock price effects of management forecasts. Waymire (1984) and Ajinkya and Gift (1984) show that there are positive stock price reactions to management forecasts of earnings increases, and negative reactions to forecasts of earnings decreases.[9] Pownall and Waymire (1989) find that the market reaction to unexpected management earnings forecasts is similar in magnitude to the reaction to unexpected earnings announcements themselves. This suggests that management forecasts have comparable credibility to audited financial information.

There is also evidence that investors are justified in viewing management forecasts as providing credible new information. Tests of the accuracy of these forecasts indicate that they are more accurate than contemporaneous analysts' forecasts (see Hassell and Jennings, 1986; Waymire, 1986), and are unbiased (see McNichols, 1989). In addition, financial analysts appear to revise their forecasts in response to information reflected in management's forecasts (see Hassell et al., 1988). Piotroski (1999a) provides evidence that voluntary disclosures other than management forecasts are also credible. He examines a sample of firms that increase segment reporting disclosures, and finds that the

[8] Lundholm (1999) points out that this role of accounting can be exploited to increase disclosures on intangible assets. However, if the legal system cannot distinguish between random forecast errors from deliberate management bias, such disclosures can potentially impose significant litigation costs.

[9] Hutton et al. (2000) find that good news forecasts, however, are only informative if they are accompanied by verifiable forward-looking statements.

expanded disclosure is associated with an increase in analysts' forecast accuracy and a decline in dispersion.

Other evidence on the credibility of voluntary disclosure is provided by Amir and Lev (1996). They report that voluntary disclosures such as market population size (POPS) and market penetration have a more significant relation to stock prices than required financial statement information, indicating that investors view such voluntary disclosures as credible. Finally, Frost (1997) finds evidence that disclosure credibility declines for financially distressed firms.

5.2.3. Limitations of studies on voluntary disclosure

One of the major limitations of the above studies is the difficulty in measuring the extent of voluntary disclosure. Researchers use several proxies for this variable, including management forecasts (see Miller and Piotroski, 2000), and metrics based on the AIMR database (see Lang and Lundholm, 1993, 1997; Healy et al., 1999a), and self-constructed measures (see Botosan, 1997; Miller, 1999). However, each approach has its limitations.

There are some significant advantages to using management forecasts as a voluntary disclosure proxy. First, they can be precisely measured. Managers' estimates are typically either point or range estimates for earnings or revenues. Second, the timing of the disclosure is typically known. As a result it is possible to assess whether the forecast preceded or lagged particular changes in variables of interest using daily or weekly data. This enables researchers to conduct more powerful tests of motivations for and consequences of voluntary disclosure.

However, one limitation of management forecasts as a proxy is that their accuracy can be easily verified by outside investors through actual earnings realizations. In contrast, it is more difficult to ex post verify the accuracy of many other types of voluntary disclosures, such as customer satisfaction and human capital. As a result, research using management forecasts as the metric for voluntary disclosure is likely to increase the power of the tests, but these findings may not generalize to other forms of voluntary disclosure.

The AIMR data provides a more general measure of voluntary disclosure than management forecasts. The annual survey produces firm rankings of aggregate voluntary disclosure for each industry covered in the survey, as well as disaggregate rankings for voluntary disclosure published in annual financial statements and 10-Ks, voluntary disclosures published in quarterly financial reports, and voluntary disclosure provided through firms' investor relations. The panels that provide the rankings comprise the leading analysts in each industry, and are therefore likely to be particularly well qualified to judge firms' disclosures. In addition, the metric covers all disclosure, including that through analyst meetings and conference calls. However, it is unclear whether the analysts on the AIMR panels take the ratings seriously, how they select firms to be included in the ratings, and what biases they bring to the ratings.

Studies with self-constructed measures of disclosure face a different set of problems. Because the authors have developed their own metric of voluntary disclosure, there is increased confidence that the measure truly captures what is intended. However, to the extent that construction of the metrics involves judgment on the part of the researcher, the findings may be difficult to replicate. In addition, these metrics typically rely on disclosures provided in the annual report or other such public documents. As a result any disclosures that firms provide in analysts meetings, conference calls, and other such venues are omitted from the analysis.

Endogeneity is a potentially serious problem for some of the above studies. For example, firms that have public capital market transactions are also likely to be facing changes in their investment opportunity sets. It is then difficult to assess whether the relation between high levels of disclosure and increases in disclosure for these firms is attributable to the public issue per se, or to other changes that the firm is experiencing.

Thus, the analyst ratings and self-constructed proxies are likely to be a noisy measure of disclosure. This is likely to reduce the power of the tests used in examining the motives for voluntary disclosure.[10]

6. Capital market consequences of reporting and disclosure

Both the positive accounting theory and the voluntary disclosure literatures have examined the capital market consequences of changes in corporate reporting. Positive accounting theory research has focused on effects of changes in accounting methods and regulatory decisions to change standards. Voluntary disclosure research has examined the capital market effects of changes in corporate disclosure.

6.1. Positive accounting theory literature

As noted above, the major focus of the positive accounting literature has been to document contracting and political factors that explain management financial reporting decisions. However, several studies have examined the economic consequences and shareholder wealth effects of changes in accounting choices. For example, studies of the effects of changes in oil and gas accounting standards find that firms required to change from the full cost

[10] In contrast, the measurement problems that we discussed for the positive accounting literature are for the independent variables, leading to a concern about bias in the findings due to correlated omitted variables.

method to successful efforts experienced a decline in stock prices (see Dyckman and Smith, 1979; Collins et al., 1981). There is some evidence that the decline is correlated with contracting variables (see Lys, 1984). However, studies of the stock price effects of other accounting standards report largely insignificant incremental contracting or political cost effects (Leftwich, 1981). Similarly, studies of firms' accounting method changes indicate that there is generally no significant relation between stock returns at announcement of the accounting change and contracting or political cost considerations (see Holthausen, 1981).

There are at least three potential explanations for this finding. First, accounting decisions have no significant shareholder wealth effects. However, there is some evidence that contradicts this explanation. The oil and gas studies themselves find that there is a significant stock price effect associated with the unanticipated change in accounting standard. Also, Foster (1979) documents significant stock price changes for critiques of firms' accounting decisions by analysts such as Abraham Briloff.[11]

A second explanation is that it is difficult to measure stock price effects for many of the events studied (see Holthausen and Leftwich, 1983; Watts and Zimmerman, 1983). For example, accounting standards are set through a lengthy process, making it difficult to capture shareholder wealth effects of the announcement of the standard itself. Similarly, it is often difficult to identify the date when outside investors first learned of an accounting change. Finally, since accounting changes are often accompanied by other economic changes, it is difficult to isolate the stock price effect of the accounting change itself.

A third explanation for the findings is that contracting and political cost considerations are economically unimportant in explaining wealth effects of reporting changes. Consistent with this explanation, Healy et al. (1987) find that the average annual CEO compensation effects from a change in depreciation accounting method amount to 1.5 percent of their base salary. Since CEO base salary is usually only a small fraction of a firm's market value, this evidence suggests that the CEO compensation effect of depreciation changes on shareholder wealth is likely to be insignificant.[12]

[11] One potential explanation for the market reaction is that Briloff's analysis provides new information about the validity of managers' forecasts underlying their accounting judgments. Some researchers argue that the ''Briloff effect'' reflects changes in the firms' economics subsequent to the publication of his articles, such as tax, litigation and regulatory effects. Foster examines this explanation, and concludes that the non-information related economic factors cannot fully explain the observed market reaction to the accounting critiques.

[12] One explanation for the small economic magnitude of compensation and other contracting effects is that investors anticipate such potential costs in writing the contracts. Surviving contracts, therefore, are likely to be efficient, making the observed contracting costs small. However, this does not suggest that the concept of contracting costs is unimportant for managers' accounting decisions.

6.2. Voluntary disclosure literature

A number of studies examine the economic consequences of voluntary disclosure. These studies argue that there are potentially three types of capital market affects for firms that make extensive voluntary disclosures: improved liquidity for their stock in the capital market, reductions in their cost of capital, and increased following by financial analysts. Each of these effects and the relevant empirical evidence is discussed below. Since many of the studies discussed have common limitations, we discussed these limitations together, subsequent to the presentation of their main findings; the findings summarized below, therefore, should be interpreted with these limitations in mind.

(a) *Improved stock liquidity*

Theory. Diamond and Verrecchia (1991), and Kim and Verrecchia (1994) argue that voluntary disclosure reduces information asymmetries among informed and uninformed investors. As a result, for firms with high levels of disclosure, investors can be relatively confident that any stock transactions occur at a "fair price", increasing liquidity in the firm's stock. In addition, these studies argue that expanded disclosure and stock liquidity will be associated with increased institutional ownership.

Evidence. Several papers provide evidence that is consistent with this hypothesis. Healy et al. (1999a) find that firms that expand disclosure experience significant contemporaneous increases in stock prices that are unrelated to current earnings performance. Gelb and Zarowin (2000) find that firms with high disclosure ratings have high stock price associations with contemporaneous and future earnings relative to firms with low disclosure ratings. These findings suggest that firms' disclosure strategies affect the speed with which information gets into prices.

In addition, several studies attempt to measure stock liquidity and to examine its relation to firm disclosure proxies. Welker (1995) documents a significant negative relation between analysts' ratings of firms' disclosures and bid-ask spreads. Healy et al. (1999a) find firms with increased analyst ratings of disclosure had significantly higher bid-ask spreads than their industries prior to the disclosure change. After the disclosure increase, bid-ask spreads for the sample firms reverted to the same levels as their industry peers. Finally, Leuz and Verrecchia (2000) examine bid-ask spreads for firms listed on the Neuer Market, which has higher disclosure requirements. They find that these firms have lower bid-ask spreads than firms listed on the Frankfurt Exchange.

(b) *Reduced cost of capital*

Theory. As discussed in Section 2, the lemons problem in capital markets creates an incentive for managers to provide voluntary disclosure to reduce the cost of capital. A similar argument is made by Barry and Brown (1984–1986), who note that when disclosure is imperfect, investors bear risks in forecasting the future payoffs from their investment. If this risk is non-diversifiable, investors will demand an incremental return for bearing the information risk. As a result, firms with high levels of disclosure, and hence low information risk, are likely to have a lower cost of capital than firms with low disclosure levels and high information risk.

Evidence. Botosan (1997) provides some evidence consistent with the cost of capital hypothesis. She finds that for firms with low analyst following, there is a negative relation between cost of equity capital and the extent of their voluntary disclosures. Piotroski (1999b) finds that firms providing additional segment disclosures have a contemporaneous increase in the market's capitalization of their earnings, consistent with the firm having a lower cost of capital.[13] Finally, Botosan and Plumlee (2000) find a negative cross-sectional relation between cost of capital and analyst rankings of annual report disclosures. However, they also find that firms' cost of capital is positively related to rankings of quarterly disclosures, and unassociated with investor relations' activities.

(c) *Increased information intermediation*

Theory. Bhushan (1989a, b) and Lang and Lundholm (1996) argue that if management's private information is not fully revealed through required disclosures, voluntary disclosure lowers the cost of information acquisition for analysts and hence increases their supply. However, the effect of voluntary disclosure on the demand for analysts' services is ambiguous. Expanded disclosure enables financial analysts to create valuable new information, such as superior forecasts and buy/sell recommendations, thereby increasing demand for their services. However, public voluntary disclosure also preempts analysts' ability to distribute managers' private information to investors, leading to a decline in demand for their services.

Evidence. Lang and Lundholm (1993) find that firms with more informative disclosures have larger analyst following, less dispersion in analyst forecasts, and less volatility in forecast revisions. Healy et al. (1999a) show that firms with increased analyst ratings of disclosure have lower analyst coverage than their industry peers in the pre-event period. After the increase in disclosure, however, analyst coverage for the sample firms reverts to the same level as other firms in the industry. Finally, Francis et al. (1998) find that there is an increase in analyst coverage for firms making conference calls.

6.3. Limitations of studies of voluntary disclosure capital market consequences

Potential endogeneity is the most important limitation of the above findings. For example, firms with the highest disclosure ratings tend to also show the

[13] The increased segment disclosure is potentially endogenous to the changes in the economics of the sample firms, potentially confounding this conclusion. The endogeneity issue is a common concern for many other studies discussed in this section. We discuss this issue further later.

highest contemporaneous earnings performance (see Lang and Lundholm, 1993). This may be caused by a self-selection bias—firms may increase disclosure when they are performing well. As a result the association between capital market variables and disclosure may be driven by firm performance rather than disclosure per se. More generally, disclosure changes are unlikely to be random events: they are likely to coincide with changes in firm economics and governance.

Several studies attempt to control for performance changes to isolate the impact of disclosure. For example, Healy et al. (1999a) control for contemporaneous earnings levels and earnings changes in examining the cross-sectional relation between disclosure increases and variables such as stock performance, analyst following, institutional ownership, and analyst forecast dispersion. However, such controls are likely to be imperfect in the absence of a reliable model of the relation between performance and disclosure. In addition, as noted above, there are likely to be other correlated omitted variables in these analyses.

A related problem with both AIMR and self-constructed measures of voluntary disclosure is that it is difficult to precisely define the timing of any change in disclosure. Typically disclosure is measured for a given year, making it difficult to infer whether disclosure changes followed or preceded changes in variables of interest. Consequently, it is difficult to draw strong conclusions about the direction of causality underlying the documented associations.

7. Where do we go from here?

Empirical research discussed in this paper supports the following broad conclusions: (1) Regulated financial reports are informative to investors, and the degree of informativeness varies systematically with firm and economy characteristics. (2) Financial analysts add value in the capital market through their analysis of firms' financial reporting decisions, forecasts of future earnings, and buy/sell recommendations. (3) There is a market-driven demand for auditing services. (4) Both financial analysts and auditors are imperfect intermediaries, in part because of incentive conflicts. (5) Managers' financial reporting and disclosure choices are associated with contracting, political cost, and capital market considerations. (6) Disclosure is associated with stock price performance, bid-ask spreads, analysts' following, and institutional ownership.

Despite the progress in the last 30 years, many of the questions identified in Table 1 have yet to be fully addressed, or are not yet answered. Some fundamental unanswered questions we identify throughout the paper include: (1) What is the objective of disclosure regulation, and what is its effect on capital market development? (2) What types of accounting standards produce high quality financial reports? (3) Do auditors enhance the credibility of financial statements? (4) Why are sell-side analysts' forecasts and recommendations credible given their well-documented biases and conflicts of interests? (5) What is the role of analysts in rapid swings in stock prices? (6) Why do firms engage in voluntary disclosure? (7) Does disclosure affect firms' cost of capital?

In addition to these unanswered questions, we believe that recent macro-economic forces create several new opportunities for research. We discuss four forces: rapid technological innovations, the advent of network organizations, changes in business economics of audit firms and financial analysts, and globalization.

(a) *Rapid technological innovation*

There have been phenomenal technological innovations in the last 20 years in areas such as computers, communications, biotechnology, and the internet. The economic consequences of these innovations are typically not reflected in financial statements in a timely manner. Except for software R&D occurring after technological feasibility, US firms expense R&D outlays immediately, regardless of their economic values. As a result, investors that are interested in assessing the potential economic performance of innovative firms in the current period, as well as potential future benefits from innovations-in-progress are forced to look beyond the financial statements.

Chang (1998) and Lev and Zarowin (1999) find that the decline in value relevance of financial statement items is partially explained by an increase in innovation. Further, Amir and Lev (1996) show that for firms in the wireless communications industry non-financial indicators of performance, such as market population size (POPS) and market penetration, have a more significant relation to stock prices than financial statement information.

Technological innovation has also created new channels for investor communication. For example, conference calls and the internet make it easier for firms to communicate rapidly with key investors and financial intermediaries. Conference calls are large-scale telephone conversations between managers and key financial analysts, where managers provide voluntary disclosure by answering analysts' questions about the firm's current and future performance. Tasker (1998) documented that 35% of mid-sized firms hosted a conference call in the period 1995–1996 and that many firms used this channel to mitigate limitations in required financial reporting.

The internet provides management with the opportunity to access all investors and to provide daily updates of important information. Many corporate internet sites provide an overview of the company's performance, a review of performance, press releases, stock quotes, frequently asked investor relations questions, earnings forecasts (by financial analysts), as well as annual reports, SEC reports. The increasing use of the internet by investors is likely to continue, reducing the costs of providing voluntary disclosures and presumably increasing their supply.

(b) *Network organizations*

Innovations in organizational forms, such as closely-coordinated supply chains and strategic alliances, also significantly affect the nature of financial reporting and disclosure. These organizational forms facilitate efficient risk sharing and market-based coordination of activities that were traditionally performed internally. However, by blurring the boundaries of firms, they pose difficult challenges to the entity measurement concept. For example, it is difficult for financial statements to fully reflect the complex relations and implicit commitments that underlie network relations between Coca Cola Company and its bottlers. As a result of its exclusive contracts with bottlers, Coke has been able to outsource the capital-intensive, low margin activities for its business. Consequently, bottlers have reported marginal financial performance while Coke has shown strong earnings performance. However, the reported financial performance of Coke does not fully reflect the complex relationship and implicit commitments between the companies. Reflecting these types of interdependencies in financial statements is challenging for standard setters. Current standards ignore them, potentially reducing the timeliness of accounting information.

(c) *Changes in business economics of audit firms and financial analysts*

A third current phenomenon is changing business economics of audit firms and financial analysts. Audit firms are increasingly reliant on management consulting, rather than assurance services. Regulators and commentators have argued that there is a potential conflict between the two. For example, they question whether an audit firm will challenge management of corporate clients if the same management is responsible for hiring the audit firm for a consulting engagement. To our knowledge there is no large sample empirical evidence of a decline in the credibility of audit reports. However, the issue has prompted the SEC to propose that audit firms divest their consulting practices and disclose consulting fees for each of their clients.

There have also been changes in the business model of financial analysts. The decline in trading costs has reduced soft dollars available for funding research. Therefore, these activities are increasingly linked to investment banking and underwriting activities. In addition, leading financial analysts are beginning to be viewed as strategy advisors to the companies that they are analyzing. For example, the financial press is replete with stories on the increasingly important roles of telecommunication analyst Jack Grubman and internet analyst Mary Meeker in the strategic decisions of their respective industries (see Business Week, 2000). These trends are likely to exacerbate potential conflicts of interest that analysts face, raising questions about the effectiveness as information intermediaries.

(d) *Globalization*

Capital markets are becoming increasingly global as a result of a variety of developments. Institutional investors are looking to diversify by investing around the globe; corporations are seeking capital wherever the terms are most attractive; and internet-based trading is making it easier for individual investors to invest in international capital markets. Financial deregulation is encouraging these activities.

The globalization of capital markets has been accompanied by calls for globalization of financial reporting. This raises several interesting questions. First, is it optimal to have a global accounting standard setter given wide disparities in the development of financial reporting infrastructure across counties? Second, what economic forces will determine the speed with which convergence of financial reporting institutions will take place? Third, what are the political and economic consequences of such a convergence? Fourth, in the absence of convergence, will financial reporting informativeness be enhanced by global accounting standards?

In summary, the increased pace of entrepreneurship and economic change has probably increased the value of reliable information in capital markets. However, the traditional financial reporting model appears to do a poor job of capturing the economic implications of many of these changes in a timely way. There is, therefore, an opportunity for future disclosure research to examine how financial reporting and disclosures adapt to changes in business and capital market environments. In addition, as we note earlier, there are many areas where our understanding of existing disclosure institutions and phenomena are limited. We believe that both opportunities make the disclosure area an exciting area of study for accounting scholars.

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Capital markets research in accounting ☆

S.P. Kothari*

Sloan School of Management, Massachusetts Institute of Technology, Cambridge, MA 02142, USA

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Abstract

I review empirical research on the relation between capital markets and financial statements. The principal sources of demand for capital markets research in accounting are fundamental analysis and valuation, tests of market efficiency, and the role of accounting numbers in contracts and the political process. The capital markets research topics of current interest to researchers include tests of market efficiency with respect to accounting information, fundamental analysis, and value relevance of financial reporting. Evidence from research on these topics is likely to be helpful in capital market investment decisions, accounting standard setting, and corporate financial disclosure decisions. © 2001 Elsevier Science B.V. All rights reserved.

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*Tel.: +1-617-253-0994; fax: +1-617-253-0603.

E-mail address: kothari@mit.edu (S.P. Kothari).

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1. Introduction

1.1. Objective of the review article

My assignment is to review research on the relation between capital markets and financial statements. This is a broad area of research that originated with the seminal publication of Ball and Brown (1968). The literature has grown rapidly with over 1000 published papers in leading academic accounting and finance journals in the past three decades. The approach I adopt for the review involves a survey of the literature using an economics-based framework. I begin with a discussion of the demand for and supply of research on the relation between financial information and capital markets. This is the organizing framework of my discussion of various areas within capital markets research.

An important objective of the review is to produce a pedagogically valuable document. Toward this end, the review extends at least two previous comprehensive surveys of the capital markets research in accounting by Lev and Ohlson (1982) and Bernard (1989). Because they provide in-depth summaries of research in the 1970s and 1980s, the bulk of the research examined in my study is from the late 1980s and 1990s. In addition to offering a fairly detailed summary of research in the past 10–15 years, I discuss the genesis of important ideas in the literature and the concurrent developments that stimulated many of the ideas. I also critically evaluate the research findings and research designs employed in past research. The main objective is to offer competing hypotheses and explanations for the observed findings. This naturally leads to unresolved issues and directions for future research noted throughout the review. I hope doctoral students (and their instructors) find the study useful in preparing themselves for successful careers in research.

I review almost exclusively empirical capital markets research. However, empirical research is (or should be) informed by theory, since interpretation of empirical analysis is impossible without theoretical guidance. Therefore, I refer to the underlying theory and alternative hypotheses that bear on the analysis, some of which Verrecchia (2001) reviews.

While I attempt to be thorough, my own tastes and interests as well as my differential expertise in various areas within capital markets research influence the review's contents. In addition, within the empirical capital markets area, there are at least three topics that are examined extensively elsewhere. Holthausen and Watts (2001) present a critical assessment of the research on value relevance in the context of standard setting. Healy and Palepu (2001) evaluate empirical research on corporate disclosure and Shackelford and Shevlin (2001) examine tax-related capital markets research. Accordingly, I do not discuss the capital markets research in the above three areas, although I make references to them.

1.2. Summary

Capital markets research in accounting includes several topics, including research on earnings response coefficients and properties of analysts' forecasts, fundamental analysis and valuation research, and market efficiency tests. Instead of summarizing each topic, I comment on areas of current interest in capital markets research and offer thoughts on how academics can prepare themselves for producing high impact research.

The capital market research topics of primary interest to researchers currently appear to be tests of market efficiency with respect to accounting information (e.g., accounting methods and accruals), fundamental analysis and accounting-based valuation, and value relevance of financial reporting (see Holthausen and Watts, 2001). The mounting evidence of apparent market inefficiency documented in the financial economics and accounting literature has fueled accounting researchers' interest in fundamental analysis, valuation, and tests of market efficiency. Evidence of market inefficiency has created an entirely new area of research examining long-horizon stock-price performance following accounting events. This is in sharp contrast to the boom in short-window event studies and studies of economic consequences of standard setting of the 1970s and 1980s. Future work on tests of market efficiency with respect to accounting information will be fruitful if it recognizes that (i) deficient research design choices can create the false appearance of market inefficiency; and (ii) advocates of market inefficiency should propose robust hypotheses and tests to differentiate their behavioral-finance theories from the efficient market hypothesis that does not rely on irrational behavior.

I expect capital markets research on issues surrounding market efficiency, fundamental analysis, and valuation to continue. It is worthwhile thinking about how best to prepare for such research. A historical perspective provides helpful guidance. Capital markets research in accounting began in the late 1960s soon after the development of the efficient markets hypothesis and event study methodology (see Section 3) at the University of Chicago. Many of the early capital markets investigators in accounting also came from Chicago and were typically trained in finance and economics. I believe future successful capital markets researchers will also be similarly well trained with a solid grounding in economics-based and behavioral theories of market inefficiency, which have begun to mushroom in finance and economics. This will prepare accounting academics to make a meaningful contribution, not simply within the field of accounting, but in finance and economics as well.

1.3. Outline of the review

Section 2 presents a discussion of the sources of demand for capital markets research in accounting. I review early capital markets research in Section 3, primarily with a pedagogical motivation. It contains an overview of the state of accounting research in the era prior to the Ball and Brown (1968) and Beaver (1968) and the developments in finance and economics in the mid-1960s that facilitated capital markets research in accounting. I discuss much of the capital markets research in the past two decades in Section 4. Section 4 is split into four subsections. Section 4.1 examines methodological research. Section 4.2 focuses on research evaluating alternative performance measures. Fundamental analysis research in accounting is the topic of Section 4.3 and tests of market efficiency in accounting are critically evaluated in Section 4.4. Capital markets research on standard setting is also a capital markets research topic, but I refer the reader to the Holthausen and Watts (2001) review. Section 5 presents a summary and conclusions.

2. Demand for capital markets research in accounting

A large fraction of published research in leading academic accounting journals examines the relation between financial statement information and capital markets, referred to as capital markets research. This voluminous published research is an indication of the demand for capital markets research.[1] There are at least four sources of the demand for capital markets research in accounting that explain its popularity: (i) fundamental analysis and valuation; (ii) tests of capital market efficiency; (iii) role of accounting in contracts and in the political process; and (iv) disclosure regulation. I discuss the four sources of demand for capital markets research below, and list the types of research studies I subsequently summarize in the review. While I believe the four sources account for a large fraction of the demand for capital markets research in accounting, these sources are neither mutually exclusive nor collectively exhaustive.

2.1. Fundamental analysis and valuation

Shareholders, investors, and lenders have an obvious interest in the value of a firm. In an efficient market, firm value is defined as the present value of expected future net cash flows, discounted at the appropriate risk-adjusted rate

[1] I do not examine the decline in the cost of doing capital market research as an explanation for the explosive growth in the supply of capital market research over the past three decades. The cost has declined with the low-cost availability of computing power, statistical packages, and machine-readable databases such as security price data from the Center for Research in Security Prices (CRSP), financial statement data from Standard & Poor's Compustat, and analysts' forecast data from Institutional Brokers Estimate System (IBES).

of return. A firm's current performance as summarized in its financial statements is an important, but not the only input to the market's assessment of the firm's future net cash flows and thus into the firm's market valuation. This is consistent with the Financial Accounting Standard Board's (FASB's) conceptual framework that financial statements should help investors and creditors in "assessing the amounts, timing, and uncertainty" of future cash flows (FASB, 1978). Therefore, a temporal association between current financial performance and future cash flows, as well as a contemporaneous association between financial performance and security prices or price changes is expected. An important goal of capital markets research is to provide evidence on these relations.

The principal focus of fundamental analysis is on valuation aimed at identifying mispriced securities. This has been popular at least since Graham and Dodd published their book *Security Analysis* in 1934.[2] A large fraction of the nearly $5 trillion currently invested in US mutual funds is actively managed, with fundamental analysis as the guiding principle of most mutual fund managers. Fundamental analysis entails the use of information in current and past financial statements, in conjunction with industry and macroeconomic data to arrive at a firm's intrinsic value. A difference between the current price and the intrinsic value is an indication of the expected rewards for investing in the security. Capital markets research on fundamental analysis has become extremely popular in recent years in part because of mounting evidence in the financial economics literature against the efficient markets hypothesis. The belief that "price convergence to value is a much slower process than prior evidence suggests" (Frankel and Lee, 1998, p. 315) has acquired currency among leading academics, spurring research on fundamental analysis. Capital markets research on fundamental analysis examines whether it successfully identifies mispriced securities. Fundamental analysis research thus cannot be disentangled from capital markets research on testing market efficiency.

The research on valuation and fundamental analysis that I review includes valuation models, such as those presented in Fama and Miller (1972, Chapter 2), Beaver et al. (1980), Christie (1987), Kormendi and Lipe (1987), Kothari and Zimmerman (1995), Ohlson (1995), and Feltham and Ohlson (1995). I then examine recent empirical applications of the valuation models like Dechow et al. (1999) and Frankel and Lee (1998). Finally, I discuss studies that employ fundamental analysis to forecast earnings and future stock returns (i.e., a test of market efficiency). Examples include Ou and Penman (1989a, b), Stober (1992), Lev and Thiagarajan (1993), Abarbanell and Bushee (1997, 1998), and Piotroski (2000).

[2] Recent editions of the book are titled "Graham and Dodd's Security Analysis" by Cottle et al. (1988).

2.2. Tests of market efficiency

Fama (1970, 1991) defines an efficient market as one in which "security prices fully reflect all available information". Whether security markets are informationally efficient is of great interest to investors, managers, standard setters, and other market participants. The interest stems from the fact that security prices determine the allocation of wealth among firms and individuals. The security prices themselves are influenced by financial information, which explains academic and practicing accountants and standard setters' interest in market efficiency research.

Market efficiency has important implications for the accounting profession. For example, rewards from fundamental analysis would diminish in an efficient market. A switch from one accounting method to another without a direct cash flow effect, a signaling effect, or incentive consequences does not affect security prices in an efficient market. Choice between disclosure in footnotes and recognition in financial statements (e.g., accounting for employee stock options) is less contentious from the perspective of its effect on security prices in an efficient market. Naturally, the opposite would be true in all of the above examples if markets were not efficient. Therefore, there is a demand for empirical research on market efficiency.

There is a huge literature testing market efficiency in finance, economics, and accounting. I concentrate on the literature in accounting. The accounting literature draws inferences about market efficiency from two types of tests: short- and long-horizon event studies and cross-sectional tests of return predictability or the anomalies literature. Event studies, which constitute the bulk of the literature, include the post-earnings-announcement drift literature (e.g., Ball and Brown, 1968; Foster et al., 1984; Bernard and Thomas, 1989, 1990; Ball and Bartov, 1996; Kraft, 1999); market efficiency with respect to accounting methods and method changes and research on functional fixation (e.g., Ball, 1972; Kaplan and Roll, 1972; Dharan and Lev, 1993; Hand, 1990; Ball and Kothari, 1991); and accrual management and analyst forecast optimism and long-term returns to initial public offerings and seasoned equities (e.g., Teoh et al., 1998a, b; Dechow et al., 1999; Kothari et al., 1999b).

Cross-sectional tests of return predictability, or the anomalies literature, examine whether the cross section of returns on portfolios formed periodically using a specific trading rule is consistent with a model of expected returns like the CAPM. The trading rules used have been either univariate indicators like earnings yield, or multivariate indicators employing a fundamental analysis of accounting ratios. Examples of research using univariate indicators are tests of the market's (mis)pricing of earnings and cash flow yield (e.g., Basu, 1977, 1983; Lakonishok et al., 1994), accounting accruals (e.g., Sloan, 1996; Xie, 1997; Collins and Hribar, 2000a, b), and analysts' forecasts (e.g., LaPorta, 1996; Dechow and Sloan, 1997). Examples of tests using multivariate indicators to earn long-horizon abnormal returns include ratio-based fundamental analysis (e.g., Ou and Penman, 1989a, b; Greig, 1992; Holthausen and Larcker, 1992; Abarbanell and Bushee, 1997, 1998), and fundamental value strategies (e.g., Frankel and Lee, 1998).

2.3. Role of accounting in contracts and in the political process

Positive accounting theory (see Watts and Zimmerman, 1986) predicts that the use of accounting numbers in compensation and debt contracts and in the political process affects a firm's accounting choices. A large body of literature in accounting tests predictions of positive accounting theory. Many of these tests entail the use of capital market data. For example, tests of the economic consequences of accounting examine stock price reactions to new accounting standards, and study whether cross-sectional variations in these stock price reactions are related to financial variables that proxy for contracting and/or political costs. To perform powerful tests of positive accounting theory and to ameliorate the effects of correlated omitted variables on the tests, researchers attempt to control for the effect of financial information on security prices that is unrelated to the positive accounting theory.[3] This creates a demand for capital markets research that aids researchers in designing more powerful stock-price-based tests of the positive accounting theory.

I review a large body of methodological capital markets research that facilitates research on positive accounting theory. The methodological research includes the earnings response coefficient literature (e.g., Kormendi and Lipe, 1987; Easton and Zmijewski, 1989; Collins and Kothari, 1989); research on the properties of time series, management, and analysts' forecasts of earnings (e.g., Ball and Watts, 1972; Foster, 1977; Brown and Rozeff, 1978; Patell, 1976; Penman, 1980; Waymire, 1984); research about problems in drawing statistical inferences (e.g., Collins and Dent, 1984; Bernard, 1987); and discretionary accrual models (e.g., Healy, 1985; Jones, 1991; Dechow et al., 1995; Guay et al., 1996).

2.4. Disclosure regulation

In the US, the FASB, with authority delegated by the Securities and Exchange Commission (SEC), is charged with issuing standards that govern

[3] Watts (1992) makes a symmetric argument in the context of tests of the relation between financial statement numbers and stock prices. He contends that in order to perform powerful tests of competing theories about the relation between accounting numbers and stock prices, it behooves researchers to include positive accounting theory-based variables in the tests to control for their effects that are correlated with the capital market relations being tested.

the disclosure of financial information by publicly traded firms. Capital markets research can help ascertain whether FASB's stated objectives are served by the standards it has issued, either singly or collectively. For example, do financial statement numbers prepared according to a new standard convey new information to the capital markets? Are financial statement numbers prepared according to a new standard more highly associated with contemporaneous stock returns and prices? What are the economic consequences of the issuance of a new disclosure standard? The nature and extent of standard setting is also likely influenced by standard setters' perception of whether security markets are informationally efficient. Thus, standard setters have an interest in the capital markets research on tests of market efficiency.

Internationally, standard setters presumably seek evidence from capital markets research. The rapid globalization of capital, product, and labor markets has created a strong demand for international accounting standards in recent years. Perhaps the most important issue facing practitioners, and standard setters is whether there should be a uniform set of accounting standards or whether there should be diversity. If standards were to be uniform, should US generally accepted accounting principles (GAAP) be the standard? Or should standards be developed internationally? Or should standards differ across nations, depending on differences in legal, political, and economic environments? Are capital markets in other countries as (in)efficient as they are in the US, which could affect the nature of international accounting standards? Interest in these and related issues has precipitated a demand for capital markets research using international accounting and capital markets data.

Holthausen and Watts (2001) review and analyze the capital markets research on issues surrounding disclosure regulation, so I refrain from reviewing this area of capital markets research in detail.

3. Early capital markets research

Ball and Brown (1968) and Beaver (1968) heralded empirical capital markets research as it is now known. This section describes the state of accounting theory and thought that preceded the positive-economics-based empirical capital markets research of the late 1960s. Concurrent developments in economics and finance constituted the theoretical and methodological impetus to the early capital markets research in accounting. In my opinion, this historical detour exploring the forces that shaped early capital markets research has positive pedagogical externalities, particularly for guiding new researchers. Seasoned researchers can skip over portions of this section without a loss of continuity.

More importantly, another reason for a historical review is that capital markets research in accounting today appears to be in a similar state as accounting theory was prior to 1968. The efficient markets hypothesis and positive economics, as well as other related developments, facilitated the birth of capital markets research in the 1960s. In contrast, theoretical models of inefficient capital markets, research methodology, and evidence of apparent market inefficiency are the catalysts for a large portion of the capital markets research in accounting today.

3.1. The state of accounting theory in the early 1960s

Until the mid-1960s, accounting theory was generally normative. Accounting theorists advanced their accounting policy recommendations on the basis of an assumed set of accounting objectives. Hendriksen (1965, p. 2) defines "a most appropriate theory" as one that "supports the development of procedures and techniques that best fulfill the objectives of accounting".[4] He adds, "One of the first steps in the development of accounting theory, therefore, is a clear statement of the objectives of accounting." Thus, theory development depended on the objectives assumed by a researcher, and theory evaluation was based on logic and deductive reasoning. There was little emphasis on the empirical validity of the theory's predictions.

Since the theories were logically consistent, the basis for selecting one accounting policy over another was reduced to choosing among alternative objectives of accounting. However, since individuals disagreed on the objectives of accounting, there was no consensus on the optimal set of accounting policies. This led to skepticism about the usefulness of accounting income reported in the financial statements. Hendriksen (1965, p. 97) observes that "already there are rumblings that the income statement will see its demise in the near future unless drastic changes are made to improve the story it tells". For a variety of reasons, many doubted whether historical cost accounting numbers conveyed useful information about, or an accurate assessment of, a firm's financial health.

3.2. Concurrent developments that facilitated capital markets research in accounting

While accounting theorists and practitioners held a dim view of whether historical cost accounting numbers accurately reflected a firm's financial health, scientific evidence on the issue did not exist. Providing empirical evidence to

[4] I use the discussion of accounting theory in Hendrikson's book as a reasonable description of the state of accounting theory at the time. That description is similar to the one in Ball and Brown (1968) and Watts and Zimmerman (1986, Chapter 1).

ascertain whether accounting numbers contained or conveyed information about a firm's financial performance was the major motivation that led to the research of Ball and Brown (1968) and Beaver (1968). There were three major concurrent developments in finance and economics that forged the way for the seminal research by both Ball and Brown (1968) and Beaver (1968): (i) positive economics theory, (ii) the efficient markets hypothesis and the capital asset pricing model (CAPM) and (iii) the event study of Fama et al. (1969).

3.2.1. Positive economics

Friedman (1953) was perhaps the most prominent among those who were instrumental in making positive, as opposed to normative, science the mainstream research methodology in economics, finance, and accounting. Following Keynes' (1891) definition of positive science as "a body of systematized knowledge concerning what is", Friedman (1953, p. 7) describes positive science as "the development of a 'theory' or 'hypothesis' that yields valid and meaningful (i.e., not truistic) predictions about phenomena yet to be observed". Most accounting research since Ball and Brown (1968) and Beaver (1968) is positive and the role of accounting theory is no longer normative. Watts and Zimmerman (1986, p. 2) state: "The objective of accounting theory is to *explain* and *predict* accounting practice." This is noteworthy departure from the widespread practice of normative accounting theory.

3.2.2. Efficient markets hypothesis and the capital asset pricing model (CAPM)

Building on past theoretical and empirical work, Fama (1965) introduced, and subsequently made major contributions to the conceptual refinement and empirical testing of the efficient markets hypothesis. Fama (1965, p. 4) notes "In an efficient market, *on the average*, competition" among rational, profit-maximizing participants "will cause the full effects of new information on intrinsic values to be reflected 'instantaneously' in actual prices".

The maintained hypothesis of market efficiency opened the doors for positive capital markets research in accounting. Ball and Brown (1968, p. 160) assert that capital market efficiency provides "justification for selecting the behavior of security prices as an operational test of usefulness" of information in financial statements. Beaver (1968) offers a similar argument. Unlike previous normative research on accounting theories and optimal accounting policies, positive capital markets research began using changes in security prices as an objective, external outcome to infer whether information in accounting reports is useful to market participants.

Sharpe (1964) and Lintner (1965) developed the capital asset pricing model, CAPM. The CAPM predicts that a security's expected rate of return is increasing in the *covariance* risk of its cash flows, which is the covariance of a security's expected return with the expected return on the market portfolio. Therefore, a portion of the cross-sectional variation in security returns is due to differences in the covariance risks of the securities. This risk-related variation in returns is generally not of interest to researchers who focus on firm-specific accounting information and its relation to the firm-specific component of the stock return. Therefore, the CAPM, along with the efficient market hypothesis, greatly facilitated the estimation of the firm-specific return component. The use of the firm-specific component alone enhances the power of the tests of information content of accounting reports (Brown and Warner, 1980, 1985).

3.2.3. Event study of Fama et al. (1969)

Fama et al. (1969) conducted the first event study in financial economics. Event studies are joint tests of market efficiency and the model of expected rates of return used in estimating abnormal returns. Fama et al.'s research design innovation permits researchers to align sample firms in event time and to then examine their security price performance before, during, and after economic events such as stock splits (Fama et al., 1969) and earnings announcements (Ball and Brown, 1968; Beaver, 1968).

3.2.4. Positive accounting theory development: a short detour

Circumstances similar to those that facilitated the Ball and Brown (1968) study also contributed to Watts and Zimmerman's positive accounting theory that revolutionized the accounting literature in the late 1970s (see Watts and Zimmerman, 1978, 1979, 1983, 1986). Watts and Zimmerman capitalized on the concurrent developments in finance and economics to explain some of the puzzles facing accounting researchers and practitioners. The impetus to Watts and Zimmerman's work was the seminal work of Jensen and Meckling (1976) and Ross (1977) that altered the course of the corporate finance literature. Jensen and Meckling (1976) articulate the implications of the agency problem between a firm's shareholders (principal) and the management (agent) and between shareholders and bondholders in an informationally efficient capital market. The agency problem arises in part because of the imperfect observability of managerial effort and costly contracting. This nexus of contracts view of a corporation enabled Watts and Zimmerman to develop hypotheses as to why there should be predictable variation in how firms account for their economic activities as well as why accounting standards would matter, even if capital markets were informationally efficient.

Watts and Zimmerman's political cost hypothesis extends the economics literature on regulation in a political process, as distinct from a market process (see Olson, 1971; Stigler, 1971; Posner, 1974; McCraw, 1975; Peltzman, 1976; Watts and Zimmerman, 1986, Chapter 10). Thus, the insight that led to the development of Watts and Zimmerman's positive accounting theory involves the accounting implications of the concurrent theoretical developments in finance and economics. Watts and Zimmerman then tailored those theories to explain accounting phenomena.

3.3. Association and event studies

Ball and Brown (1968) and Beaver (1968) are the pioneering studies in capital markets research in accounting. Both perform an event study and Ball and Brown also conduct an association study. Both types of studies are now common in the literature.

In an event study, one infers whether an event, such as an earnings announcement, conveys new information to market participants as reflected in changes in the level or variability of security prices or trading volume over a short time period around the event (see Collins and Kothari, 1989, p. 144; Watts and Zimmerman, 1986, Chapter 3). If the level or variability of prices changes around the event date, then the conclusion is that the accounting event conveys new information about the amount, timing, and/or uncertainty of future cash flows that revised the market's previous expectations. The degree of confidence in this conclusion critically hinges on whether the events are dispersed in calendar time and whether there are any confounding events (e.g., a simultaneous dividend and earnings announcement) co-occurring with the event of interest to the researcher. As noted earlier, the maintained hypothesis in an event study is that capital markets are informationally efficient in the sense that security prices are quick to reflect the newly arrived information. Because event studies test for the arrival of information through an accounting event, they are also referred to as tests of information content in the capital markets literature in accounting. Besides Ball and Brown (1968) and Beaver (1968), other examples of event studies include Foster (1977), Wilson (1986), Ball and Kothari (1991), Amir and Lev (1996), and Vincent (1999).

An association study tests for a positive correlation between an accounting performance measure (e.g., earnings or cash flow from operations) and stock returns, both measured over relatively long, contemporaneous time periods, e.g., one year. Since market participants have access to many more timely sources of information about a firm's cash flow generating ability, association studies do not presume that accounting reports are the only source of information to market participants. Therefore, no causal connection between accounting information and security price movements is inferred in an association study. The objective is to test whether and how quickly accounting measures capture changes in the information set that is reflected in security returns over a given period. In addition to Ball and Brown (1968), other pertinent studies include Beaver et al. (1980), Rayburn (1986), Collins and Kothari (1989), Livnat and Zarowin (1990), Easton and Harris (1991), Easton et al. (1992), Dechow (1994), and Dhaliwal et al. (1999).

3.4. Early evidence from event studies and association studies

3.4.1. Event study evidence

Ball and Brown (1968) and Beaver (1968) provide compelling evidence that there is information content in accounting earnings announcements. Ball and Brown correlate the sign of the abnormal stock return in the month of an earnings announcement with the sign of the earnings change over that firm's previous year's earnings. They find a significantly positive correlation.

The maintained hypothesis underlying the Ball and Brown test is that the earnings expectation model is well specified in providing a clean measure of earnings surprise. That is, at least a portion of the earnings increase experienced by the firms classified as "good news" firms was a favorable surprise to the market, which led to increased security prices. Thus, the strength of the association between earnings announcement period abnormal return and the earnings surprise is a function of both the information content of earnings and the quality of the earnings expectation model employed. Ball and Brown provide evidence using two earnings expectation models: a simple random walk model and a market model in earnings.

Beaver (1968) circumvents the problem of specifying an earnings expectation model by examining the variability of stock returns and trading volume around earnings announcements. Beaver hypothesizes that the earnings announcement period is characterized by an increased flow of information compared to a non-earnings announcement period. He uses return volatility to infer the flow of information. The evidence supports Beaver's hypothesis.

Beaver also tests for the flow of information by comparing trading volume in the earnings announcement periods to that in the non-announcement periods. The notion here is that market participants have heterogeneous expectations about a forthcoming earnings announcement. Earnings announcements resolve some of the uncertainty and thus narrow the heterogeneity of beliefs, but in the process contribute to increased trading among the market participants who might have taken positions based on their pre-earnings announcement period heterogeneous expectations.[5]

3.4.2. Association study evidence

The Ball and Brown evidence clearly demonstrates that accounting earnings contemporaneously capture a portion of the information set that is reflected in security returns. The evidence also suggests that competing sources of information (including quarterly earnings) preempt the information in annual

[5] Recent models of investors' belief revision show that increased heterogeneity is also possible as a consequence of news events such as an earnings announcement (see Harris and Raviv, 1993; Kandel and Pearson, 1995; Bamber et al., 1999).

earnings by about 85%. In this sense, annual accounting numbers are not a particularly timely source of information to the capital markets.

The use of annual earnings to infer earnings' timeliness weakens the case in favor of earnings' timeliness because one of the sources of other information to the capital markets is quarterly earnings (see Foster, 1977). Even so, earnings are unlikely to be a particularly timely source of information. Because accounting earnings measurement rules emphasize transaction-based revenue recognition, compared to the stock market's focus on current and expected future net revenues, earnings' lack of timeliness is not surprising (e.g., Beaver et al., 1980; Collins et al., 1994). In other words, stock prices lead accounting earnings in terms of reflecting new information.

In addition to studying the association and information content of accounting earnings with respect to security returns, Ball and Brown also test for market efficiency by examining whether the market's reaction to good and bad news earnings announcement is quick and unbiased. They find preliminary evidence of a post-earnings announcement drift in that the market's adjustment to bad news in particular takes several months. This suggests market underreaction and subsequent gradual adjustment to the information in earnings. While Ball and Brown provide preliminary evidence of a post-earnings announcement drift, the anomaly literature on the drift took a solid root with the works of Jones and Litzenberger (1970), Litzenberger et al. (1971), Foster et al. (1984), and Bernard and Thomas (1989, 1990).[6] This research is reviewed in Section 4 under tests of market efficiency.

Ball and Brown also compare the informativeness of earnings and cash flows to test whether the accrual process makes earnings more informative than cash flows. Their evidence suggests the annual abnormal return adjustment is greater for earnings changes than for cash flow changes, consistent with the accrual process making earnings more informative. Following Ball and Brown, a long stream of research examines the relative informativeness of earnings and cash flows.[7] This research is reviewed in Section 4.

3.5. Beyond the early evidence

Ball and Brown (1968) and Beaver (1968) spawned an industry of capital markets research, which is systematically reviewed in the next two sections. Some of the research following Ball and Brown and Beaver replicates their results in different settings, e.g., in different countries, using interim earnings compared to annual earnings, using shorter earnings announcement periods, and by examining both the sign and magnitude compared to only the sign in

[6] See Ball (1978) for an early survey of this literature.

[7] Examples include Rayburn (1986), Bowen et al. (1987), Wilson (1986, 1987), Bernard and Stober (1989), Livnat and Zarowin (1990), and Dechow (1994).

Ball and Brown. I review this and subsequent capital markets research in Sections 4 and 5.

3.5.1. Market efficiency and evaluation of accounting standards

The early evidence of earnings' association with security returns and evidence of capital market efficiency in finance and economics led some accounting researchers to draw standard-setting implications.[8] For example, Beaver (1972) in the *Report of the American Accounting Association Committee on Research Methodology in Accounting*, suggests that the association of accounting numbers with security returns can be used to rank order alternative accounting methods as a means of determining the accounting method that should become a standard. The report states that the "method which is more highly associated with security prices… ought to be the method reported in the financial statements" (p. 428), subject to considerations of competing sources of information and costs.[9]

The initial high expectations of the usefulness of capital markets research in guiding accounting standard setters to the socially most desirable accounting methods proved ephemeral. Gonedes and Dopuch (1974) and others quickly pointed out weaknesses (e.g., the free rider problem of non-purchasers' access to accounting information) in using the strength of the association with security returns as a determining criterion for the social desirability of an accounting standard. The debate, however, continues.

Many advocate changes in financial accounting standards because of the perception that current GAAP earnings have low correlation with security prices (e.g., Lev, 1989). They propose alternative accounting methods that arguably would improve the correlation with stock returns (e.g., Lev and Zarowin, 1999). Others contend that the correlation between accounting numbers and security returns would be a function of the objectives of financial statements. There is a demand for objective, verifiable information that is useful for contracting and performance evaluation purposes (Watts and Zimmerman, 1986). Such demand skews the accounting process in the direction of presenting historical information summarizing the effects of actual, rather than expected, transactions, i.e., the application of the revenue recognition principle. In contrast, security price changes primarily reflect revisions in expectations of future profitability. Consequently, the contemporaneous return–earnings association is expected to be small (Kothari, 1992). Commenting on standard setting and the research on the association between security returns and financial information, Lee (1999, p. 13) concludes: "Until accounting regulators decide that reported earnings should include anticipated profits from future exchanges (that is, until we abandon the "revenue

[8] Holthausen and Watts (2001) discuss this topic in detail.

[9] Also see Beaver and Dukes (1972) and Gonedes (1972).

recognition" principle), it is difficult to see how higher correlation with contemporaneous returns should have *any* standard setting implications."[10]

Notwithstanding the conceptual debate over the appropriateness of the correlation with security returns as a criterion for evaluating financial accounting standards, the criterion continues to be used frequently, albeit with some cautionary language. For example, Dechow (1994) uses correlation with stock returns to compare earnings and cash flows as measures of a firm's periodic performance and Ayers (1998) examines whether deferred tax accounting under SFAS No. 109 provides incremental value relevance over the previous standard for income taxes. One of the objectives of financial reporting, as stated in FASB (1978, paragraph 47), is "Financial reporting should provide information to help present and potential investors and creditors and other users in assessing the amounts, timing, and uncertainty" of prospective cash flows. This serves as a major motivation for researchers to use correlation with stock returns as a criterion for evaluating alternative accounting methods and performance measures.

3.5.2. Role of maintained hypothesis

A maintained hypothesis in research that uses correlation with stock returns as a criterion for evaluating accounting methods is that capital markets are efficient. However, in recent years, market efficiency has been subjected to significant empirical assault. There is mounting evidence of capital market anomalies, which suggests that capital markets might be inefficient. Section 4 examines some of this evidence in the context of the accounting capital markets literature. My limited objective here is to comment on the implications for capital markets research that assumes capital market inefficiency.

The appealing feature of market efficiency as a maintained hypothesis is that it often facilitates the specification of a relation between accounting information and security prices under the null hypothesis. For example, neither systematic positive nor negative abnormal returns are predicted in periods following the announcement of an accounting method change. Systematic evidence of non-zero abnormal returns would refute market efficiency.

If market inefficiency is the maintained hypothesis, then the relation between security prices and financial information under the null hypothesis is difficult to specify a priori. The challenge facing researchers is to place more structure on the form of the relations under market inefficiency (Fama, 1998). A wide range of relations is feasible under market inefficiency. It is important to develop refutable hypotheses on the basis of behavioral theories of inefficient financial

[10] Barclay et al. (1999) make a similar point using managerial performance measurement as the motivation.

markets and to perform tests that discriminate between efficient and inefficient market hypotheses.[11] This is the essence of the positive theory of economics that has guided much capital markets research for the past three decades. Accountants armed with the knowledge of institutional details about accounting and the use of accounting information by financial analysts have a comparative advantage in developing theories and in designing more powerful tests of market efficiency and/or specific forms of market inefficiency.

3.6. Summary

The early event studies and association studies were seminal in several respects. First, they refuted the then prevailing concern that the historical cost earnings measurement process produces meaningless numbers. Second, these studies introduced positive empirical methodology and event study research design to the accounting literature. The early capital markets research amply demonstrated the benefits of incorporating the developments from, and contributing to, the economics and finance literature. Finally, the studies helped dispel the notion that accounting is a monopoly source of information to the capital markets. The early evidence clearly establishes that accounting is not a particularly timely source of information affecting security prices, with many competing sources of information pre-empting earnings information. This has accounting standard-setting implications.

4. Capital markets research in the 1980s and 1990s

Early capital markets research demonstrates that accounting reports have information content and that financial statement numbers reflect information that influences security prices, although not on a timely basis. The decades following the early research witnessed an explosive growth in capital markets research. I categorize the demand of this research into five main areas: (i) methodological capital markets research, (ii) evaluation of alternative accounting performance measures, (iii) valuation and fundamental analysis research, (iv) tests of market efficiency, and (v) value relevance of disclosures according to various financial accounting standards and economic consequences of new accounting standards. (Since Holthausen and Watts (2001) and Healy and Palepu (2001) examine item (v) in great detail, I do not discuss this item.)

Considerable overlap exists among the first four areas of research, but they have sufficiently different motivations and they strike me as quite distinct from

[11] See Barberis et al. (1998), Daniel et al. (1998), and Hong and Stein (1999) for behavioral models that produce predictable security return patterns consistent with market inefficiency.

each other. The next four subsections consider the above four areas of research.

4.1. Methodological capital markets research

Capital markets research seeks to answer a wide range of questions. A sample of the questions examined in previous research includes:

- Do current cost earnings have incremental information content over historical cost earnings?
- Do differences in corporate governance structures affect the degree of information asymmetry in capital markets and, in turn, influence the timing and strength of the relation between security returns and earnings information?
- Does managerial ownership affect the informativeness of accounting numbers because of the separation of corporate ownership and control?
- Does the perceived quality of an auditor affect the relation between corporate earnings and security returns?
- How does the reporting of transitory gain as part of ordinary income and transitory loss as an extraordinary item affect prices?
- How do we test for the capital market effects of accounting method changes?
- Are disclosures about other post-retirement employee benefits (OPEB) value relevant?
- Does an economic value added (EVA®) performance measure correlate more highly with stock returns and prices than historical cost accounting earnings?
- What would be the consequence of the Securities and Exchange Commission discontinuing the requirement of reconciliation between the US GAAP and the foreign- or the International Accounting Standards-GAAP for the non-US firms seeking to list their shares on the US exchanges and raise capital in the US?
- Would financial statements be more informative about current economic income (i.e., change in the market value) if GAAP were changed to permit managers to capitalize R&D outlays?

To answer these questions, a researcher must control for the "normal" relation between financial statement information and security returns to isolate the treatment effect of interest. The normal relation obviously varies with the research setting, and could mean any relation other than the treatment effect. For example, in examining the effect of managerial ownership on the informativeness of accounting numbers, the investigator must control for the influence of growth opportunities on earnings' informativeness because managerial ownership percentage is likely to be correlated with growth opportunities, which affect earnings' informativeness. This effect of growth might be unrelated to the potential agency effect of ownership control on earnings' informativeness.

I review methodological research in four sub-sections.

(i) Earnings response coefficients research (Section 4.1.1),
(ii) Properties of time series, management, and analysts' forecasts of earnings and earnings growth rates (Section 4.1.2).
(iii) Methodological issues in drawing statistical inferences from capital markets research (Section 4.1.3).
(iv) Models of discretionary and non-discretionary accruals (Section 4.1.4). Additional details on this issue are deferred to Section 4.4 on tests of market efficiency because in the capital markets context, the models of discretionary and non-discretionary earnings are frequently used in tests of market efficiency.

4.1.1. Earnings response coefficients research

4.1.1.1. Motivation for research on earnings response coefficients. Earnings response coefficient research is motivated by its potential use in valuation and fundamental analysis. As seen below, a valuation model underlies earnings response coefficient estimation. Another important methodological motivation for research on earnings response coefficients is to facilitate the design of more powerful tests of the contracting and political cost hypotheses or voluntary disclosure or signaling hypotheses in accounting.

4.1.1.2. Intuition for earnings response coefficients. Kormendi and Lipe (1987) is an early paper on earnings response coefficients (also see Miller and Rock, 1985). They build on the accounting association studies literature[12] and the macroeconomics literature on the permanent income hypothesis, which relates the time-series properties of consumption and income.[13] Kormendi and Lipe estimate the magnitude of the relation between stock returns and earnings, the earnings response coefficient, and test whether firm-specific estimates of earnings response coefficients cross-sectionally exhibit a positive correlation with the time-series properties of the firms' earnings. Thus, earnings response coefficients are a mapping of earnings' time-series properties and discount rates into changes in equity market values. For example, if earnings' time-series properties are such that earnings innovations are permanent, then assuming a

[12] See, for example, Ball and Brown (1968), Foster (1977), Beaver et al. (1979, 1980, 1987), and Watts and Zimmerman (1986, Chapter 2).

[13] See, for example, Hall (1978), Flavin (1981), and Kormendi and LaHaye (1986). The permanent income hypothesis is developed in Modigliani and Brumberg (1954), Friedman (1957), and Ando and Modigliani (1963).

one-to-one relation between earnings innovations and net cash flow innovations, the earnings response coefficient is the present value of the perpetuity of the earnings innovation calculated by discounting the perpetuity at the risk-adjusted rate of return on equity. The present value of a \$1 permanent innovation in annual earnings is $(1 + 1/r)$, where r is the annual risk-adjusted discount rate for equity.

To predict earnings response coefficient magnitudes, a researcher thus requires a valuation model (e.g., dividend-discounting model), revisions in forecasts of future earnings based on current earnings information, and a discount rate. Time-series properties of earnings play a role in parsimoniously describing the revisions in earnings forecasts based on current earnings, but a rigorous theory for the time-series properties does not exist. The most promising area of research in the earnings response coefficient literature is to relate time-series properties of earnings to economic determinants like competition, technology, innovation, effectiveness of corporate governance, incentive compensation policies, etc. (see below). I believe further refinements in the valuation models and more accurate estimates of discount rates are likely to be only incrementally fruitful in furthering our understanding of the return–earnings relation or the earnings response coefficients.

4.1.1.3. Economic determinants of earnings response coefficients. Early research by Kormendi and Lipe (1987), Easton and Zmijewski (1989), and Collins and Kothari (1989) identifies four economic determinants of earnings response coefficients. These studies all begin with the discounted net cash flow valuation model that is standard in the finance and economics literature. To link earnings to security returns, a one-to-one link between revisions in the market's expectations of earnings and net cash flows is assumed. The price change in response to a \$1 earnings innovation is the \$1 innovation plus the discounted present value of the revision in expectations of all future periods' earnings. The four determinants of this price change or the earnings response coefficient are: persistence, risk, growth, and interest rate. I discuss each briefly.

Kormendi and Lipe (1987) and Easton and Zmijewski (1989) show that the greater the impact of an earnings innovation on market participants' expectations of future earnings, i.e., the more persistent the time-series property of earnings, the larger the price change or the earnings response coefficients. Collins and Kothari (1989, Table 1) relate the earnings response coefficient to a number of commonly assumed ARIMA time-series properties of earnings, including the random walk, moving average, and autoregressive properties.

Easton and Zmijewski (1989) explain why risk negatively affects earnings response coefficient. Risk here refers to the systematic (or non-diversifiable or the covariance) component of the equity cash flows' volatility. Single- or multi-beta versions of the CAPM imply that the equity discount rate increases in the equity cash flows' systematic risk.[14] Thus, greater risk implies a larger discount rate, which reduces the discounted present value of the revisions in expected future earnings, i.e., the earnings response coefficient.

Collins and Kothari (1989) predict a positive marginal effect of a firm's growth opportunities on the earnings response coefficient. Growth here refers either to existing projects or to opportunities to invest in new projects that are expected to yield rates of return that exceed the risk-adjusted rate of return, r, commensurate with the systematic risk of the project's cash flows (see Fama and Miller, 1972, Chapter 2). A firm's ability to earn above-normal rates of return on its current or future investments does not contradict capital market efficiency. It only means that the firm has monopoly power in the product markets and is able to earn (quasi) rents for a finite period. Stated differently, entry or exit in the product markets often does not instantaneously eliminate firms' ability to earn super-normal rates of return.[15] To the extent current earnings are informative about the firm's growth opportunities, the price change is expected to be large. Collins and Kothari (1989, pp. 149–150) argue that the price reaction would be greater than that implied by the time-series persistence of earnings in part because persistence estimates from historical data are likely to be "deficient in accurately reflecting *current* growth opportunities".

Finally, Collins and Kothari (1989) predict a negative temporal relation between earnings response coefficients and the risk-free rate of interest. The logic here is straightforward. The discount rate, r, at any point in time is the sum of the risk-free rate of return at the time and a risk premium. If the risk-free rate of interest rises, then ceteris paribus the discounted present value of the revisions in expectations of future earnings innovations falls, inducing a negative temporal association between interest rate levels and earnings response coefficients.[16]

[14] The Sharpe (1964) and Lintner (1965) CAPM is a single-beta CAPM whereas the Fama and French (1993) three-factor model that includes size and book-to-market factors beyond the market factor or the Carhart (1997) four-factor model that adds the momentum factor to the Fama–French three-factor model is an example of multi-beta CAPM. The state-of-the-art in the finance literature is to use either the three- or the four-factor CAPM models (see Fama and French, 1997).

[15] In contrast, in an efficient capital market, prices adjust immediately to reflect changing expectations about a firm's earnings generating ability such that at any point in time an investor can only expect a normal rate of return on an investment in any stock.

[16] The argument ignores the possibility that changes in interest are simply changes in expected inflation and that the firm passes on the changes in inflation to its customers in the form of higher prices. In this case earnings response coefficients would be unrelated to interest rate changes. The negative relation between interest rates and earnings response coefficient implicitly assumes either interest rate changes covary positively with changes in real interest rates or inflation negatively impacts stock prices because of unanticipated inflation's negative effects on economic activity (see Fama and Schwert, 1977; Fama, 1981). See further discussion in Section 4.1.1.4.

4.1.1.4. Assessment of the early evidence on earnings response coefficients. Evidence in Kormendi and Lipe (1987), Easton and Zmijewski (1989), and Collins and Kothari (1989) indicates a statistically significant effect of the cross-sectional and temporal determinants on estimated earnings response coefficients. Numerous studies replicate these results and it has become an industry standard now in the capital markets literature to control for the effects of persistence, risk, and growth and focus on the incremental effect of a treatment variable, like ownership control, on earnings response coefficients.

Notwithstanding the success and impact of the earnings response coefficients literature, there are at least three criticisms of this research. First, the research on persistence and its relation to earnings response coefficients tends to be statistical in nature. I will revisit this issue in the context of research on time-series properties of earnings. Research on earnings response coefficients can be enriched by focusing on the economic determinants of the time series properties of firms' earnings. There is some work in this area. Ahmed (1994) draws on the works of Lev (1974, 1983), Thomadakis (1976), Lindenberg and Ross (1981), and Mandelker and Rhee (1984) on the relation between the potential to earn economic rents on a firm's assets and the degree of competition in the firm's industry and the firm's cost structure. Ahmed (1994, p. 379) then proposes and reports consistent evidence that "if accounting earnings reflect information about future economic rents generated by firms' assets-in-place, earnings response coefficients will vary inversely with competition and directly with the ratio of fixed costs to variable costs".[17]

Anthony and Ramesh (1992) draw on research on the relation between a firm's life cycle and business strategy[18] to explain cross-sectional variation in earnings response coefficients. They argue that depending on a firm's stage in its life cycle, financial statement information is differentially informative about a firm's cash flow generating ability such that earnings response coefficients are predictably related to a firm's stage in its life cycle.[19]

[17] Also see Biddle and Seow (1991) for evidence on cross-industry variation in earnings response coefficients and Baginski et al. (1999) for the impact of economic characteristics on earnings persistence measures.

[18] See Porter (1980), and Spence (1977, 1979, 1981), Wernerfelt (1985), Richardson and Gordon (1980), and Rappaport (1981).

[19] There is another stream of literature that derives predictions about the behavior of earnings response coefficients as a function of a firm's life cycle that is rooted in the resolution of uncertainty about the parameter values of the time-series properties of earnings (see Rao, 1989; Lang, 1991).

More recently, Ohlson (1995) introduces a mean-reverting process for residual income, which is in the spirit of competition eroding a firm's sustained ability to earn supernormal earnings. By modeling residual income, instead of total income or changes in income, as an autoregressive process, Ohlson (1995) better captures the intuitive economic effect of product-market competition. Dechow et al. (1999) report evidence that supports the economic modeling of residual income as an autoregressive process. However, they are able to achieve "only modest improvements in explanatory power" over research using simpler earnings capitalization and dividend-discounting models (Dechow et al., 1999, p. 3).

The second weakness of the literature linking earnings response coefficients to persistence is that it tends to present in-sample evidence. For example, Kormendi and Lipe (1987) and Collins and Kothari (1989) estimate time-series parameters and perform cross-sectional tests of a relation between the persistence parameters and earnings response coefficients over the same sample period.[20] The absence of a predictive test weakens our confidence in the results, even though the arguments and hypothesis are intuitive.[21] Dechow et al. (1999) confirm that the autoregressive properties at the industry level have predictive power with respect to the persistence of earnings in future, but their objective was not to explicitly link persistence to earnings response coefficients.

The third criticism of the literature on earnings response coefficient determinants, made in Watts (1992, p. 238), is that it does "not control for differences in accounting earnings' ability to proxy for current and future cash flows and differences in accounting methods. This raises the distinct possibility of a correlated omitted variables problem". Salamon and Kopel (1991) independently make a similar point. The potential for a correlated omitted variables problem arises in part because of the following two possibilities. (i) There is an association between the earnings response coefficients' economic determinants like risk and accounting method choice. (ii) Accounting method

[20] Ali and Zarowin (1992) point out that tests that ignore the effect of transitory earnings components (see below) in relating earnings response coefficients to persistence overstate the importance of persistence. However, even after controlling for this overstatement, they report that persistence is a significant determinant of earnings response coefficients.

[21] One weakness of Lys et al. (1998) is precisely that their use of in-sample time-series properties does not permit them to convincingly discriminate between the following two hypotheses: The effect of time-series properties on earnings response coefficients and the Easton et al. (1992) argument that temporal aggregation of earnings is key to a strong relation between returns and earnings. I will revisit this issue below in the context of research on reasons why estimated earnings response coefficients are too small compared to their predicted values under certain modeling assumptions.

choice is correlated with earnings' predictive power with respect to future cash flows. In general, the literature on economic determinants of earnings response coefficients has not adequately explored economic variables based on the contracting or accounting-choice theory literature as earnings response coefficients' determinants.[22] This is worthy of future investigation.[23]

4.1.1.5. Competing hypotheses to explain why estimated earnings response coefficients are "too small". Empirical estimates of earnings response coefficient magnitudes range from 1 to 3 (see, for example, Kormendi and Lipe, 1987; Easton and Zmijewski, 1989). Assuming a random walk as a reasonable description of the time series of annual earnings (see Ball and Watts (1972), and further discussion below) and a discount rate of about 10%, the expected magnitude of the earnings response coefficient is about 11 ($= 1 + 1/r$). Using price–earnings multiple as a reasonable estimate of the earnings response coefficient, one expects a magnitude of 8–20 depending on the time period examined. The relatively small magnitude of the earnings response coefficient compared to its predicted value motivated researchers to advance several hypotheses and explanations that I survey below. Interestingly, however, the inquiry into a comparison of the estimated with the predicted magnitude of the earnings response coefficients predates the earnings response coefficient literature that began with Kormendi and Lipe (1987).

Beaver et al. (1980) attempt to explain the difference between predicted and estimated values of earnings response coefficients by introducing three interrelated ideas: prices lead earnings (see below), a true-earnings-plus-noise model of accounting earnings, and a reverse-regression econometric research design. Another notable attempt appears in Easton and Harris (1991). Assuming the book value of equity is a noisy proxy for the market value of equity and assuming clean surplus, they argue that earnings measures the change in the market value of equity. They therefore argue that earnings-deflated-by-price should be used in addition to earnings-change-deflated-by-price in explaining

[22] Exceptions include studies like Baber et al. (1996, 1998) that examine the interplay between earnings response coefficients, investment opportunities, and management compensation.

[23] There is another criticism that concerns the temporal relation between interest rates and earnings response coefficients. Is the interest rate a causal determinant of earnings response coefficients? A large component of nominal interest rates is inflation. Finance and macroeconomics literature documents that shocks to inflation are negatively related to both shocks to real economic activity and stock market returns (see Fama and Schwert, 1977; Fama, 1981). Furthermore, real economic activity and business outlook are negatively related to expected rates of returns on stocks and bonds (see Fama and French, 1988, 1989; Balvers et al., 1990; Chen, 1991). This means interest rates might be positively related to the risk premium, as suggested in the literature on time-varying expected rates of returns. Thus, the interest rate effect on earnings response coefficients (or on price–earnings multiples) might be via time-varying risk premium (i.e., expected return on the market minus the risk-free rate of interest). Interest rate itself might not be the causal factor contributing to its negative relation with earnings response coefficients.

earnings. If the balance sheet perspective in Easton and Harris (1991) is adopted, the predicted coefficient on earnings is one, which implies earnings are entirely transitory. Since earnings are highly persistent, I find the Easton and Harris (1991) explanation unsatisfactory even though their evidence clearly shows that earnings-deflated-by-price significantly explains stock returns beyond the earnings-change variable. Kothari (1992) and Ohlson and Shroff (1992) offer alternative, earnings-expectations-based motivation for using earnings-deflated-by-price to explain stock returns in a return–earnings regression. In recent years, researchers estimating a return–earnings regression frequently use earnings-deflated-by-price variable to explain stock returns. However, the estimated earnings response coefficient is far from its predicted value of approximately the price–earnings multiple.

At least four hypotheses explain the observed low magnitudes of earnings response coefficients: (a) prices lead earnings; (b) inefficient capital markets; (c) noise in earnings and deficient GAAP; and (d) transitory earnings.[24] I discuss these below along with a summary of the evidence.

(a) *Prices lead earnings*: An important paper, Beaver et al. (1980), develops the idea that the information set reflected in prices is richer than that in contemporaneous accounting earnings.[25] In an efficient market, price changes instantaneously incorporate the present value of the revisions in the market's expectations of future net cash flows. In contrast, because of the revenue realization and expense matching principles that are fundamental to the earnings determination process (Statement of Financial Accounting Concepts No. 6, paras 78–79), accounting earnings incorporate the information reflected in price changes systematically with a lag. This is parsimoniously referred to as "prices lead earnings".

One implication of prices leading earnings is that even though annual earnings' time-series properties are reasonably described as a random walk and thus successive earnings changes are unpredictable using the information in past time series of earnings, the information set reflected in prices contains

[24] An additional reason is whether the earnings response coefficient is estimated using time-series data for an individual firm or it is estimated for classes of securities in the cross section. Teets and Wasley (1996) offer compelling evidence that firm-specific, time-series estimates of earnings response coefficients are substantially larger than those estimated using cross-sectional regression. They show that the firm-specific estimates are on average larger because of a strong negative cross-sectional correlation between the variance of unexpected earnings and firm-specific earnings response coefficient. In pooled estimations, the high, unexpected earnings variance firms receive disproportionate weight, which causes the estimated coefficient to be smaller than the average of the firm-specific estimates.

[25] Following Beaver et al. (1980), there has been voluminous work on the implications of prices leading earnings. A selected list of papers includes Collins et al. (1987, 1994), Beaver et al. (1987, 1997), Freeman (1987), Collins and Kothari (1989), Kothari (1992), Kothari and Sloan (1992), Easton et al. (1992), Warfield and Wild (1992), Jacobson and Aaker (1993), Basu (1997), Ball et al. (2000), and Liu and Thomas (2000).

information about future earnings changes. That is, from the perspective of the market, successive annual earnings changes are not unpredictable. The econometric consequence of prices leading earnings is that when returns are correlated with contemporaneous earnings changes, only a portion of the earnings change is a surprise to the market. In an efficient market, the anticipated portion of the earnings change is irrelevant in explaining contemporaneous returns. This informationally irrelevant portion of earnings change contributes to a standard errors-in-variables problem (see Maddala, 1988, Chapter 11; or Greene, 1997, Chapter 9), which biases downward the earnings response coefficient and reduces the explanatory power of the return–earnings regression. Thus, simply correlating earnings change with returns or failure to use an accurate proxy for unexpected earnings in the presence of prices leading earnings is hypothesized as a reason for earnings response coefficients that are "too small".

(b) *Inefficient capital markets*: If the market fails to correctly appreciate the implications of a current earnings surprise in revising its expectations of future earnings, the price change associated with earnings change will be too small. There is a large body of evidence that suggests that the stock market underreacts to earnings information and recognizes the full impact of the earnings information only gradually over time (see references in Section 3 on the post-earnings-announcement-drift literature and further discussion in this section under "tests of market efficiency"). Smaller-than-predicted values of earnings response coefficients are consistent with capital market inefficiency. Such an interpretation, however, should be tempered unless there is a logically consistent inefficient markets theory that predicts underreaction to earnings information. The reason is that overreaction is just as easily possible as underreaction in an inefficient market without a theory that predicts a particular phenomenon.

(c) *Noise in earnings and deficient GAAP*: The "noise in earnings" argument gained currency among accounting academics with Beaver et al. (1980).[26] While Beaver et al. elegantly express the intuition for why prices lead earnings, their modeling (Beaver et al., 1980, Section 2) relies on defining accounting earnings as the sum of "true earnings" plus value-irrelevant noise or a garbling component that is uncorrelated with stock prices (i.e., value) or returns in all periods.[27] This assumption enables Beaver et al. to present one model of the prices-lead-earnings phenomenon.[28] However, the "true-earnings-plus-noise"

[26] Also see Choi and Salamon (1990), Collins and Salatka (1993), Ramesh and Thiagarajan (1993), and Ramakrishnan and Thomas (1998).

[27] However, there is no consensus in the literature on the definition of value-irrelevant noise (see, for example, Ramakrishnan and Thomas, 1998).

[28] For a different approach, see Fama (1990), Lipe (1990), Ohlson and Shroff (1992), Kothari (1992), Kothari and Sloan (1992), and Kothari and Zimmerman (1995). This alternative approach is described below.

view of earnings suggests that accountants garble an otherwise "true earnings" signal about firm value. This seems counterintuitive and contrary to evidence on at least two grounds. First, there is evidence that accounting accruals are informative (see Rayburn (1986) and Dechow (1994), and many other studies). Second, regardless of whether accruals are informative or not, it seems unlikely that earnings without the accruals would be "true income". There is no economic intuition to suggest that an earnings-measurement process that emphasizes a transaction-based approach would generate "true income", which means earnings that capture all of the information that is in economic income, i.e., the change in equity market capitalization. In fact, the thesis of Beaver et al. is that prices lead earnings, which means the information set in price changes is richer than that in accounting earnings.

The deficient-GAAP argument takes the major objective of financial reporting to be "the prediction of future investor cash flows or stock returns" (Lev, 1989, p. 157). Proponents of the deficient-GAAP argument therefore use the return–earnings correlation as a measure of GAAP's success in fulfilling its objective. The maintained hypothesis is that capital markets are informationally efficient and the major objectives of financial reporting are generally inferred from the FASB's Statements of Financial Accounting Concepts.[29] In a series of papers, Baruch Lev with numerous coauthors has been probably the single biggest advocate of the "deficient GAAP" argument. Deficient GAAP is claimed to produce "low quality" earnings that exhibit only weak correlation with security returns. Lev (1989, p. 155) states, "While misspecification of the return/earnings relation or the existence of investor irrationality ("noise trading") may contribute to the weak association between earnings and stock returns, the possibility that the fault lies with the low quality (information content) of reported earnings looms large."

Lev expresses similar views in the context of accounting for research and development in Amir and Lev (1996), Aboody and Lev (1998), Lev and Sougiannis (1996), Lev and Zarowin (1999), and other papers. In addition, there is a vast positive empirical literature that examines the "deficient-GAAP" argument without making regulatory prescriptions. See, for example, Abraham and Sidhu (1998), Healy et al. (1999), and Kothari et al. (1999a) in the context of the capitalization versus expensing of research and development costs and Bryant (1999) in the context of full cost versus successful efforts method of accounting for oil-and-gas drilling costs.

[29] For example, Lev (1989) quotes the following from FASB (1978, para. 43): "The primary focus of financial reporting is information about an enterprise's performance provided by measures of earnings and its components. Investors, creditors, and others who are concerned with assessing the prospects for enterprise net cash flows are especially interested in that information. Their interest in an enterprise's future cash flows and its ability to generate favorable cash flows leads primarily to an interest in information about its earnings…"

The noise-in-earnings and deficient-GAAP arguments have similar consequences for the return–earnings correlation. Both weaken the contemporaneous return–earnings correlation and bias downward the earnings response coefficient (see, for example, Beaver et al., 1980; Lev, 1989, the appendix; or Kothari, 1992). However, I believe the two arguments are different. Noise is defined as a variable that is uncorrelated with the information in security returns in all time periods, i.e., current, past, and future. Deficient GAAP, in contrast, is simply another form of the prices-lead-earnings argument, except that there is a normative undercurrent in the deficient-GAAP argument. The deficient-GAAP argument posits that financial statements are slow to incorporate the information that is reflected in contemporaneous market values. In addition, it assumes that the greater the contemporaneous correlation of earnings with returns, the more desirable the GAAP that produces that earnings number. Unfortunately, the reasons why maximizing the earnings' correlation with stock returns is desirable are not well articulated or proven logically. I have touched upon this issue earlier, but a detailed treatment appears in Holthausen and Watts (2001).

(d) *Transitory earnings*: Although annual earnings are frequently assumed to follow a random walk, the presence of transitory components in earnings has long been recognized in the literature (see, for example, Brooks and Buckmaster, 1976; Ou and Penman, 1989a, b). There are several reasons for transitory earnings. First, certain business activities, like asset sales, produce one-time gains and losses.[30]

Second, because of information asymmetry between managers and outsiders, and because of potential litigation, there is a demand for and supply of conservative accounting numbers. Following Basu (1997, p. 4), I define conservatism as asymmetry in the speed with which accounting numbers reflect economic gains and losses or earnings reflecting ‘‘bad news more quickly than good news'' (also see Ball et al., 2000). Both information asymmetry and threat of litigation motivate management to disclose bad news on a more timely basis than good news. That is, the accounting recognition criteria have evolved to be less stringent for losses than gains such that anticipated losses, but not gains, are recognized more often and more quickly. Recognition of anticipated losses approximates recognition of the market value effect (loss) as it becomes known, so losses, like market value *changes*, are transitory. Hayn (1995) points out another reason for losses being transitory. She argues that the firm has an abandonment put option to discontinue the loss-making (or below-market return generating) operation and recoup the book value of the firm's assets. So,

[30] Here I assume the business events that produce one-time gains or losses are exogenous. If managerial incentives were to influence the occurrence of these events, then they would be endogenous (e.g., Bartov, 1991). The endogenous nature of these events is more realistic and it is discussed below.

only firms expecting to improve will continue operations, which means observed losses would be temporary. The loss-making firms' ability to recoup the book value through abandonment and adaptation enhances the book value's association with prices in periods when a firm is performing poorly (also see Berger et al., 1996; Burgstahler and Dichev, 1997; Barth et al., 1998; Wysocki, 1999).[31] The role of book values in valuation and book values' association with prices are topics examined in some detail below and especially in Holthausen and Watts (2001).

Finally, managerial motivations rooted in agency theory might contribute to transitory gains and losses. For example, Healy (1985) hypothesizes and documents evidence that for compensation considerations in a costly contracting setting, managers might generate discretionary accruals that reduce high levels of non-discretionary earnings or might take a "big bath" to report an extreme loss.[32] The "big bath" discretionary accrual behavior is also observed with incoming CEOs (see Pourciau, 1993; Murphy and Zimmerman, 1993). The discretionary component of the accruals is likely to be transitory and in fact mean reverting because accruals (eventually) reverse.

4.1.1.5.1. Econometric consequence of transitory earnings. The econometric consequence of transitory earnings components is straightforward. A simple model based on the analysis in Kothari and Zimmerman (1995, Section 5.1) illustrates the effect. I follow it up with a richer analysis later. Suppose

$$X_t = x_t + u_t,$$

where X_t is the reported earnings consisting of a random walk component, $x_t = x_{t-1} + e_t$, $e_t \sim \mathrm{N}(0, s_e^2)$ and a transitory component, $u_t \sim \mathrm{N}(0, s_u^2)$. Also assume that the market has no information beyond the time-series property of earnings and that e_t and u_t are uncorrelated. The earnings response coefficient on the transitory component is one. However, the market's sensitivity to the random walk component, i.e., the permanent component of earnings is $\beta = (1 + 1/r)$ or the average price–earnings multiple. Using the beginning-of-period-price, P_{t-1}, as the deflator, a return–earnings regression

$$R_t = \gamma_0 + \gamma_1 X_t/P_{t-1} + error_t$$

[31] The abandonment option is a real option. See Robichek and Van Horne (1967) for an early treatment of the abandonment option in capital budgeting. The role of real options in valuation is an important emerging area in financial economics. See Pindyck (1988), Dixit and Pindyck (1994), Abel et al. (1996), and Trigeorgis (1996) for excellent treatments of real options and valuation. The idea of real options has recently been applied in accounting (see Wysocki, 1999), but I believe there is far more potential still to be realized.

[32] Following Healy (1985), there is a huge literature that examines compensation-motivated earnings management. This and other earnings management literature on the debt and political cost hypotheses that originated with the positive accounting theory (see Watts and Zimmerman, 1978, 1986) is beyond the scope of my review, unless it is related to the capital markets research.

will yield a slope coefficient that falls between 1 and β because X_t is the sum of two independent variables with two different slope coefficients relating them to the dependent variable. Disentangling the two components and including those separately in the regression will yield coefficients on the two components that are closer to their predicted values (see, for example, Collins et al., 1997) and the model's explanatory power will increase. The γ_1 coefficient's magnitude depends on the relative magnitudes of the variances of the random walk and transitory components of earnings. If k is defined as $s_e^2/(s_e^2 + s_u^2)$, then γ_1 is expected to equal $k(\beta - 1) + 1$. Thus, if there are no transitory earnings, then $k = 1$ and the slope coefficient will be β. Alternatively, at the other extreme, if there are no permanent earnings, then $k = 0$ and the slope coefficient will be 1 on entirely transitory earnings.

As the assumption of zero correlation between the random walk and transitory earnings components is relaxed, the predictions about γ_1's magnitudes naturally change. Economic hypotheses about managers' incentives would generally suggest a non-zero correlation between the two components, which complicates the analysis.

4.1.1.5.2. Evidence on transitory earnings' effect on earnings response coefficients. There is an extensive literature documenting a smaller earnings response coefficient on transitory earnings as proxied for by non-recurring items reported in the financial statements (see, for example, Collins et al., 1997; Hayn, 1995; Elliott and Hanna, 1996; Ramakrishnan and Thomas, 1998; Abarbanell and Lehavy, 2000a). In addition, there is a literature on non-linearities in the return–earnings relation that attempts to infer transitory earnings from the magnitude of earnings response coefficients. An S-shaped return–earnings relation is seen from the empirical results of Beaver et al. (1979). They find that abnormal returns associated with extreme earnings changes are not proportionately as large as those associated with the non-extreme earnings change portfolios, which gives rise to an S-shaped return–earnings relation. One interpretation is that the market does not expect extreme earnings changes to be permanent, so the price adjustment is smaller. Thus, there is a negative correlation between the absolute magnitude of the earnings change and the likelihood that it is permanent. An appealing economic intuition exists for this correlation. Either extreme earnings changes are a result of one-time, windfall gains and losses, or competition in the product market makes it unlikely that the extreme high level of profitability can be sustained. At the extreme low level of earnings, the abandonment option argument is relevant.

Freeman and Tse (1992) model the non-linear relation using an arc-tangent transformation. Cheng et al. (1992) propose a rank-regression approach to tackle non-linearity. Other research on the non-linear return–earnings relation includes Abdel-khalik (1990), Das and Lev (1994), Hayn (1995), Subramanyam (1996a), Basu (1997), and Beneish and Harvey (1998). While the research on non-linearity is successful in improving the return–earnings regression fit, a strong economic foundation for the modeling is not apparent. Therefore, researchers must exercise caution in employing ad hoc statistical refinements.

4.1.1.6. Discriminating between competing hypotheses. Researchers have used many different research designs to discriminate between the above four competing hypotheses to explain the weak return–earnings correlation and why estimated earnings response coefficients are too small compared to those predicted on the basis of a random walk time series property of annual earnings. Prices leading earnings and the presence of transitory earnings appear to be the dominant explanations for the modest contemporaneous return–earnings association and for the observed magnitudes of earnings response coefficients. A summary of this research will hopefully make this apparent.

There is another reason for summarizing the above research. In many applications, researchers choose a research design from among many alternatives available. To facilitate research design selection in the future, I summarize the central features of and pros and cons of the research designs using common notation. The modeling below extends Fama's (1990) analysis of the effect of expanding the measurement window for both returns and earnings (industrial production) on the return–earnings correlation and earnings response coefficient.

An important distinction between the analysis in Fama (1990) or similar studies in finance and the return–earnings literature in accounting centers around the maintained hypothesis and motivation for the studies. In the finance literature, the maintained hypothesis is that explanatory variables like industrial production are real, economic, fundamental variables that a researcher has measured with a reasonable degree of accuracy. The motivation for their tests is to examine whether time-series or cross-sectional variation in stock returns is rational (efficient) in the sense that it is largely explained by economic fundamentals. The alternative hypothesis is that pricing in the market is not an outcome of the market participants' rational economic behavior. The objective of the accounting literature like Ball and Brown (1968) or Easton et al. (1992) is to assess whether the accounting earnings determination process captures the factors that affect security prices, with the maintained hypothesis that capital markets are informationally efficient. So, market efficiency is a maintained hypothesis and whether accounting captures underlying economic reality that moves the market is tested in the research (see Patell (1979) for a mathematically elegant treatment of these issues).

4.1.1.6.1. Assumptions and variable definitions. I present a simple model of the relation between earnings *growth* rates and stock returns, which captures the prices-lead-earnings phenomenon. I use growth rates because it simplifies the analysis. However, the intuition from the analysis is equally applicable to return–earnings analysis that uses earnings or earnings change deflated by price as the earnings variable in the regressions. The particulars of the econometrics naturally change with different specifications of the variables, but the qualitative results continue to hold.

Suppose earnings growth in period t, X_t, is

$$X_t = x_t + y_{t-1}, \tag{1}$$

where x_t is the portion of earnings growth that is news to the market, whereas y_{t-1} is the portion of earnings growth that the market had anticipated at the beginning of period t. Stated differently, y_{t-1} is past earnings news that shows up in period t's earnings, i.e., prices lead earnings. Further assume that x_t and y_{t-1} are uncorrelated and i.i.d. with $\sigma^2(x) = \sigma^2(y) = \sigma^2\cdot$ These assumptions imply earnings follow a random walk and that each component of earnings growth contributes to a new permanent level of earnings. Using earnings growth rates empirically poses practical difficulties because earnings can be negative. I assume this issue away here in the interest of a simple analysis that communicates the intuition.

Stock prices respond only to information about earnings growth, i.e., discount rates are assumed constant inter-temporally and cross-sectionally. Given the assumptions about earnings growth rates, return in period t, R_t, is

$$R_t = x_t + y_t. \tag{2}$$

Current stock return reflects the news in current earnings and news about earnings growth that will be captured in the next period's earnings. In this model, the market is assumed to have information about one-period-ahead earnings growth rate. This is a conservative assumption in that previous research suggests prices reflect information about two-to-three-year-ahead earnings growth (e.g., Kothari and Sloan, 1992).

Since all the earnings information is expressed in terms of growth rates and because all earnings growth is assumed to be permanent, annual stock returns are simply the sum of the earnings growth rates that are news to the market. That is, there is a one-to-one correspondence between stock returns and news in earnings growth rates, and the price response to unexpected earnings growth, i.e., the earnings response coefficient, is one. If, instead of using earnings growth rates, unexpected earnings deflated by the beginning of the period price are used, then the earnings response coefficient is $(1 + 1/r)$.

4.1.1.6.2. Contemporaneous one-period return–earnings relation. This is the commonly estimated annual return–earnings relation:

$$R_t = a + bX_t + e_t, \tag{3}$$

where b is the earnings response coefficient. The regression estimate of b is

$$\begin{aligned} b &= \mathrm{Cov}(R_t, X_t)/\mathrm{Var}(X_t) \\ &= \mathrm{Cov}(x_t + y_t, x_t + y_{t-1})/\mathrm{Var}(x_t + y_{t-1}) \\ &= \mathrm{Cov}(x_t, x_t)/[\mathrm{Var}(x_t) + \mathrm{Var}(y_{t-1})] \\ &= \sigma^2/(\sigma^2 + \sigma^2) \\ &= 0.5. \end{aligned} \tag{4}$$

To determine the explanatory power, adjusted R^2, of the regression, consider the decomposition of the dependent variable's variance ($= 2\sigma^2$):

$$\mathrm{Var}(R_t) = b^2\,\mathrm{Var}(X_t) + \mathrm{Var}(e_t),$$

$$\begin{aligned} 2\sigma^2 &= 0.5^2[\mathrm{Var}(x_t) + \mathrm{Var}(y_{t-1})] + \mathrm{Var}(e_t) \\ &= 0.5^2[\sigma^2 + \sigma^2] + \mathrm{Var}(e_t) \\ &= 0.5\sigma^2 + 1.5\sigma^2. \end{aligned} \tag{5}$$

From (5), the adjusted R^2, denoted as R^2 for parsimony, is

$$R_2 = (2\sigma^2 - 1.5\sigma^2)/2\sigma^2 = 25\%. \tag{6}$$

Eqs. (4) and (6) provide results of a contemporaneous return–earnings regression with the market anticipating half the information in earnings growth rates [i.e, $\mathrm{Var}(x_t) = \mathrm{Var}(y_{t-1})$] one period ahead. The earnings response coefficient is 50% biased and the explanatory power of the regression is 25%. The estimated earnings response coefficient is biased because the anticipated portion of the earnings growth rate, y_{t-1}, is stale information that is irrelevant to explaining variation in current returns and it acts as measurement error in the independent variable. Bias in the slope coefficient reduces the model's explanatory power. This errors-in-variables problem is exacerbated if the market anticipated earnings growth rates more than one period in advance.

In addition to the errors-in-variables problem, note also that whereas variation in R_t is due to earnings growth rates x_t and y_t, which are reflected in current and next period's earnings, y_t is not included in the regression model. The absence of y_t means there is an omitted variable. This also contributes to reducing the model's explanatory power. Since y_t is (assumed to be) uncorrelated with the included independent variable, $X_t(= x_t + y_{t-1})$, the coefficients on the included earnings growth rates are not biased due to a correlated omitted variable.

Include future earnings in the return–earnings model: Previous research in accounting and finance employs several alternative approaches to mitigate the errors-in-variables and omitted-variable problems in the return–earnings or similar regressions. Jacobson and Aaker (1993) and Warfield and Wild (1992) in return–earnings regressions and Fama (1990) and Schwert (1990) in

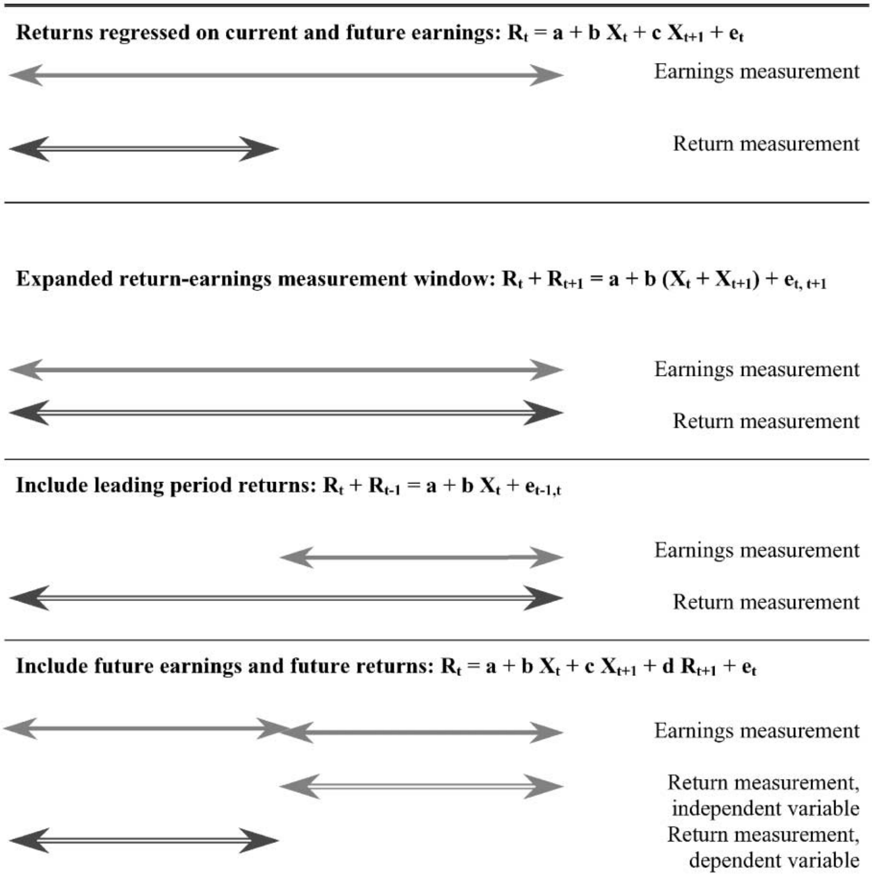

Fig. 1.

regressions of returns on industrial production include future years' earnings or production growth. In the context of the simple model, their approach estimates the following model (see Fig. 1):

$$R_t = a + bX_t + cX_{t+1} + e_t. \quad (7)$$

In this case, since X_t and X_{t+1} are uncorrelated (because the x and y components of earnings growth rates are assumed to be i.i.d.), b is the same as before in the univariate regression of returns on contemporaneous earnings growth, i.e., $b = 0.5$. The expected value of c is

$$c = \mathrm{Cov}(x_t + y_t, x_{t+1} + y_t)/\mathrm{Var}(x_{t+1} + y_t) = 0.5. \quad (8)$$

To derive the model's explanatory power, I decompose the variances

$$\mathrm{Var}(R_t) = b^2\,\mathrm{Var}(X_t) + c^2\,\mathrm{Var}(X_{t+1}) + \mathrm{Var}(e_t),$$

$$2\sigma^2 = 0.5^2[2\sigma^2] + 0.5^2[2\sigma^2] + \mathrm{Var}(e_t) = \sigma^2 + \sigma^2(e_t), \tag{9}$$

$$R^2 = \sigma^2/2\sigma^2 = 50\%. \tag{10}$$

The explanatory power increases from 25% for the contemporaneous regression model to 50% upon the inclusion of future earnings growth rate. Coefficients on both current and future earnings growth will be value relevant, but biased because both contain earnings growth rate components that are irrelevant to explaining R_t. This also dampens the explanatory power. The R^2 is greater than that of the contemporaneous model because there is no omitted variable in Eq. (7).

4.1.1.6.3. Expanding the return–earnings measurement window. Easton et al. (1992), Warfield and Wild (1992), Fama (1990), and Schwert (1990) report results of estimating contemporaneous return–earnings models in which both returns and earnings measurement windows are allowed to vary. Expanding the measurement window mitigates both errors-in-variable and omitted-variable problems that arise because of prices leading earnings. In addition, if the noise is mean-reverting, then the ratio of the variance of noise to the variance of value-relevant earnings will decrease as the measurement window is expanded.[33] Ignoring noise, the effect of expanding the return–earnings measurement window on the following contemporaneous regression is (see Fig. 1)

$$R_t + R_{t+1} = a + b(X_t + X_{t+1}) + e_{t,t+1}. \tag{11}$$

The slope coefficient is

$$\begin{aligned} b &= \frac{\mathrm{Cov}[(x_t + y_t + x_{t+1} + y_{t+1}), (xt + y_{t-1} + x_{t+1} + y_t)]}{\mathrm{Var}[(x_t + y_{t-1} + x_{t+1} + y_t)]} \\ &= 3\sigma^2/4\sigma^2 \\ &= 0.75. \end{aligned} \tag{12}$$

The explanatory power is

$$\mathrm{Var}(R_t + R_{t+1}) = b^2\,\mathrm{Var}(X_t + X_{t+1}) + \mathrm{Var}(e_{t,t+1}),$$

$$4\sigma^2 = 0.75^2 \times 4\sigma^2 + \mathrm{Var}(e_{t,t+1}). \tag{13}$$

[33] In case of mean-reverting noise, variance of the sum of noise over n periods is less than n times the variance of noise in a single period. In contrast, i.i.d. value-relevant growth implies the variance of the sum of earnings growth rates over n periods is n times the single-period variance of the earnings growth rate. This causes the ratio of the variance of noise to the variance of earnings growth to decline as the measurement window is expanded.

From Eq. (13), the R^2 of the regression model (11) is 56.25%. The above analysis demonstrates that expanding the return measurement window yields a less biased earnings response coefficient and a higher explanatory power than in the case of a single-period contemporaneous return–earnings regression. If the measurement window is expanded further, then an even stronger regression fit will be obtained and the estimated slope becomes less biased.[34] However, there will always be an end-point problem. Some forward-looking information about earnings growth exists in returns, y_{t+1} in Eq. (12), but it is missing from the earnings variable (i.e., the omitted-variable problem). Similarly, earnings growth at the beginning part of the measurement window contains some stale information, y_{t-1} in Eq. (12), which serves as measurement error in the independent variable.

4.1.1.6.4. Including leading period return. Kothari and Sloan (1992), Warfield and Wild (1992), and Jacobson and Aaker (1993) regress current and past returns on current period earnings to overcome the errors-in-variables problem that arises in a return–earnings regression as a result of prices leading earnings. The regression in the context of the simple model here is (see Fig. 1)

$$(R_t + R_{t-1}) = a + bX_t + e_{t-1,t}. \tag{14}$$

The slope coefficient is

$$\begin{aligned} b &= \mathrm{Cov}[(x_t + y_t + x_{t-1} + y_{t-1}), (x_t + y_{t-1})]/\mathrm{Var}[(x_t + y_{t-1})] \\ &= 2\sigma^2/2\sigma^2 \\ &= 1. \end{aligned} \tag{15}$$

The explanatory power is

$$\mathrm{Var}(R_t + R_{t-1}) = b^2\,\mathrm{Var}(X_t) + \mathrm{Var}(e_{t-1,t}),$$

$$4\sigma^2 = 1^2 \times 2\sigma^2 + \mathrm{Var}(e_{t-1,t}). \tag{16}$$

From Eq. (16), the R^2 of the regression model (14) is 50%, even though the slope coefficient is unbiased. The return–earnings association is not perfect because there are omitted (explanatory) variables in the model to explain information about future earnings growth that is reflected in current returns. In

[34] Unfortunately there are disadvantages of expanding the window too much. First, as the window is expanded, a larger fraction of the variation in the dependent variable in the cross section is accounted for by differences in expected rates of returns in the cross section. Therefore, it becomes increasingly difficult to unambiguously attribute explained variation from the return–earnings regression to earnings (or cash flow) information (see Easton et al. (1992) for a discussion of this concern and Fama and French (1988), Fama (1990), and Sloan (1993) for a discussion of the sources of variability in returns). Second, as the measurement window is expanded, a researcher must impose increasingly stringent data availability requirements, which introduces survivor biases. Third, discriminating between noise and prices-lead-earnings explanations becomes tenuous.

addition, the dependent variable has some news about earnings in period $t-1$, x_{t-1}, that is also not included in the explanatory variable, X_t.

Leading period returns in regression model (14) are helpful in discriminating between the noise and prices-lead-earnings hypotheses. In the presence of noise the slope coefficient will not approach one, whereas by including higher-order lagged returns, the prices-lead-earnings phenomenon will be captured and the slope coefficient will increase towards one. Presence of transitory components in earnings will prevent the model from yielding a slope coefficient of one, however. Evidence in Kothari and Sloan (1992) suggests a dramatic rise in the earnings response coefficient as leading period returns are included, consistent with price leading earnings being an important characteristic of the information environment. Their estimated slope coefficients fall short of approaching the price–earnings multiples, consistent with both noise and transitory earnings components.

4.1.1.6.5. Including future earnings and future returns. We saw earlier that when returns are regressed on current and future earnings growth, an errors-in-variables problem arises in part because future earnings growth contains future information that cannot explain current returns. Drawing on Kothari and Shanken (1992), Collins et al. (1994) mitigate this errors-in-variables problem by including future return as an independent variable. The benefit of future return arises through its correlation with the new information in future earnings growth. Econometrically, future return removes the new information error from the future earnings growth variable.[35] Specifically, the regression model is (see Fig. 1)

$$R_t = a + bX_t + cX_{t+1} + dR_{t+1} + e_t. \tag{17}$$

The intuition for why including R_{t+1} mitigates the errors-in-variables problem in using future earnings growth is best seen from the following equivalent two-stage procedure (see the appendix of Kothari and Shanken, 1992). If X_{t+1} is regressed on R_{t+1} in a first stage regression, then the residual from that regression will be the portion of $t+1$ period earnings growth that is unrelated to new information in R_{t+1}. This residual is (a noisy estimate of) the anticipated portion of earnings growth or the y_t component of X_{t+1} in the context of the simple model in this section. The second-stage of the procedure is a regression of R_t on X_t and the residual from the first stage regression, i.e., an estimate of y_t.

If proxies for both the new information in future earnings growth and for the anticipated component of current growth are accurate, then the approach in

[35] For a related practice in the accounting literature of using prior returns as a proxy for expected earnings, see Brown et al. (1987b), Collins et al. (1987), and Lys and Sivaramakrishnan (1988). Instead of past returns, Collins et al. (1994) use earnings yield at time $t-1$ to control for the anticipated earnings growth for period t.

Kothari and Shanken (1992) and Collins et al. (1994) will be successful. That is, the estimated earnings response coefficients will be unbiased and the model's explanatory power will approach 100%. Note that the model in Eq. (17) will have to be expanded to also include proxies for the anticipated component of current growth, X_t. Of course, success of the model depends crucially on the quality of the proxies. Evidence in Collins et al. is largely consistent with the prices-lead-earnings argument and they find little support for the noise-in-earnings hypothesis.

4.1.1.6.6. Use of analysts' forecasts instead of future returns. Recently, Liu and Thomas (1999a, b), Dechow et al. (1999), and others have begun to directly incorporate information about revised expectations of future earnings growth in a return–earnings regression through the use of analysts' forecasts.[36] This is similar in spirit to the model in Eq. (17) in which expectations about earnings growth are econometrically backed out through the use of actual future earnings growth minus the impact of new information on future earnings growth. The Liu and Thomas (1999a, b) type of research begins with the Edwards and Bell (1961), Peasnell (1982), Ohlson (1995), and Feltham and Ohlson (1995) residual income valuation model. This model defines price as the sum of the book value of equity and the discounted present value of expected future residual earnings (i.e., earnings in excess of the cost of the expected book value of the equity capital employed in future years).[37] Residual income valuation models are a transformation of the dividend-discounting model (see Feltham and Ohlson, 1995; Dechow et al., 1999; or Lee, 1999), but express value directly in terms of current and future accounting numbers, book values and earnings. This potentially facilitates the use of analysts' forecasts.

Researchers typically use analysts' forecasts of earnings and book values of equity to proxy for expected future residual earnings.[38] Availability of forecasts in a machine-readable form has spurred the use of analysts' forecasts in capital markets research (see below). Recent research that uses analysts' forecasts documents a strong association between returns and contemporaneous earnings and revisions in analysts' forecasts in a residual income framework. However, more research is needed to determine whether the source of the

[36] Also see Abdel-khalik (1990) for a similar approach with the motivation of developing a return–earnings model that accounts for non-linearity.

[37] For a historical perspective on the concept of residual income valuation, see Biddle et al. (1997), who trace it all the way back to Hamilton (1777) and Marshall (1890).

[38] Use of analysts' forecasts generally violates the clean surplus assumption underlying the residual income model because analysts' forecasts often exclude items that affect book values of equity. However, the use of analysts' forecasts should be guided by their usefulness in explaining and predicting empirical phenomena rather than whether they are consistent with the clean surplus assumption.

improved association is the use of analysts' forecasts or the residual income model or a combination. A comparison with simpler models with and without analysts' forecasts would be a natural next step. Dechow et al. (1999) have made a very good beginning in this respect.[39]

4.1.1.6.7. Levels regression to obtain less biased estimates of earnings response coefficients. Kothari and Zimmerman (1995) argue that one advantage of the levels regression (i.e., price regressed on earnings) is that the errors-in-variables problem is avoided. The logic is straightforward. Current price contains all the information in current earnings plus some forward-looking information that is missing from current earnings because prices lead earnings. Therefore, when price is regressed on earnings, there is no errors-in-variables problem in the right-hand-side variable. Only forward-looking information, which is uncorrelated with the included independent variable, earnings, is omitted from the regression. The econometric consequence is that the estimated earnings response coefficient is unbiased, but that the explanatory power is sacrificed because of the omitted forward-looking information.

The bad news in using levels regressions is that there are potentially other econometric problems, like correlated omitted variables (e.g., growth), and heteroskedasticity. These and other related issues are discussed thoroughly in Brown et al. (1999) and Holthausen and Watts (2001).

4.1.1.7. Bottom line. The earnings response coefficient research has made significant progress in the last decade. However, notwithstanding these refinements, I believe the best a researcher can do currently is to test whether a coefficient is statistically significant or whether it is significantly greater than the coefficient on another variable (e.g., coefficient on earnings versus on cash flow from operations). The research also suggests that controlling for the effects of persistence, growth, and risk on earnings response coefficients is important. It is rare to see research examining whether the estimated coefficient equals some predicted value. Only occasionally have researchers attempted to test whether the estimated coefficient on transitory earnings equals one (e.g., Barth et al., 1992). The lack of tests of predicted coefficient magnitudes is in part because predicted values depend on unobservable forecasted earnings growth rates over all future periods and expected discount rates for future periods' earnings. Levels regressions yield earnings response coefficient estimates that are closer to economically plausible values. However, severe econometric problems make their use less attractive (see Holthausen and Watts, 2001).

[39] While there are advantages of using analysts' forecasts, there are also problems because of apparent optimism in analysts' forecasts, which varies cross-sectionally with earnings skewness (see Gu and Wu, 2000). I defer a detailed discussion of these issues to the next section.

4.1.2. Time series, management, and analysts' forecasts of earnings

This section explains the motivation for research on properties of time series, management, and analysts' forecasts of earnings (Section 4.1.2.1). I then describe research on the properties of time-series forecasts of earnings in Section 4.1.2.2, management's forecasts in Section 4.1.2.3, and finally the research on analysts' forecasts in Section 4.1.2.4.

4.1.2.1. Motivation for research on earnings forecasts. There are at least five reasons for research on the time-series properties of earnings and properties of management and analysts' forecasts (see Watts and Zimmerman (1986, Chapter 6), Schipper (1991), and Brown (1993) for discussions of some of these reasons). First, almost all models of valuation either directly or indirectly use earnings forecasts. The discounted cash flow valuation models (Fama and Miller, 1972, Chapter 2) often use forecasted earnings, with some adjustments, as proxies for future cash flows. The analytically equivalent residual-income valuation models (e.g., Edwards and Bell, 1961; Ohlson, 1995; Feltham and Ohlson, 1995) discount forecasted earnings net of "normal" earnings.

Second, capital markets research that correlates financial statement information with security returns frequently uses a model of expected earnings to isolate the surprise component of earnings from the anticipated component. In an efficient capital market, the anticipated component is uncorrelated with future returns, which are measured over the announcement period or the association study period. Any anticipated component that smears the estimated proxy for the surprise component of earnings, serves as noise or measurement error in the proxy and weakens the estimated return–earnings association. Thus, the degree of return–earnings association hinges critically on the accuracy of the unexpected earnings proxy used by a researcher, which naturally creates a demand for the time-series properties of earnings or analysts' forecasts.

Third, the efficient markets hypothesis is being increasingly questioned, both empirically and theoretically (with behavioral finance models of inefficient markets; see Daniel et al., 1998; Barberis et al., 1998; Hong and Stein, 1999). Accounting-based capital market research has produced evidence that is apparently inconsistent with market efficiency (see the detailed review below). A common feature of this research is to show that security returns are predictable and that their predictability is associated with the time-series properties of earnings and/or properties of analysts' forecasts, which creates a demand for research in the time-series properties of earnings and earnings forecasts.

Fourth, positive accounting theory research hypothesizes efficient or opportunistic earnings management and/or seeks to explain managers' accounting procedure choices. In this research there is often a need for "normal" earnings that are calculated using a time-series model of earnings.

For example, tests of the earnings smoothing hypothesis might examine properties of pre-smoothed and smoothed time series of earnings.

Finally, analyst and management forecasts are a source of information in the capital markets. The forecasts thus affect the information environment and influence the level and variability of security prices. There is a large literature (see Healy and Palepu, 2001) that examines the nature of the information environment, the demand and supply of forecasts, the incentives facing management and analysts and their effect on the properties of the forecasts, the effect of the properties of the forecasts on the variability of security returns and cost of capital, etc. In this research, properties of management and analysts' forecasts are an input.

4.1.2.2. Time-series properties of earnings. Brown (1993) examines the large body of literature on the time-series properties of earnings. I deliberately keep my remarks on the earnings' time-series properties short because I believe this literature is fast becoming extinct. The main reason is the easy availability of a better substitute: analysts' forecasts are available at a low cost in machine-readable form for a large fraction of publicly traded firms (see below).

4.1.2.2.1. Properties of annual earnings. Random walk: A large body of evidence suggests a random walk or random walk with drift is a reasonable description of the time-series properties of annual earnings. The early evidence appears in Little (1962), Little and Rayner (1966), Lintner and Glauber (1967), and additional references in Ball and Watts (1972). Ball and Watts (1972) conduct the first systematic study and fail to reject the random walk time-series property for annual earnings. Subsequent research confirms their conclusion (see Watts, 1970; Watts and Leftwich, 1977; Albrecht et al., 1977) by testing against the predictive ability of Box–Jenkins models of annual earnings vis-à-vis the random walk model. This is notwithstanding the indication of negative first-order autocorrelation in Ball and Watts (1972, Table 3) and other research.[40]

The random walk property of annual earnings is puzzling. Unlike the random walk property of security prices, which is a theoretical prediction of the efficient capital markets hypothesis, economic theory does not predict a random walk in earnings.[41] Accounting earnings do not represent the capitalization of expected future cash flows like prices. Therefore, there is no

[40] In-sample estimates of autocorrelation coefficients are biased downward because of the small sample bias that equals $-1/(T-1)$, where T is the number of time-series observations (see Kendall, 1954; Jacob and Lys, 1995). Bias-adjusted first-order serial correlation coefficients for annual earnings changes are close to zero (see Dechow et al., 1998a, Table 5).

[41] The random walk property of security prices in an efficient capital market requires the additional assumption of constant expected rates of return, which might not be descriptive (see Fama, 1976, Chapter 5; Fama and French, 1988; Kothari and Shanken, 1997). Therefore, the random walk property is only an approximate prediction.

economic reason to expect annual earnings to follow a random walk (see, for example, Fama and Miller, 1972, Chapter 2; Watts and Zimmerman, 1986, Chapter 6).

Mean reversion: Starting with Brooks and Buckmaster (1976), a number of studies document evidence of mild mean reversion in annual earnings (see, for recent studies, Ramakrishnan and Thomas, 1992; Lipe and Kormendi, 1994; Fama and French, 2000). However, interpreting evidence of mean reversion from in-sample estimates of the time-series parameter values requires caution. Notwithstanding the evidence of mean reversion, predictive ability might not be much better than a random walk model in holdout samples (see Watts, 1970; Watts and Leftwich, 1977; Brown, 1993).

Economic reasons for mean reversion: There are several economic and statistical reasons to expect mean reversion in earnings. First, competition in product markets implies that above-normal profitability is not sustainable (Beaver and Morse, 1978; Lev, 1983; Ohlson, 1995; Fama and French, 2000). Second, accounting conservatism (see Basu, 1997) and litigation risk (see Kothari et al., 1988; Ball et al., 2000) motivate managers to recognize economic bad news more quickly than good news. As a result, firms often recognize anticipated losses.[42] This recognition of losses makes losses less permanent and thus induces negative autocorrelation in earnings. Third, firms incurring losses have the option to liquidate the firm if the management does not anticipate recovery (Hayn, 1995; Berger et al., 1996; Burgstahler and Dichev, 1997; Collins et al., 1999). That means surviving firms are expected to reverse the poor performance. Thus, the abandonment option and survivor bias together imply the time series of earnings will exhibit reversals. Finally, the incidence of transitory special items and losses has increased dramatically over time (see, for example, Hayn, 1995; Elliott and Hanna, 1996; Collins et al., 1997), which means earnings changes are predictable. The increase in transitory items might be due in part to a shift in standard setting by the SEC and FASB toward mark-to-market accounting for some assets and liabilities.

Cross-sectional estimation: Fama and French (2000) introduce a cross-sectional estimation approach to the earnings forecasting literature to uncover the time-series properties of earnings. They argue that time-series estimation lacks power because there are only a few time-series observations of annual earnings available for most firms. In addition, use of a long time series introduces survivor bias. The survivor bias implies more observations of positive earnings changes following positive changes than expected by chance, for reasons discussed above. This offsets the underlying negative time-series correlation in earnings changes. The effect of survivor bias, together with low

[42] Agency theory-based reasons (e.g., the nature of compensation contracts and CEO turnover) also might motivate managers to take a "big bath" in earnings.

power (i.e., large standard errors) of time-series estimation, favors the conclusion of a random walk in annual earnings.

In a cross-sectional estimation, annual earnings (levels or changes, and with or without a deflator) are regressed on its lagged observation. The estimation is performed annually and inferences are drawn on the basis of the time series of annual parameter estimates from the cross-sectional regressions. This is the well-known Fama and MacBeth (1973) procedure.

One weakness of cross-sectional estimation is that firm-specific information on the time-series properties is sacrificed. However, this is mitigated through a conditional estimation of the cross-sectional regression. Conditional estimation is an attempt to capture cross-sectional variation in the parameters of the time-series process of earnings (e.g., the autocorrelation coefficient). This approach is grounded in economic analysis, rather than the previous statistical exercise of fitting the best time-series model of earnings (e.g., fitting the best Box–Jenkins model). The conditional approach models the cross-sectional variation in earnings' autocorrelation coefficient as a function of its economic determinants. That is, the coefficient is hypothesized to vary with the realized values of a set of conditioning variables like past performance, dividend yield, leverage, industry competition, etc.[43] Since the number of observations in a cross section is typically large, it is generally possible to accommodate many economic determinants in the estimation. Overall, cross-sectional estimation enhances power, overcomes survivor bias problems, and permits a researcher to incorporate the effect of economic determinants of the time-series properties of earnings.

Conditional cross-sectional estimation: Previous research employs at least three different approaches to expand the information set beyond the past time series of earnings in obtaining conditional earnings forecasts (or conditional estimates of the parameters of the time-series process of earnings).

First, a conditional forecast is obtained using information on one or more determinants of the autocorrelation coefficient of earnings. For example, Brooks and Buckmaster (1976) focus on extreme earnings changes, Basu (1997) examines negative earnings changes, and Lev (1983) identifies economic determinants like barriers-to-entry in an industry, firm size, product type, and capital intensity of a firm; also see Freeman et al. (1982) and Freeman and Tse (1989, 1992). Recent studies estimating conditional forecasts include Fama and French (2000) and Dechow et al. (1999).

Second, price-based forecasts are used to improve on the time-series forecasts of earnings on the premise that prices reflect a richer information set than the past time series of earnings (Beaver et al., 1980). Research

[43] The econometric approach to estimate a parameter conditional on a set of (state) variables is well developed in finance and economics. See, for example, Shanken (1990), Chan and Chen (1988), and Ferson and Schadt (1996) for time-varying conditional best estimation.

examining price-based earnings forecasts includes Beaver and Morse (1978), Freeman et al. (1982), Collins et al. (1987), Beaver et al. (1987), and Freeman (1987). Notwithstanding the fact that prices reflect a richer information set than the past time series of earnings, researchers have found it difficult to harness the information in prices at the firm level to make an economically important improvement. Therefore, this research has had only a modest impact on forecasting. The benefit of prices in improving forecasts or in backing out market expectations is primarily in long-horizon settings (e.g., Easton et al., 1992; Kothari and Sloan, 1992; Collins et al., 1994) precisely because prices anticipate earnings information for several future periods.

Finally, Ou and Penman (1989a, b), Lev and Thiagarajan (1993), and Abarbanell and Bushee (1997, 1998) use financial statement analysis of income statement and balance sheet ratios to forecast future earnings and stock returns. The primary motivation for this research is to employ fundamental analysis to identify mispriced securities. Superior earnings forecasts are only an intermediate product of this research.

4.1.2.2.2. Properties of quarterly earnings. Interest in the time-series properties of quarterly earnings arises for at least four reasons. First, quarterly earnings are seasonal in many industries because of the seasonal nature of their main business activity (e.g., apparel sales and toy sales). Second, quarterly earnings are more timely, so the use of a quarterly earnings forecast as a proxy for the market's expectation is likely more accurate than using a stale annual earnings forecast.

Third, GAAP requires that the quarterly reporting period is viewed as an integral part of the annual reporting period (see APB, 1973, Opinion No. 28; FASB, 1974, SFAS No. 3; FASB, 1977, FASB Interpretation No. 18). As a result, firms are required to estimate annual operating expenses and allocate these costs to quarterly periods. The fourth quarter thus offsets the intentional (i.e., opportunistic) and unintentional estimation errors in allocating expenses to the first three quarterly periods. This contributes to differences in the properties of fourth versus the first three quarterly earnings (see Bathke and Lorek, 1984; Collins et al., 1984; Mendenhall and Nichols, 1988; Salamon and Stober, 1994). More importantly, quarterly earnings are potentially a more powerful setting to test positive accounting theory based and capital markets research hypotheses (see, for example, Salamon and Stober, 1994; Hayn and Watts, 1997; Rangan and Sloan, 1998). The source of the power comes from the fact that the errors in estimating operating expenses in the first three quarters are offset in the fourth quarter, thus permitting tests that exploit this property of error reversals. One downside of using quarterly earnings is that they are not audited.

Finally, there are four times as many quarterly earnings observations as annual earnings observations. To the extent there is a loss of information in aggregation, a quarterly earnings time series has the potential to generate more precise annual earnings forecasts than annual earnings-based forecasts (see for evidence, Hopwood et al., 1982). That is, less stringent data availability requirements are necessary using quarterly than annual earnings to achieve the same degree of precision of the forecasts. This enables the researcher to reduce survivor biases and to use a larger sample of firms.

While a quarterly earnings forecast is likely a more timely and accurate proxy for the market's expectation of earnings at the time of an earnings announcement, this benefit should be tempered by the following potential downside. The market's reaction to any information event reflects the revision in expectation of cash flows for all future periods. The market might be responding to information about future quarters, which may or may not be highly correlated with the information over a quarter (a relatively short time period). Therefore, despite greater accuracy, the strength of the association between the quarterly earnings surprise and narrow-window stock price reaction to the surprise is not higher than a long-window association (e.g., one year or longer). Recent evidence in Kinney et al. (1999) shows that the odds of the same sign of stock returns and earnings surprise are no greater than 60–40% even when using composite earnings forecasts tabulated by First Call Corporation.[44] The lack of a strong association should not be interpreted mechanically as an indication of noise in the earnings expectation proxy. The modest association is likely an indication of prices responding to information about future income that are unrelated to the current earnings information. That is, the forward-looking nature of prices with respect to earnings becomes an important consideration (see Kinney et al., 1999; Lev, 1989; Easton et al., 1992; Kothari and Sloan, 1992; Collins et al., 1994). In addition, increased incidence of transitory items in earnings in recent years further weakens the relation between current earnings surprise and revisions in expectations about future periods' earnings as captured in the announcement period price change.

ARIMA properties of quarterly earnings: Well-developed Box–Jenkins autoregressive integrated moving average (ARIMA) models of quarterly earnings exist (Foster, 1977; Griffin, 1977; Watts, 1975; Brown and Rozeff, 1979). Research comparing the models shows that the Brown and Rozeff (1979) model is slightly superior in forecast accuracy at least over short horizons (see Brown et al., 1987a). However, this advantage does not necessarily show up as a stronger association with short-window returns around quarterly earnings announcements (see Brown et al., 1987b). Simpler models like Foster (1977) do just as well as the more complicated models. The

[44] Kinney et al. (1999) use annual, not quarterly earnings forecast error. However, since first three quarters' earnings are known at the time of the annual earnings announcement, examining the association of annual earnings forecast error with a narrow window return is almost equivalent to examining a relation between quarterly earnings surprise and stock returns.

main advantage of the Foster (1977) model is that it can be estimated without the Box–Jenkins ARIMA software.

Currently the main use of quarterly earnings time-series models is in tests of market efficiency examining post-earnings-announcement drift (see below). In other capital markets research, researchers almost invariably use analysts' or management forecasts of earnings. As seen below, these forecasts are not only easily available, but they are more accurate and more highly associated with security returns.

4.1.2.2.3. Properties of components of earnings. There are at least three reasons for researchers' interest in the properties of earnings components. First, to examine whether earnings components are incrementally informative beyond earnings in their association with security prices.[45] This research is generally aimed at evaluating standards that require earnings components to be disclosed and fundamental analysis. Conclusions about the incremental association or information content of earnings components hinge on the accuracy of the proxies for the unexpected portion of the earnings components, which creates a demand for the time-series properties of earnings components.

Second, accruals and cash flows are the two most commonly examined components of earnings. Operating accruals represent accountants' attempt to transform operating cash flows into earnings that are more informative about firm performance and thus make earnings a more useful measure for contracting and/or in fundamental analysis or valuation. However, self-interested managers might use accounting discretion opportunistically and manipulate accruals, which would distort earnings as a measure of firm performance. Tests of accrual management hypotheses based on positive accounting theory examine accounting accruals' properties. These tests provide a motivation for research in the time-series properties of accruals and cash flows and other earnings components (e.g., current and non-current accruals, operating and investing cash flows, etc.).

Finally, interest in the time-series properties of earnings components also arises because summing the forecasts of the components might yield a more accurate forecast of earnings. The logic here is similar to that underlying the aggregation of quarterly earnings forecasts to improve the accuracy of annual earnings forecasts. The difference is that the aggregation of components is contemporaneous (i.e., cross-sectional) whereas the aggregation of quarterly forecasts is temporal. In both cases the assumption is that there is a loss of information in aggregation.

4.1.2.2.4. Current status and future directions for research in earnings components. There is an active interest in research on the properties of earnings components because of both positive accounting research and

[45] See, for example, Lipe (1986), Rayburn (1986), Wilson (1986, 1987), Livnat and Zarowin (1990), Ohlson and Penman (1992), Dechow (1994), and Basu (1997).

fundamental analysis. Early research on the properties of accruals assumed naïve models (e.g., DeAngelo, 1986; Healy, 1985), but progress has been made since (e.g., Jones, 1991; Kang and Sivaramakrishnan, 1995; Dechow et al., 1995). I believe that modeling earnings components' properties using the nature of economic transactions and the accounting recording of those transactions is likely to be more fruitful than simply fitting time-series models on earnings components (see Guay et al., 1996; Healy, 1996). Dechow et al. (1998a) represent one attempt at modeling the time-series properties of accruals, operating cash flows, and earnings with sales as the starting point or primitive. The economic modeling of accruals or earnings components will not necessarily provide the best fit for the historical data, but it might have predictive power and ability to explain managerial behavior better than purely statistical time-series models.

4.1.2.3. Management forecasts. Management forecasts have many labels, including earnings warnings, earnings pre-announcements, and management's earnings forecasts. Earnings warnings and pre-announcements precede earnings announcements and typically convey bad news. Management's earnings forecasts are often soon after earnings announcements and do not necessarily communicate bad news to the market. Since management forecasts are voluntary, there are economic motivations for the forecasts. A detailed discussion of the economic issues surrounding management forecasts appears in the Healy and Palepu (2001) and Verrecchia (2001) review papers. A few examples of the economic issues include the following: (i) the threat of litigation influencing management's decision to issue voluntary forecasts and forecasts of bad news (e.g., Skinner, 1994; Francis et al., 1994; Kasznik and Lev, 1995); (ii) the effect of management's concern about the proprietary cost of disclosure on the nature of management forecasts (e.g., Bamber and Cheon, 1998); and (iii) the timing of management forecasts and the timing of insider buying and selling of company stocks (Noe, 1999). In this review, I only summarize the extant research on the properties of management forecasts. The summary describes the main findings and the hypotheses tested in the literature.

Early research on management forecasts appears in Patell (1976), Jaggi (1978), Nichols and Tsay (1979), Penman (1980), Ajinkya and Gift (1984), and Waymire (1984). They collectively show that management forecasts have information content. Specifically, management forecast releases are associated with significant increases in return variability (see e.g., Patell, 1976) and there is a positive association between the unexpected component of the management forecast and security returns around the forecast date (e.g., Ajinkya and Gift, 1984; Waymire, 1984).

One of the hypotheses for voluntary management forecasts is that through the forecasts management aligns investors' expectations with the superior information that the management possesses (Ajinkya and Gift, 1984). This expectation-adjustment hypothesis implies that management forecasts are superior to market expectations of earnings at the time of management forecasts. However, previous evidence in Imhoff (1978) and Imhoff and Paré (1982) suggested management forecasts are not systematically more accurate than analysts' forecasts. Evidence consistent with the superiority of management vis-à-vis analysts' forecasts as a proxy for the market's prevailing expectation appears in Waymire (1984). Recent research examines issues like the relation between various types, precision, and credibility of management forecasts and security price changes (e.g., Pownall et al., 1993; Baginski et al., 1993; Pownall and Waymire, 1989; Bamber and Cheon, 1998). Overall, the evidence suggests that management forecasts have information content and the information content is positively correlated with a number of determinants of the quality of the management forecasts.

4.1.2.4. Analysts' forecasts. There is a huge empirical and theoretical literature on analysts' forecasts. I focus on the properties of analysts' forecasts and some determinants of these properties. I do not review the research that examines why analysts forecast earnings, the determinants of the number of analysts following a firm, and the consequences of analysts' following on the properties of security returns. Some of these issues are examined in Verrecchia (2001) and Healy and Palepu (2001). I recognize that the issues n ot examined here also affect the properties of analysts' forecasts, but nevertheless I consider those beyond the scope of my review of the capital markets research.

Buy- and sell-side analysts issue earnings forecasts. Most research in accounting examines sell-side analysts' forecasts because these are publicly available. Analysts from brokerage houses and investment-banking firms in the financial services industry issue sell-side forecasts. Buy-side analysts are typically employed by mutual funds and pension funds and issue forecasts primarily for internal investment decision-making purposes. Like most of the research on analysts' forecasts, I review the research on sell-side analysts' forecasts.

Analysts' forecasts research can be broadly divided into two categories. The first category examines properties of consensus analysts' forecasts. A consensus forecast is the mean or median of the analysts' forecasts of (either quarterly or annual or long-term) earnings of an individual firm. An example of research in this category would be "Are analysts' forecasts optimistic?" The second category focuses on the properties of individual analysts' forecasts either in the cross section or temporally. This category examines questions like "What are the determinants of an individual analyst's forecast accuracy?" and "Does skill affect the accuracy of an analyst's forecast?" There is overlap between these two areas of research, so the discussion is sometimes applicable to both.

4.1.2.4.1. Analysts' forecasts compared to time-series forecasts. Early research examines the accuracy of analysts' forecasts and their association with security returns, and compares these properties with time-series forecasts of earnings. Brown and Rozeff (1978) were the first to document superior accuracy of analysts' forecasts over time-series forecasts of quarterly earnings. Subsequent research offers conflicting evidence (see Collins and Hopwood (1980) and Fried and Givoly (1982) for confirming the evidence in Brown and Rozeff (1978), whereas Imhoff and Paré (1982) for contradictory evidence) and also raises the question of whether analysts' superiority stemmed from their timing advantage (i.e., access to more recent information) over time-series models. Brown et al. (1987a, b) test for both accuracy and association with security returns in comparing the quality of analysts' forecasts against time-series forecasts of quarterly earnings. They show that, even after controlling for the timing advantage, analysts' forecasts are more accurate and modestly more highly associated with stock returns than time-series forecasts. O'Brien (1988), however, documents conflicting evidence in which an autoregressive model forecast is more highly associated with returns than I/B/E/S forecasts. The conflicting evidence notwithstanding, in recent years it is common practice to (implicitly) assume that analysts' forecasts are a better surrogate for market's expectations than time-series forecasts. The issues of current interest are whether analysts' forecasts are biased, the determinants of the biases, and whether the market recognizes the apparent biases in pricing securities.

4.1.2.4.2. Optimism in analysts' forecasts. Many studies report evidence that analysts' forecasts are optimistic,[46] although the optimism appears to be waning in recent years (see Brown, 1997, 1998; Matsumoto, 1998; Richardson et al., 1999). There are at least three hypotheses consistent with the decline in analyst optimism: (i) analysts are learning from evidence of past biases (see Mikhail et al. (1997), Jacob et al. (1999), and Clement (1999) for mixed evidence on the effect of experience on learning); (ii) analysts' incentives have changed; and (iii) the quality of data used in the research examining analysts' forecast properties has improved (e.g., suffers less from survivor biases or selection biases).

4.1.2.4.3. Estimating bias in analysts' forecasts. Forecast optimism is inferred from a systematic positive difference between the forecast and actual earnings per share. The optimism has been documented using Value Line, I/B/E/S, and Zacks data sources for analysts' forecasts (Lim, 1998). The estimates of analyst optimism vary across studies in part because of differences in research designs, variable definitions, and time periods examined. Consider, for example, the following three recent studies that report properties of I/B/E/S

[46] Examples include Barefield and Comiskey (1975), Crichfield et al. (1978), Fried and Givoly (1982), Brown et al. (1985), O'Brien (1988), Stickel (1990), Abarbanell (1991), Ali et al. (1992), Brown (1997, 1998), Lim (1998), Richardson et al. (1999), and Easterwood and Nutt (1999).

analysts' forecasts: Lim (1998), Brown (1998), and Richardson et al. (1999). Each uses over 100,000 firm-quarter observations and analyzes I/B/E/S forecasts from approximately the same time period from 1983 or 1984 to 1996 or 1997.

Lim (1998, pp. 9–10) uses "the median of the unrevised estimates of a quarter's earnings across all brokerage firms", although the use of the mean of analysts' forecasts is not uncommon in the literature (see, for example, Chaney et al., 1999).[47] Richardson et al. (1999) use individual analyst's forecast and average the forecast errors each month, whereas Brown (1998) reports results using only the most recent analyst forecast. Lim (1998) calculates forecast errors as the difference between the earnings forecast and actual earnings per share as reported on Compustat, based on the evidence in Philbrick and Ricks (1991) that actual earnings reported by I/B/E/S suffers from an "alignment problem". In contrast, Brown (1998) and Richardson et al. (1999) use I/B/E/S actual earnings "for comparability with the forecast" (Richardson et al., 1999, p. 7).

Previous research also differs in its treatment of outliers. Lim (1998) excludes absolute forecast errors of $10 per share or more, while Brown (1998) winsorizes absolute forecast errors greater than 25 cents per share and Degeorge et al. (1999) delete absolute forecast errors greater than 25 cents per share. Richardson et al. (1999) delete price-deflated forecast errors that exceed 10% in absolute value. Brown (1998), Degeorge et al. (1999), and Kasznik and McNichols (2001) do not use a deflator in analyzing analysts' forecast errors, whereas Lim (1998) and Richardson et al. (1999) deflate forecast errors by price. Analysis without a deflator implicitly assumes that the magnitude of undeflated forecast error is not related to the level of earnings per share (i.e., forecast errors are not heteroskedastic). In contrast, use of price deflation implicitly assumes that the deviation of the actual from forecasted earnings depends on the level of earnings per share or price per share and that price deflation mitigates heteroskedasticity.

4.1.2.4.4. Evidence of bias. Notwithstanding the research design differences, the evidence in most of the studies suggests analysts' optimism. This conclusion should be tempered by the fact that the forecast samples examined in various studies are not independent. Lim (1998) finds an average optimistic bias of 0.94%. of price. The bias is considerably higher at 2.5% of price for small firms and it is 0.53% of price for large market capitalization stocks. He also reports that the bias is pervasive in that it is observed every year and in every market

[47] Note that even if the distribution of actual earnings might be skewed, the distribution of analysts' forecasts for a given firm need not be skewed, so the use of the mean or median of analysts' forecasts might not make much difference. Evidence in O'Brien (1988) indicates that median forecasts are slightly smaller than the mean.

capitalization decile of sample firms, and it is observed in both newly covered and not newly covered securities by analysts.

While the forecast biases reported in Lim (1998) seem both statistically and economically large, Brown (1998) reports a mean bias of only a cent per share in the most recent analyst's forecast. His annual analysis from 1984 to 1997 reveals a range of bias from 2.6 cents per share optimism in 1993 to 0.39 cents per share pessimism in 1997. Richardson et al. (1999) also find that the bias declines dramatically, from 0.91% of the price to 0.09% of price, as the forecast horizon is shortened from one year to one month (also see O'Brien, 1988). Like Brown (1998), Richardson et al. also report that the bias has turned from optimism to pessimism in recent years. Abarbanell and Lehavy (2000a) take issue with this conclusion. They argue that forecast data providers like First Call, Zacks, and IBES have increasingly changed the definition of reported earnings to earnings from continuing operations and now require analysts to forecast earnings from continuing operations. Abarbanell and Lehavy (2000a) conclude that this change "plays a dominant role in explaining the recent declines in apparent forecast optimism and increases in the incidence of zero and small pessimistic forecast errors".

In most studies the median forecast bias is quite small (e.g., 0.01% in Lim, 1998), which suggests that extreme observations hugely influence the results, i.e., skewness of the earnings distribution drives the results. Consistent with earnings skewness, Gu and Wu (2000) and Abarbanell and Lehavy (2000b) find that a small number of forecast error observations disproportionately contributes to the observed bias.

4.1.2.4.5. Potential research design problems. Despite the apparently compelling evidence, I remain somewhat skeptical of the evidence of analysts' forecast bias for several reasons. First, forecast earnings and actual earnings against which the forecast is being compared do not always seem to be the same (see I/B/E/S data definitions), especially when Compustat actuals are used (see Sabino, 1999). Analysts generally forecast earnings without special items and other one-time gains and losses. I/B/E/S apparently adjusts the actual reported earnings number for special items and/or one-time gains and losses to back out the earnings number the firm would have reported consistent with the earnings number analysts were forecasting (see for details, Sabino, 1999; Abarbanell and Lehavy, 2000a). This procedure seems subjective and whether it contributes to the observed bias (or noise) is worthy of investigation.

Second, the coverage of data has improved dramatically through the years and the degree of bias has declined steadily (see evidence in Brown, 1997, 1998; Richardson et al., 1999). Is the evidence of bias related to the improvement in the coverage of firms in the data bases? Third, are there survival biases in the data? Survival bias might arise not simply because firms go bankrupt, but mostly because of mergers and acquisitions. Finally, what is the effect of mixing stale forecasts with recent forecasts? Evidence suggests recent forecasts are less biased than forecasts issued earlier. However, not all analysts revise their forecasts, so the median forecast at any point in time is for a sample of recent and stale forecasts. What is the contribution to the bias arising from stale forecasts? Is analysts' proclivity to revise forecasts diminished if a firm is performing poorly? This would impart an optimistic bias as a result of using stale forecasts (see Affleck-Graves et al., 1990; McNichols and O'Brien, 1997). Analysis in Richardson et al. (1999), which examines forecast bias as a function of the horizon, appears to be a step in the right direction.

4.1.2.4.6. Bias in long-horizon forecasts. In addition to quarterly earnings forecasts, there is a large body of recent research that examines properties of long-horizon analysts' forecasts. Long-horizon forecasts are generally forecasts of growth over two-to-five years. Analysis of long-term earnings growth forecasts also reveals that these are generally optimistic (e.g., LaPorta, 1996; Dechow and Sloan, 1997; Rajan and Servaes, 1997). An emerging body of research examines analysts' long-term forecasts in tests of market efficiency (see below). I defer the discussion of some of the properties of analysts' long-term forecasts to the tests of market efficiency section of the paper.

4.1.2.4.7. Economic determinants of forecast bias. Evidence of optimism in analysts' forecasts has led to many studies proposing and testing hypotheses to explain the optimistic bias. The hypotheses fall in two broad categories. First, there are economic incentives based explanations for analysts' forecast optimism. Second, a behavioral cognitive-bias explanation for analysts' bias is proposed.

Incentives-based explanations: First, an important economic incentive motivating "sell-side" analysts to issue optimistic earnings forecasts is the compensation they receive for their services to the corporate finance arm of an investment-banking firm.[48] The corporate finance division derives revenues mainly from services related to securities issues and merger-and-acquisition activities. Sell-side analysts' optimistic forecasts help the corporate finance division generate business. The deterrent to analysts from issuing overly optimistic forecasts is that a portion of their annual compensation and their reputation, and thus human capital, are an increasing function of forecast accuracy and a decreasing function of forecast bias.[49] One prediction of the hypothesis here is that analysts working for an investment-banking firm doing business with the client firm (called affiliated analysts) would issue more optimistic forecasts than unaffiliated analysts. Lin and McNichols (1998a),

[48] See Adair (1995), Ali (1996), Dechow et al. (1999), Dugar and Nathan (1995), Hansen and Sarin (1996), Hunton and McEwen (1997), Lin and McNichols (1998a,b), Michaely and Womack (1999), and Rajan and Servaes (1997).

[49] Consistent with this hypothesis, Mikhail et al. (1999) document a significant relation between analyst turnover and relative forecast accuracy.

Michaely and Womack (1999), Dugar and Nathan (1995), and Dechow et al. (1999), among others, offer evidence consistent with the hypothesis.

An alternative interpretation for the observed bias in affiliated analysts' forecasts is as follows. The determination of affiliated analysts is not exogenous. Suppose there are N analysts, and all of them are assumed to issue unbiased forecasts. Assume furthermore that they independently issue N forecasts at time t for a firm i. Firm i's management is interested in an investment-banking relation with one of the analyst's firm because it would like to issue new equity. Firm i might retain the investment-banking firm of the analyst issuing the highest of the N forecasts. That is, the firm's choice of the investment-banking analyst is likely in part a function of who is most bullish about the firm's prospects.[50] If the N forecasts were issued independently and since all the analysts are assumed to issue unbiased forecasts *on average*, the order statistic of the cross-sectional distribution of analysts' forecasts (or a forecast from the high end of the distribution) selected by the firm's management will ex post appear optimistic. I believe the challenge is to discriminate between the above explanation and the incentive-based opportunistic-forecast explanation.

Second, Lim (1998) and Das et al. (1998) argue that analysts might issue optimistic forecasts to gain increased access to information from management, especially in cases where the information asymmetry between the management and the investment community is high. Analysts' investment in developing better relations with firms' management improves the flow of information from managers as well as helps obtain more investment banking and brokerage business, and potentially more brokerage commissions from clients. Lim (1998) and Das et al. (1998) recognize that forecast bias is bad, but management might reward optimism by funneling information to the analyst. This information is helpful in improving forecast accuracy. The benefit to analysts is greatest when prior uncertainty is high. So analysts trade-off bias against information from management, which reduces the variance of the forecast error. This leads to an interior equilibrium, rather than a corner solution of huge optimistic bias.[51] The hypothesis also generates a cross-sectional prediction that the bias would be increasing in variables that proxy for prior uncertainty and information asymmetry (e.g., firm size, and growth opportunities). Evidence in Lim (1998) and Das et al. (1998) is consistent with the hypothesis.

[50] While this provides an incentive for all analysts to be optimistic, recall that I have assumed unbiased forecasts. The argument I make here is unchanged even if the analysts are on average assumed to make optimistically biased forecasts. If this were the case, the affiliated analyst is expected to appear more optimistically biased than the rest.

[51] See Laster et al. (1999) for a similar argument using publicity from their forecasts traded-off against accuracy as a motivation for analysts' optimistic bias.

Third, Gu and Wu (2000) hypothesize that the observed forecast bias results from analysts' incentives in the presence of earnings skewness. They argue that optimistic bias is rational and expected because analysts strive to minimize mean absolute forecast error. The median of a skewed distribution minimizes the mean absolute forecast error. Thus, if the realized earnings distribution is negatively skewed and if analysts seek to minimize the absolute forecast error, not mean squared error, then forecasts will be optimistically biased. Evidence in Gu and Wu (2000) is consistent with their skewness explanation. While Gu and Wu (2000) offer an interesting explanation, in their setting both optimistic and pessimistic biases are explained so long as analysts forecast median earnings. Therefore, if skewed earnings distribution suggests extreme surprising outcomes, then in good economic periods analysts ex post turn out to be pessimistic and they ex post turn out to be optimistic in bad economic times. Gu and Wu (2000) cannot discriminate between the above explanation and their hypothesis that analysts have an incentive to forecast the median.

Finally, Abarbanell and Lehavy (2000b) propose that it is management's incentive to take earnings baths that largely contributes to the observed optimistic bias in analysts' forecasts. That is, unlike the previous explanations, Abarbanell and Lehavy (2000b) argue that the bias has nothing to do with analysts' incentives or cognitive biases (see below). Instead, they show that earnings management observations disproportionately impact the estimated bias, which prior research seeks to explain on the basis of analysts' incentives and/or cognitive biases.

Cognitive-bias explanations: Cognitive-bias explanations for analysts' optimism have been proposed mainly to explain anomalous security-return evidence that suggests market inefficiency in long-horizon returns. Evidence of apparent market overreaction to past good and bad price performance (i.e., a profitable contrarian investment strategy) prompted a cognitive bias in analysts' forecasts as an explanation. Drawing upon the behavioral theories of Tversky and Kahneman (1984) and others, DeBondt and Thaler (1985, 1987, 1990), Capstaff et al. (1997), and DeBondt (1992) propose a cognitive-bias explanation for analysts' forecast optimism. Specifically, they hypothesize that analysts systematically overreact to (earnings) information, which imparts an optimistic bias in analysts' forecasts. However, in order for an optimistic bias in analysts' forecasts to arise, there must be some asymmetry in overreaction such that analysts' overreaction to good news is not fully offset by their overreaction to bad news. Elton et al. (1984) argue that analysts overestimate firms performing well and Easterwood and Nutt (1999) document evidence that analysts overreact to good earnings information, but underreact to bad earnings information. The source of asymmetry in the analysts' overreaction is not fully understood in the literature. The asymmetry also makes it difficult to explain the post-earnings-announcement drift because reversal in the reaction to good news earnings is not observed.

Research also examines whether there is a cognitive-bias-induced overreaction and optimism in analysts' forecasts (see Klein, 1990; Abarbanell, 1991) as well as whether the apparent security-return overreaction[52] is a result of the market believing analysts' cognitive-bias-induced overreacting and biased forecasts (e.g., LaPorta, 1996; Dechow and Sloan, 1997). Klein's (1990) evidence is inconsistent with overreaction in analysts' forecasts and Abarbanell (1991) infers underreaction to earnings information, which is consistent with the post-earnings-announcement drift. In recent work, Abarbanell and Lehavy (2000b) fail to find evidence consistent with cognitive bias inducing optimistic bias in analysts' forecasts. I defer the security-return evidence to Section 4 where I discuss research on market efficiency with respect to analysts' long-horizon forecasts.

Other explanations: In addition to the above incentives-based and cognitive-bias-related explanations for analysts' optimism, at least three other explanations are offered in the literature. These are (see Brown, 1998): herd behavior (Trueman, 1994); low earnings predictability (Huberts and Fuller, 1995); and analysts prefer to withhold unfavorable forecasts (Affleck-Graves et al., 1990; McNichols and O'Brien, 1997).

4.1.2.4.8. Properties of individual analyst's forecasts. Research in this area almost invariably has a descriptive component that documents properties of individual analyst's forecasts. Other research analyzes properties of individual analyst's forecasts in the context of analysts' economic incentives in issuing earnings forecasts, i.e., the costs and benefits of issuing accurate or biased forecasts. The latter is more interesting, but also more difficult.

Research on the properties of individual analysts' forecasts can be categorized into three streams. First, there is research on cross-sectional variation in and determinants of analysts' forecast accuracy. Second, research examines whether analysts' forecasts are efficient in using all the information available at the time of their forecasts. Third, there is research on systematic differences in the properties of analysts' forecasts between groups of analysts (e.g., affiliated versus unaffiliated analysts), which might be related to differential economic incentives facing the groups of analysts.

4.1.2.4.9. Differential forecast accuracy and its determinants. The early literature fails to find differential forecast accuracy among analysts (see Brown and Rozeff, 1980; O'Brien, 1990; Butler and Lang, 1991). Failure to control for the confounding effect of forecast recency on forecast accuracy contributed to the lack of finding significant differential forecast accuracy. Using larger data sets and better controls for forecast horizon, Sinha et al. (1997) conclude that analysts differ in terms of their forecast accuracy. They show that even in hold

[52] See DeBondt and Thaler (1985, 1987), Chan (1988), Ball and Kothari (1989), Chopra et al. (1992), Ball et al. (1995), and Fama and French (1995) for research examining whether investors and the stock market overreact to information over long horizons.

out samples (i.e., an ex ante analysis), superior forecasters based on past performance outperform other analysts in forecast accuracy (also see Stickel (1992), for the forecast superiority of the *Institutional Investor* All American Research Team vis-à-vis other analysts). Sinha et al. also find that poor performers do not necessarily repeat poor performance. Their evidence is consistent with economic Darwinism in that superior forecasters survive, but poor performers are possibly weeded out in the marketplace.

Recent examples of research examining the determinants of analyst forecast superiority include Mikhail et al. (1997), Jacob et al. (1999), and Clement (1999). The evidence in these studies suggests that experience (or learning), the size of the brokerage firm that an analyst works for, and the complexity of the analyst's task (number of firms and industries followed by an analyst) affect forecast accuracy. The evidence on experience appears mixed in part because of data problems. For example, data are available only since 1984, so even if some analysts were experienced at the start of the data availability year, they are coded as no more experienced as a novice. In addition, inferences about the effect of long experience are confounded by potential survivor bias problems.

4.1.2.4.10. Efficiency of analysts' forecasts. A number of studies show that analysts' forecasts are inefficient in the sense that they do not fully incorporate past information available at the time of their forecasts. Evidence in Lys and Sohn (1990), Klein (1990), and Abarbanell (1991) suggests that analysts underreact to past information reflected in prices. There is evidence of serial correlation in forecast revisions of individual analysts surveyed by Zacks Investment Research (see Lys and Sohn, 1990), in the Value Line forecasts (see Mendenhall, 1991) and in the I/B/E/S consensus forecasts (see Ali et al., 1992). This research examines whether analysts' underreaction to past information and/or earnings information is a potential explanation for the post-earnings-announcement drift (also see Abarbanell and Bernard, 1992).

The inefficiency of analysts' forecasts in incorporating available information in revising their forecasts raises the question of an analyst's incentive to provide an accurate forecast. Stated differently, is the cost of incorporating all the information outweighed by potential benefits? This requires better knowledge of (or proxies for) the cost and reward structure of a financial analyst.

4.1.2.4.11. Differences in forecast accuracy across classes of analysts. Recent research examines whether economic incentives motivate different classes of analysts (e.g., analysts affiliated with a brokerage firm that has an investment-banking relation with the firm whose earnings are being forecast versus unaffiliated analysts). This research, discussed earlier, examines both differences in forecast accuracy across the classes of analysts and security price performance in an attempt to ascertain whether capital markets are fixated on biased analysts' forecasts. I will revisit the issues surrounding market efficiency below.

4.1.3. Methodological issues and capital markets research

There are several issues involved in drawing statistical inferences in capital markets research. Although econometric in nature, some methodological research appears in the accounting literature because it addresses issues that are unique to capital markets research in accounting. The uniqueness often stems either from the properties of accounting data or from choice of research design (e.g., levels regressions). There is a voluminous body of research that examines econometric issues germane to capital markets research. These issues are important and have a tremendous bearing on the inferences we draw from the statistical analysis presented in the research. However, to keep the review focused, I survey this research only by way of listing the main issues and refer the reader to the relevant literature for technical details. The main issues include:

(i) bias in test statistics because of cross-correlation in the data or regression residuals (see Schipper and Thompson, 1983; Collins and Dent, 1984; Sefcik and Thompson, 1986; Bernard, 1987; Christie, 1987; Kothari and Wasley, 1989; Brav, 2000; Mitchell and Stafford, 2000);
(ii) price and return regression models (see Lev and Ohlson, 1982; Christie, 1987; Landsman and Magliolo, 1988; Kothari and Zimmerman, 1995; Barth and Kallapur, 1996; Barth and Clinch, 1999; Easton, 1998; Brown et al., 1999; Holthausen and Watts, 2001); and
(iii) comparing the information content of alternative models, e.g., comparing the association of earnings versus cash flows with stock returns (see Davidson and MacKinnon, 1981; Cramer, 1987; Vuong, 1989; Dechow, 1994; Biddle et al., 1995; Biddle and Seow, 1996; Dechow et al., 1998b; Ball et al., 2000).

4.1.4. Models of discretionary and non-discretionary accruals

4.1.4.1. Motivation. I review methodological research on models of discretionary and non-discretionary accruals because of their preeminent role in researchers' ability to draw correct inferences in capital markets and other research in accounting. Discretionary accruals and earnings management are used synonymously in the literature. Schipper (1989) defines earnings management as "purposeful intervention in the external reporting process, with the intent of obtaining some private gain to managers or shareholders". The discretionary accrual models split total accruals into a discretionary component, which serves as a proxy for earnings management, and a non-discretionary portion. The non-discretionary accrual together with operating cash flows is the non-discretionary portion of reported earnings. At least three streams of research use discretionary accrual models.

First, discretionary accrual models are used in tests of contracting- and political-cost-based hypotheses about management's incentives to manipulate accounting numbers (i.e., opportunistic use of accruals). Alternatively, this research hypothesizes that firms choose accounting policies or include discretionary accruals in earnings to convey management's private information about the firm's prospects or to more accurately reflect the firm's periodic performance, i.e., the efficient contracting use of accruals (see Holthausen and Leftwich, 1983; Watts and Zimmerman, 1990; Holthausen, 1990; Healy and Palepu, 1993). This body of research is usually not in the capital markets area.

Second, using market efficiency as a maintained hypothesis, many studies test the efficient contracting and opportunism hypotheses by correlating earnings components with stock returns. This research is frequently aimed at testing the information content or association with security returns of new mandated recognition or disclosure standards of accounting. Examples of this research include studies examining whether banks' disclosures of fair values of investments and loans contain value-relevant information (see, e.g., Barth, 1994; Barth et al., 1996; Nelson, 1996). Alternatively, research examines properties of voluntarily disclosed accounting data to test the efficient contracting and opportunism hypotheses (e.g., Beaver and Engel, 1996; Wahlen, 1994). Beaver and Venkatachalam (1999) is an example of research that simultaneously tests the information content and opportunism hypotheses, i.e., it allows for both non-strategic noise and opportunistic accrual manipulation.

Third, a recent popular area of research tests the joint hypothesis of market inefficiency and accrual manipulation with a capital market motivation, e.g., an incentive to manipulate accruals upward in periods prior to stock issues (see Dechow et al., 1996; Jiambalvo, 1996). Recent developments in financial economics and accounting, which are suggestive of informational inefficiency of the capital markets, have fueled this research. The research tests whether there is a positive association between current manipulated (or discretionary) accruals and subsequent risk-adjusted abnormal stock returns. Examples of research in this area include Sloan (1996), Teoh et al. (1998a–c), Rangan (1998), and Ali et al. (1999).

4.1.4.2. Discretionary accrual models. There are five well-known time-series models of discretionary accruals in the literature.[53] These are: the DeAngelo (1986) model, the Healy (1985) model, the industry model used in Dechow and Sloan (1991), the Jones (1991) model, and the modified-Jones model by Dechow et al. (1995). Of these only the Jones and modified-Jones models are commonly used in research in part because they outperform the rest in terms of specification and power (see Dechow et al., 1995). Thomas and Zhang (1999)

[53] Strictly speaking, they are models of non-discretionary accruals and the residual (or the intercept plus the residual) from each model is an estimate of discretionary accruals.

dispute Dechow et al.'s finding and conclude "Only the Kang-Sivaramakrishnan model, which is coincidentally the least popular model, performs moderately well." Kang and Sivaramakrishnan (1995) employ an instrumental variable approach to estimate discretionary accruals.

Moreover, cross-sectional estimation of the Jones model (see DeFond and Jiambalvo, 1994; Subramanyam, 1996b) has replaced the original time-series formulation of the model in terms of recent application. DeFond and Jiambalvo (1994), Subramanyam (1996b) and other studies have legitimized the cross-sectional estimation. Their evidence suggests the performance based on cross-sectional estimation is no worse than that using time-series estimation of the Jones and modified-Jones models. Cross-sectional estimation imposes milder data availability requirements for a firm to be included for analysis than time-series estimation. This mitigates potential survivor bias problems. The precision of the estimates is also likely higher in cross-sectional estimation because of larger sample sizes than the number of time-series observations for an individual firm. The downside of cross-sectional estimation is that cross-sectional variation in the parameter estimates is sacrificed. However, conditional cross-sectional estimation is a good remedy for the problem (see previous discussion in the context of time-series properties of annual earnings forecasts in Section 4.1.2, and Fama and French, 2000; Dechow et al., 1999).

4.1.4.3. Evaluation of discretionary accruals models. An influential study by Dechow et al. (1995) evaluates the power and specification of alternative discretionary accrual models. Their conclusion that the "modified version of the model developed by Jones (1991) exhibits the most power in detecting earnings management" (Dechow et al., 1995, p. 193) serves as the basis for the widespread use of the modified-Jones model. Dechow et al. (1995, p. 193) also conclude that, while "all of the models appear well specified when applied to a random sample", "all models reject the null hypothesis of no earnings management at rates exceeding the specified test levels when applied to samples of firms with extreme financial performance". Finally, Dechow et al. (1995, p. 193) find that "the models all generate tests of low power for earnings management…".

Since earnings management studies almost invariably examine samples of firms that have experienced unusual performance, the most relevant conclusion from Dechow et al. (1995) is that the discretionary accrual models are seriously misspecified. The misspecification arises because the magnitude of normal accruals, i.e., non-discretionary or expected accruals, is correlated with past (and contemporaneous) firm performance. The dependence arises for two reasons. First, as discussed in Section 4.1 on the time-series properties of earnings, firm performance conditional on past performance does not follow a random walk. Second, both operating accruals and operating cash flows are strongly mean reverting (see Dechow (1994) for evidence, and Dechow et al.

(1998a, b) for a model that explains the correlation structure), which means these variables are not serially uncorrelated. However, none of the five discretionary accrual models used in the literature explicitly captures accruals' serial correlation property, so estimated discretionary accruals are biased and contaminated with non-discretionary accruals. Evidence in Guay et al. (1996), who use market-based tests, and Hansen (1999), who examines the behavior of future earnings, suggests that the extent of the non-discretionary accrual component in estimated discretionary accruals is large. Thomas and Zhang's (1999) conclusion is still stronger. They infer that the commonly used models "provide little ability to predict accruals".

I now turn attention to power of the tests that use discretionary accruals. Power of a test is the frequency with which the null hypothesis is rejected when it is false. In assessing the power of the discretionary accrual models, there are two relevant issues. First, if a test is misspecified (i.e., rejection frequency under the null exceeds the significance level of the test, e.g., 5%), statements about the power of the test are not particularly meaningful. Second, assuming that the estimated discretionary accruals are adjusted for bias due to past performance or other reasons, I would argue that the discretionary accrual models yield tests of high, not low power. This conclusion contrasts with Dechow et al. (1995). They examine the power of the tests using individual securities, i.e., sample size is one. Since almost all research studies use samples in excess of 50–100, assuming independence, the standard deviation of the mean discretionary accrual is an order of magnitude smaller than that in Dechow et al. (1995).[54] Therefore, in most research settings, the power is considerably higher than reported in Dechow et al. (1995). Not surprisingly, the null of zero discretionary accruals is often rejected in empirical research.

4.1.4.4. Future research: Better models of discretionary accruals and better tests. The misspecification of and bias in the discretionary accrual models suggest that inferences about earnings management might not be accurate. Accruals should be modeled as a function of a firm's immediate past economic performance, so that discretionary accruals can be more accurately isolated (see Kaplan, 1985; McNichols and Wilson, 1988; Guay et al., 1996; Healy, 1996; Dechow et al., 1998a). Shocks to a firm's economic performance affect normal accruals as well as serve as a strong motivation to managers to manipulate accruals both opportunistically and to convey information. This complicates the researcher's task of separating discretionary from non-discretionary accruals.

Collins and Hribar (2000b) point to another problem in identifying not only discretionary accruals, but total accruals as well. They show that a researcher's

[54] Even if the standard deviation is estimated with a correction for cross-sectional dependence, it is likely to be considerably smaller than that for a sample of one firm as in Dechow et al. (1995).

estimate of total accruals using the balance sheet approach instead of taking information directly from a cash flow statement is economically significantly biased in the presence of mergers and acquisitions and discontinued operations.[55] Precise information on cash flows and accruals has become available only after the Statement of Financial Accounting Standard No. 95 became effective in 1987, and many research studies use the balance sheet approach even in the recent period. The misestimation of total accruals increases the error in estimating discretionary accruals and potentially biases the estimated discretionary accrual. If the test sample firms are more active in mergers and acquisitions or have discontinued operations more frequently than the control sample firms, then Collins and Hribar (2000b) analysis suggests the inferences might be incorrect. Their replication of the studies examining seasoned equity offering firms' accrual manipulation reveals that the bias in estimated discretionary accruals largely accounts for the apparent manipulation documented in Teoh et al. (1998a) and elsewhere.

Another complicating factor is whether discretionary accruals are motivated by managerial opportunism or efficient contracting considerations. Subramanyam (1996b) reports results of the tests of estimated discretionary accruals' association with returns and with future earnings and cash flow performance. He concludes that discretionary accruals are on average informative, not opportunistic.[56] In contrast, portfolios representing firms with extreme amounts of accruals, which are likely to be flagged as extreme discretionary accrual portfolios, are suggestive of accrual manipulation with a motivation to (successfully) fool capital markets (see Sloan, 1996; Xie, 1997; Collins and Hribar, 2000a, b). Because the opportunism and efficient contracting motivations are likely linked to managers' incentives and firm performance, it behooves researchers to link the development of a discretionary accrual model to firm performance.

Simultaneous with the development of better economic models of discretionary accruals, improved tests using discretionary accruals are required. The demand for better tests arises for at least three reasons. First, research using discretionary accruals frequently examines multi-year performance, whereas methodological studies like Dechow et al. (1995) examine discretionary accrual performance over only one year. Second, test statistics calculated assuming cross-sectional independence might be misspecified especially when a researcher examines performance over multi-year horizons. See Brav (2000), for evidence on bias in tests of long-horizon security-return performance using

[55] Also see Drtina and Largay (1985), Huefner et al. (1989), and Bahnson et al. (1996).

[56] However, Subramanyam (1996b) finds that the coefficient on discretionary accruals is smaller than that on non-discretionary accruals, which is consistent with discretionary accruals being partially opportunistic or that they are less permanent than non-discretionary accruals.

tests that ignore positive cross-sectional dependence (also see Collins and Dent, 1984; Bernard, 1987).

Third, test statistics for multi-year performance might be misspecified because long-horizon performance is likely right skewed (or might exhibit some other form of non-normality) and not all sample firms survive, so there might be a survivor bias. While a *t*-test using a large sample size is quite robust to non-normality, the combination of skewness (or other forms of non-normality) and cross-sectional dependence might contribute to test misspecification. Use of Bootstrap standard errors would be an option that is worth examining to tackle problems arising from both non-normality and survivor biases.

Fourth, the percentage of firms surviving the multi-year test period in a typical research study is considerably smaller than 100%. For example, Teoh et al. (1998c) study a sample of 1514 IPOs for a six-year post-IPO period. In their tests based on the return-on-sales performance measure using a matched-pair sample, the number of firms surviving in the sixth post-IPO year is only 288, i.e., 19% of the original sample (see Teoh et al., 1998c, Table 2, panel C). Such a large reduction in sample size is not unique to the Teoh et al. (1998c) study. Surprisingly, however, there is no systematic evidence in the literature on whether such a large degree of attrition imparts a bias. Moreover, in a matched-pair research design, is the attrition due more often to the lack of survival of test firms or matched control firms? Does this matter?

Finally, evidence in Barber and Lyon (1996) suggests that use of a performance-matched control firm yields unbiased measures of abnormal operating performance in random and non-random samples. Use of performance-matched samples is common in research examining discretionary accruals. However, a systematic study of the specification and power of the tests of discretionary accruals using performance-matched control firm samples is missing in the literature.

4.1.4.5. Capital market research implications. Of direct relevance in this review of the capital markets literature is the question whether capital market studies are affected by problems with the discretionary accrual models. I believe they are. Let me give one example. Consider the hypothesis in Aharony et al. (1993), Friedlan (1994), Teoh et al. (1998b, c), and other studies that in the years leading up to an IPO, management biases financial performance upward through positive discretionary accruals.

First, management's IPO decision is endogenous. It is likely to be taken in the light of superior past and expected future economic performance and a need for cash for investments to meet the anticipated demand for the company's products and services. However, high growth is mean reverting. One reason is that a portion of high growth often results from transitory earnings due to a non-discretionary (or neutral) application of GAAP. Thus, a portion of the subsequent performance reversal is expected and may not be due to discretionary accruals.

Second, the popularly used modified-Jones model treats all of the increase in accounts receivables as discretionary (see Teoh et al., 1998c; Dechow et al., 1995).[57] Thus, legitimate revenue growth on credit is treated as discretionary or fraudulent (see Beneish, 1998). This means, since extreme revenue growth is mean reverting, the modified-Jones model exacerbates the bias in estimated discretionary accrual in the post-IPO period.

The above example suggests the possibility of bias in estimated discretionary accruals (also see Beneish, 1998). More careful tests are warranted to draw definitive conclusions. In addition to documenting evidence of discretionary accruals, researchers correlate the estimated discretionary accruals with contemporaneous and subsequent security returns to test market efficiency. I defer to Section 4.4 a discussion of potential consequences of misspecified discretionary accrual models for inferences about the market's fixation on reported accounting numbers in the context of tests of market efficiency. As noted above, the capital market motivation for accrual manipulation has assumed great importance in the light of evidence suggesting capital markets might be informationally inefficient.

4.2. Alternative accounting performance measures

Starting with Ball and Brown (1968), many studies use association with stock returns to compare alternative accounting performance measures like historical cost earnings, current cost earnings, residual earnings, operating cash flows, and so on. A major motivation for research comparing alternative performance measures is perceived deficiencies in some of the performance measures. For example, Lev (1989), the AICPA Special Committee on Financial Reporting (1994), also known as the Jenkins Committee, and compensation consultants like Stern, Stewart & Company (Stewart, 1991) all argue that the historical cost financial reporting model produces earnings of "low quality" vis-à-vis firm performance.

Researchers' explicit or implicit use of the term "earnings quality" is either in the context of examining whether earnings information is useful to investors for valuation or in evaluating managers' performance. Capital-markets research typically assumes that an accounting performance measure serves

[57] Teoh et al. (1998c, p. 192) describe their estimation of discretionary accruals as follows: "…we first estimate expected current accruals by cross-sectionally regressing current (not total) accruals on only the change in sales revenues. The expected current accruals is calculated using the estimated coefficients in the fitted equation after subtracting the change in trade receivables from the change in sales revenues. The residual of current accruals is the abnormal current accruals".

either the managerial performance measure role or the valuation information role. A managerial performance measure indicates the value added by the manager's efforts or actions in a period, whereas a measure designed to provide information useful for valuation gives an indication of the firm's economic income or the change in shareholders' wealth. The former has a contracting motivation and the latter has an informational or valuation motivation. Although I expect the performance measure with the contracting motivation to be positively correlated with the performance measure designed with a valuation motivation, I do not expect the two to be the same (see discussion below). Therefore, I believe the research design comparing alternative performance measures should be influenced by the assumed choice of the objective.

4.2.1. Review of past research

Early research on association studies (e.g., Ball and Brown, 1968), which is reviewed in Section 3, firmly establishes that earnings reflect some of the information in security prices. However, this early research did not perform statistical tests comparing alternative performance measures, since the primary concern was to ascertain whether there is any overlap between earnings information and the information reflected in security prices.

In the 1980s several studies statistically compared stock returns' association with earnings, accruals, and cash flows. This research includes long-window association studies by Rayburn (1986), Bernard and Stober (1989), Bowen et al. (1986, 1987), and Livnat and Zarowin (1990) and short-window tests by Wilson (1986, 1987). Apart from providing a formal test, their motivation is that previous research used a relatively crude measure of cash flows. They also use more sophisticated expectation models to more accurately isolate the unexpected components of earnings (accruals) and cash flows, because returns in an efficient market only reflect the unanticipated components. The conclusion from most of these studies is that there is incremental information in accruals beyond cash flows.

In this heavily researched area of the relative information content of earnings and cash flows, Dechow's (1994) innovation is in developing cross-sectional predictions about the conditions that make earnings relatively more informative about a firm's economic performance than cash flows (also see Dechow et al., 1998a). Dechow (1994) argues that the emphasis in previous research on unexpected components of the performance measures is misplaced. She views performance measures as primarily serving a contracting purpose. Therefore, she is not interested in a research design that (i) attempts to obtain the most accurate proxy for the anticipated component of a performance measure and (ii) correlates the unanticipated component with stock returns. She argues that managers' compensation contracts almost invariably specify only one summary performance variable (e.g., earnings) and that the contracts rarely specify it in terms of the innovation in the variable (e.g., unexpected earnings). Dechow (1994) therefore forcefully argues that tests evaluating alternative performance measures should seek to identify the best alternative measure, regardless of whether each measure provides incremental association.[58]

4.2.2. Current interest

Recent research examines new performance measures that the FASB requires to be disclosed (e.g., comprehensive income compared to primary earnings per share by Dhaliwal et al., 1999). Alternatively, research compares different measures advocated by compensation consultants like Stern Stewart & Company against earnings (e.g., EVA compared against earnings by Biddle et al., 1997) or measures that have evolved in different industries (e.g., Vincent (1999) and Fields et al. (1998) examine alternative performance measures used by real estate investment trusts, REITs). Evidence from these studies suggests that performance measures that have evolved voluntarily in an unregulated environment (e.g., performance measures in the REIT industry) are more likely to be incrementally informative than those mandated by regulation (e.g., comprehensive income).

4.2.3. Unresolved issues and future research

4.2.3.1. Correlation with returns as a criterion. Research evaluating alternative performance measures frequently uses association with security returns as the criterion to determine the best measure. Going back to Gonedes and Dopuch (1974), a long-standing issue has been whether association with stock returns is the right test. Holthausen and Watts (2001) offer an in-depth analysis of the issue as well. Research evaluating alternative performance measures must recognize that the objective of a particular performance measure should influence the choice of a test. Consider the scenario in which the performance measure and financial statements are geared towards facilitating debt contracts. It is not clear that a performance measure that seeks to measure the change in the value of the firm's growth options, which would be reflected

[58] Dechow (1994) proposes the Vuong (1989) test, which, in substance, is a test of difference between the adjusted explanatory powers of two models, each with one (set of) explanatory variable(s), but the same dependent variable in both the models. Following Dechow (1994), the Vuong (1989) test has become the industry standard. However, there are alternatives to the Vuong test, as developed in Biddle et al. (1995), or the Davidson and MacKinnon (1981) non-nested J-test. Biddle and Seow (1996) claim that the Biddle et al. (1995) test's specification and power are at least as good as or better than the Vuong and J-tests in the presence of heteroskedastic and cross-correlated data (see Dechow et al., 1998b). Another alternative is to compare *r*-squares of two models with or without the same dependent variable using the standard error of the *r*-square as derived in Cramer (1987). This approach is helpful in making comparisons across countries (see for example, Ball et al., 2000) or across industries.

in the change in the firm's market capitalization, is of greatest interest to the firm's debt-holders.

As another example, if the objective of a performance measure is to report the net value of the delivered output in the past period, then it may not necessarily correlate highly with stock returns (see, for example, Lee, 1999; Barclay et al., 1999). The reason is that return for a period reflects the consequences of only the unanticipated component of the period's delivered output and revisions in expectations about future output. Once we accept that highest correlation with returns is neither a necessary nor a sufficient condition in comparing alternative performance measures, then incremental information content of a measure becomes a questionable criterion in evaluating alternative performance measures.

4.2.3.2. Level or unanticipated component of a performance measure. As noted earlier, Dechow (1994) argues that most management compensation contracts use only one accounting performance measure and that the measure is not the unexpected component of the performance variable. She therefore advocates against using the unexpected component of the performance measure. This suggests correlating the level of the performance measure with the level of price. Use of beginning-of-the-period price as a deflator for both dependent and independent variables is motivated by the econometric benefits (e.g., fewer correlated omitted variables, lesser heteroscedasticity and reduced serial correlation) that follow from using price as a deflator (see Christie, 1987). However, Ohlson (1991), Ohlson and Shroff (1992), and Kothari (1992) show that, because price embeds expectations about future performance, it serves not only as a deflator with econometric benefits, but it in effect correlates returns with the unexpected component of the performance measure. Therefore, if the objective is to focus on the total performance measure, not just its unexpected component, then should it be correlated with returns or prices? Correlation with prices indeed correlates the entire performance measure with prices because current price contains information in the surprise as well as the anticipated components of the performance measure (Kothari and Zimmerman, 1995).[59] The down side of correlating prices with a performance measure is that there can be severe econometric problems due to heteroscedasticity and correlated omitted variables (see Gonedes and Dopuch, 1974; Schwert, 1981; Christie, 1987; Holthausen, 1994; Kothari and Zimmerman, 1995; Barth and Kallapur, 1996; Skinner, 1996; Shevlin, 1996; Easton, 1998; Holthausen and Watts, 2001).

[59] For other advantages of using price regressions, also see Lev and Ohlson (1982) and Landsman and Magliolo (1988).

4.2.3.3. Correlation with future cash flows. An important stated objective of financial accounting standards is that financial information should be helpful to users in assessing the amount, timing, and uncertainty of future cash flows (see FASB, 1978). An operational interpretation of this criterion is to compare performance measures on the basis of their correlation with future cash flows. Some recent research examines earnings' correlation with future cash flows (see Finger, 1994; Dechow et al., 1998a; Barth et al., 1999). If a researcher employs correlation with future cash flows as the criterion to evaluate alternative performance measures, then the performance measure's correlation with prices would serve as a complementary test. The benefit of using price is that it contains information about expected future cash flows in an efficient market, which means the vector of expected future cash flows is collapsed into a single number, price. Of course, the trade-off is econometric problems in using price-level regressions (see Holthausen and Watts, 2001) and the effect of discount rates on price, holding cash flows constant.

4.3. Valuation and fundamental analysis research

This section begins with a discussion of the motivation for research on fundamental analysis (Section 4.3.1). Section 4.3.2 explains the role of fundamental analysis as a branch of capital markets research in accounting. Section 4.3.3 describes the dividend discounting, earnings capitalization, and residual income valuation models that are used frequently in accounting research. This section also reviews the empirical research based on these valuation models. Section 4.3.4 reviews the fundamental analysis research that examines financial statement ratios to forecast earnings and to identify mispriced stocks.

4.3.1. Motivation for fundamental analysis

The principal motivation for fundamental analysis research and its use in practice is to identify mispriced securities for investment purposes. However, even in an efficient market there is an important role for fundamental analysis. It aids our understanding of the determinants of value, which facilitates investment decisions and valuation of non-publicly traded securities. Regardless of the motivation, fundamental analysis seeks to determine firms' intrinsic values. The analysis almost invariably estimates the correlation between the intrinsic value and the market value using data for a sample of publicly traded firms. The correlation between market values and intrinsic value might be estimated directly using intrinsic values or indirectly by regressing market values on determinants of the intrinsic value. In this section, I examine the latter. The last step in fundamental analysis is to evaluate the success or failure of intrinsic valuation on the basis of the magnitude of risk-adjusted returns to a trading strategy implemented in periods subsequent to intrinsic valuation. This is a test of market efficiency and I discuss research on this topic in Section 4.4.

4.3.2. Is fundamental analysis accounting research?

To better answer the question whether research on fundamental analysis should be considered as part of accounting research,[60] first compare the information set in financial statements with the set incorporated in market values. Since market value is the discounted present value of expected future net cash flows, forecasts of future revenues, expenses, earnings, and cash flows are the crux of valuation. Lee (1999, p. 3) concludes that the ''essential task in valuation is forecasting. It is the forecast that breathes life into a valuation model''. However, in most economically interesting settings (e.g., IPOs, high-growth firms, and efficiency enhancing and/or synergy motivated mergers), financial statements prepared according to current GAAP are likely to be woefully inadequate as summary statistics for the firm's anticipated future sales, and therefore, for predicted future earnings information that is embedded in the current market values. Therefore, unless current accounting rules are changed dramatically, it is unlikely that financial statements in themselves will be particularly useful or accurate indicators of market values.

The reliability principle that underlies GAAP is often cited as the reason why financial statements do not contain forward-looking information that affects market values. For example, Sloan (1998, p. 135) surmises ''It seems that it is the reliability criterion that makes the difference between the myriad of variables that can help forecast value and the much smaller subset of variables that are included in GAAP.'' While the reliability principle is important, I believe the revenue recognition principle is just as, if not more, important. The revenue recognition principle reduces financial statements to answering the question ''What have you done for me lately?'' Thus, even if future revenue were to be reliably anticipated (at least a big fraction of it can be for many firms), still *none* of it would be recognized. Since market values and changes in those values depend crucially on news about future revenues, current GAAP financial statements are unlikely to be particularly timely indicators of value.

In spite of a lack of timely information in financial statements, I emphasize the following. First, lack of timeliness in itself does not imply a change in GAAP with respect to the revenue recognition principle (or the reliability principle) is warranted; I am merely describing current GAAP. There are economic sources of demand for historical information in financial statements and therefore for the revenue recognition principle, but that is beyond the

[60] This question might be asked of some other research as well (e.g., market efficiency research in accounting). However, my casual observation is that this question is raised more frequently in the context of fundamental analysis.

scope of this review. Second, there is still some information conveyed by financial reports that is not already in the public domain, as seen from the event study research on the information content of accounting. The association study and the earnings response coefficient literatures seek to ascertain whether accounting captures some of the information that affects security prices and how timely are accounting reports in reflecting that information. As discussed earlier, one concern in this literature is whether GAAP and/or managerial discretion render accounting numbers devoid of value-relevant information.

Given the historical nature of information in financial statements, meaningful fundamental analysis research requires accounting researchers to expand the definition of capital markets research to include research using forecasted earnings information for fundamental analysis. Lee (1999) offers a spirited defense of this viewpoint. He concludes (p. 17) "User-oriented research, such as valuation, is definitely a step in the right direction" for accounting researchers. I concur. However, such research has to move beyond reporting descriptive statistics and evidence of the success of trading strategies into proposing theories and presenting empirical tests of the hypotheses derived from the theories.

Students of fundamental analysis and valuation research should have an understanding of alternative valuation models and fundamental analysis techniques both from the perspective of fulfilling the demand for valuation in an efficient market and intrinsic valuation analysis designed to identify mispriced securities. Below I summarize valuation models and empirical research evaluating the models. I follow this up with fundamental analysis research like Ou and Penman (1989a, b), Lev and Thiagarajan (1993), and Abarbanell and Bushee (1997,1998). Whether abnormal returns can be earned using intrinsic value calculation or fundamental analysis is deferred to the next section on tests of market efficiency.

4.3.3. Valuation models

For fundamental analysis and valuation, the accounting literature relies on the dividend-discounting model or its transformation, like the earnings (capitalization) model or the residual income model. An ad hoc balance sheet model is also popular in the literature (e.g., Barth and Landsman, 1995; Barth, 1991, 1994; Barth et al., 1992). It implicitly relies on the assumption that a firm is merely a collection of separable assets whose reported amounts are assumed to be noisy estimates of their market values. The balance sheet model is used primarily to test value relevance in the context of evaluating financial reporting standards, which is not the primary focus of my review (see Holthausen and Watts, 2001). Moreover, when used, the balance sheet model is typically augmented to also include earnings as an additional variable, which makes it empirically similar to the transformed dividend-discounting models. I therefore only discuss the dividend-discounting model and its accounting-variable-based transformations.

4.3.3.1. Dividend-discounting and earnings capitalization models. This model is generally attributed to Williams (1938). The dividend-discounting model defines share price as the present value of expected future dividends discounted at their risk-adjusted expected rate of return. Formally,

$$P_t = \sum_{k=1}^{\infty} \mathrm{E}_t[D_{t+k}] / \prod_{j=1}^{k} (1 + r_{t+j}), \tag{18}$$

where P_t is the share price at time t, $\sum$ is the summation operator, $\mathrm{E}_t[D_{t+k}]$ is the market's expectation of dividends in period $t+k$, $\prod$ is the product operator, and r_{t+j} is the risk-adjusted discount rate that reflects the systematic risk of dividends in period $t+j$.

As seen from Eq. (18), price depends on the forecasts of future dividends and the discount rates for future periods. Gordon (1962) makes simplifying assumptions about both the dividend process and discount rates to derive a simple valuation formula, known as the Gordon Growth model. Specifically, if the discount rate, r, is constant through time and dividends are expected to grow at a constant rate $g<r$, then

$$P_t = \mathrm{E}_t(D_{t+1})/(r-g). \tag{19}$$

Since future dividends can be rewritten in terms of forecasted values of future earnings and future investments, the dividend-discounting model can be reformulated. Fama and Miller (1972, Chapter 2) is an excellent reference for making the basic transition from the dividend-discounting model to an earnings capitalization model.[61] Fama and Miller make several points that are helpful in understanding the drivers of share price. First, value depends on the forecasted profitability of current and forecasted future investments, which means dividend policy per se does not affect firm value, only a firm's investment policy affects value (Miller and Modigliani, 1961). Fama and Miller (1972) entertain dividend signaling to the extent that a change in dividends conveys information about the firm's investment policy and in this sense mitigates information asymmetry.[62]

Second, the growth rate, g, in Eq. (19) depends on the extent of reinvestment of earnings into the firm and the rate of return on the investments. However, reinvestment itself does not increase market value today unless the return on

[61] For a more sophisticated treatment that allows for a changing discount rate, see Campbell and Shiller (1988a, b), Fama (1977, 1996), and Rubinstein (1976).

[62] See Ross (1977), Bhattacharya (1979), Asquith and Mullins (1983), Easterbrook (1984), Miller and Rock (1985), Jensen (1986), and Healy and Palepu (1988), for some of the literature on dividend signaling.

investments in the future exceeds the discount rate or the cost of capital, r. That is, if the expected return on investments in all future periods exactly equals r, then share price is simply X_{t+1}/r, where X_{t+1} is forecasted earnings for the next period. This valuation is obtained regardless of the degree of expansion either through reinvestment or through issuance of new equity. Fama and Miller (1972, p. 90) refer to this valuation as "the capitalized value of the earnings stream produced by the assets that the firm currently holds". Share value will be higher than X_{t+1}/r only if the firm has opportunities to invest in projects that are expected to earn an above-normal rate of return (i.e., return in excess of r).

Third, capitalization of forecasted earnings generally yields incorrect valuation because future earnings also reflect growth due to reinvestment (i.e., plow back of earnings) and investments financed by new issuance of equity. So, the transformation from a dividend-discounting model to an earnings capitalization model requires an adjustment to exclude the effect of reinvestment on future earnings, but include any effect on future earnings as a result of earning an above-normal rate of return (i.e., the effect of growth opportunities on earnings).

Earnings capitalization models are popular in accounting and much of the earnings response coefficient literature relies on them (see Beaver, 1998; Beaver et al., 1980). In earnings response coefficient applications of earnings capitalization models, forecasted earnings are either based on time-series properties of earnings (e.g., Beaver et al., 1980; Kormendi and Lipe, 1987; Collins and Kothari, 1989) or analysts' forecasts (e.g., Dechow et al., 1999). This literature finesses the reinvestment effect on earnings by assuming that future investments do not earn above-normal rates of returns, which is equivalent to assuming a 100% dividend–payout ratio (e.g., Kothari and Zimmerman, 1995). The marginal effect of growth opportunities is accounted for in the earnings response coefficient literature by using proxies like the market-to-book ratio, or through analysts' high forecasted earnings growth. The hypothesis is that such growth opportunities will have a positive marginal effect on earnings response coefficients (e.g., Collins and Kothari, 1989) because growth stocks' prices are greater than X_{t+1}/r, the no-growth valuation of a stock.

4.3.3.2. Residual income valuation models. The Ohlson (1995) and Feltham and Ohlson (1995) residual income valuation models have become hugely popular in the literature.[63] Starting with a dividend-discounting model, the residual income valuation model expresses value as the sum of current book

[63] Several critiques of the Ohlson and Feltham–Ohlson models appear in the literature. These include Bernard (1995), Lundholm (1995), Lee (1999), Lo and Lys (2001), Sunder (2000), and Verrecchia (1998).

value and the discounted present value of expected abnormal earnings, defined as forecasted earnings minus a capital charge equal to the forecasted book value times the discount rate. Ohlson (1995) and others (e.g., Bernard, 1995; Biddle et al., 1997) point out that the concept of residual income valuation has been around for a long time.[64] However, Ohlson (1995) and Feltham and Ohlson (1995) deserve credit for successfully reviving the residual income valuation idea, for developing the ideas more rigorously, and for impacting the empirical literature.

The Ohlson (1995) model imposes a time-series structure on the abnormal earnings process that affects value. The linear information dynamics in the model (i) specifies an autoregressive, time-series decay in the current period's abnormal earnings, and (ii) models "information other than abnormal earnings" into prices (Ohlson, 1995, p. 668). The economic intuition for the autoregressive process in abnormal earnings is that competition will sooner or later erode above-normal returns (i.e., positive abnormal earnings) or firms experiencing below-normal rates of returns eventually exit. The other information in the Ohlson model formalizes the idea that prices reflect a richer information set than the transaction-based, historical-cost earnings (see Beaver et al., 1980).

The Feltham and Ohlson (1995) model retains much of the structure of the Ohlson (1995) model except the autoregressive time-series process. The Feltham–Ohlson residual income valuation model expresses firm value in terms of current and forecasted accounting numbers, much like the dividend-discounting model does in terms of forecasted dividends or net cash flows. Forecasted abnormal earnings can follow any process and they reflect the availability of other information. This feature enables the use of analysts' forecasts in empirical applications of the Feltham–Ohlson model and is sometimes claimed to be an attractive feature of the valuation model vis-à-vis the dividend-discounting model. For example, in comparing the applications of the dividend-discounting model to the residual income valuation model, Lee et al. (1999) conclude that "practical considerations, like the availability of analysts' forecasts, makes this model easier to implement" than the dividend-discount model (also see Bernard, 1995, pp. 742–743). The illusion of ease arises because, assuming clean surplus, one can value the firm directly using abnormal earnings forecasts, rather than backing out net cash flows from pro forma financial statements. Abnormal earnings forecasts are the difference between (analysts') forecasts of earnings and a capital charge,

[64] The predecessor papers of the residual valuation concept include Hamilton (1777), Marshall (1890), Preinreich (1938), Edwards and Bell (1961), Peasnell (1982), and Stewart (1991).

i.e., $E_t[X_{t+k} - r\,BV_{t+k-1}]$. Using abnormal earnings forecasts, the share price at time t, P_t, is expressed as[65]

$$P_t = BV_t + \sum_{k=1}^{\infty} E_t[X_{t+k} - r\,BV_{t+k-1}]/(1+r)^k, \tag{20}$$

where BV_t is the book value of equity at time t, $E_t[.]$ the expectation operator where the expectation is based on information available at time t, X_t the earnings for period t, and r the risk-adjusted discount rate applicable to the equity earnings (or cash flows).

While Eq. (20) expresses price in terms of forecasted book values and abnormal earnings, those forecasts have precisely the same information as forecasts of dividends, which are implicit in analysts' forecasts of earnings. Stated differently, the residual income valuation model is a transformation of the dividend-discounting model (see Frankel and Lee, 1998; Dechow et al., 1999; Lee et al., 1999).

In addition to the apparent ease of implementation, Bernard (1995) and others argue that another appealing property of the residual income valuation model is that the choice of accounting method does not affect the model's implementation. If a firm employs aggressive accounting, its current book value and earnings would be high, but its forecasted earnings will be lower and the capital charge (or normal earnings) would be higher. Therefore, lower forecasted future abnormal earnings offset the consequences of aggressive accounting that appear in current earnings. Unfortunately, the elegant property that the effect of the management's choice of accounting methods on earnings in one period is offset by changes in forecasted earnings has three unappealing consequences. First, it renders the Feltham–Ohlson model devoid of any accounting content, just as a dividend-discounting model is not particularly helpful for financial reporting purposes. The accounting content is lost because the model does not offer any guidance or predictions about firms' choice of accounting methods or properties of accounting standards, notwithstanding the frequent use of the term conservative and unbiased accounting in the context of the residual income model. This point is discussed in detail in Lo and Lys (2001), Sunder (2000), Verrecchia (1998), and Holthausen and Watts (2001).

Second, from a practical standpoint of an analyst, even though reduced future abnormal earnings offset the effect of aggressive accounting methods, an analyst must forecast future abnormal earnings by unbundling current earnings into an aggressive-accounting-method-induced component and remaining regular earnings.

[65] The pricing equation is misspecified in the presence of complex, but routinely encountered, capital structures that include preferred stock, warrants, executive stock options etc. I ignore such misspecification in the discussion below.

Third, the interpretation of abnormal earnings is clouded. Some researchers interpret expected abnormal earnings as estimates of economic rents (Claus and Thomas, 1999a, b; Gebhardt et al., 1999). However, the choice of accounting methods mechanically affects the estimates of expected abnormal earnings, so those estimates by themselves are not an indication of economic rents. For example, a firm choosing the pooling of interest method of accounting for a merger will have higher expected "abnormal" earnings compared to an otherwise identical firm that uses the purchase method of accounting for mergers. In contrast, America Online is expected to report an amortization charge of approximately $2 billion per year for next 25 years as a result of its merger with Time Warner, which will be accounted for as a purchase transaction.

4.3.3.3. Empirical applications and evaluation of valuation models. All valuation models make unrealistic assumptions. This feature is common to most theoretical models, like the Ohlson (1995) model that imposes a particular structure on the abnormal earnings process and other information. It is fruitless to criticize one or more of these models on the basis of the realism of the assumptions.[66] Assuming efficient capital markets, one objective of a valuation model is to explain observed share prices. Alternatively, in an inefficient capital market, a good model of intrinsic or fundamental value should predictably generate positive or negative abnormal returns. Therefore, in the spirit of positive science, it is worthwhile examining which of these models best explains share prices and/or which has the most predictive power with respect to future returns. In this section, I evaluate models using the former criteria, whereas the next section focuses on the models' ability to identify mispriced securities.

Several recent studies compare the valuation models' ability to explain cross-sectional or temporal variation in security prices (see Dechow et al., 1999; Francis et al., 1997, 1998; Hand and Landsman, 1998; Penman, 1998; Penman and Sougiannis, 1997, 1998; Myers, 1999).[67] Two main conclusions emerge from these studies. First, even though the residual income valuation model is identical to the dividend-discounting model, empirical implementations of the dividend-discounting model yield value estimates do a much poorer job

[66] Lo and Lys (2001), in the spirit of Roll's (1977) critique of the CAPM, argue that the Feltham and Ohlson (1995) and Ohlson (1995) models are not testable. Any test of the models is a joint test of the model (or the model's assumptions) and that the model is descriptive of the market's pricing of stocks.

[67] In an influential study, Kaplan and Ruback (1995) evaluate discounted cash flow and multiples approaches to valuation. Since they do not examine earnings-based valuation models, I do not discuss their study.

of explaining cross-sectional variation in market values than earnings capitalization models (e.g., Francis et al., 1997; Penman and Sougiannis, 1998). Second, the traditional implementation of the dividend-discounting model by capitalizing analysts' forecasts of earnings is just about as successful as the residual income valuation model (e.g., Dechow et al., 1999; Lee et al., 1999; Liu et al., 2000). I discuss and explain the two conclusions below.

The poor showing of the dividend-discounting model, the first conclusion stated above, appears to be a consequence of inconsistent application of the model in current research (see Lundholm and O'Keefe (2000) for an in-depth discussion). Consider the implementation of the model in Penman and Sougiannis (1998) and Francis et al. (1997) with a five-year horizon for dividend forecasts plus terminal value. The dividend forecasts for the five years generally account for a small fraction of current market value. This is not surprising because dividend yield is only a few percent. The terminal value is estimated assuming a steady-state growth in dividends beyond year five. It is common to assume the steady-state growth rate, g, to be either zero or about 4%. Both Penman and Sougiannis (1998) and Francis et al. (1997) report results using $g = 0$ or 4% in perpetuity.

The inconsistent application of the dividend-discount model arises because if $g = 0$, then the forecasted dividend in period 6 should be the earnings for period 6. FD_{t+6} should equal forecasted earnings for year 6 because once the no-growth assumption is invoked, the need for investments diminishes compared to that in the earlier growth periods. That is, there is no longer a need to plow earnings back into the firm to fund investments for growth. Investments roughly equal to depreciation would be sufficient to maintain zero growth in steady state. Therefore, cash available for distribution to equityholders will approximate earnings, i.e., the payout ratio will be 100%. Thus, assuming a zero growth in perpetuity will typically result in a huge permanent increase in dividends from year 5 to year 6, with dividends equal to earnings in years 6 and beyond. Instead, both Penman and Sougiannis (1998) and Francis et al. (1997) use $FD_{t+5}(1 + g)$, where FD_{t+5} is the forecasted dividend for year 5. Naturally, they find that dividend capitalization models perform poorly.[68] However, if the implications of the zero-growth assumption are applied consistently to the dividend discounting and the residual income valuation models, the fundamental value estimate from both models will be identical.[69] Similar logic applies to other growth rate assumptions.

Francis et al. (1997, Tables 3 and 4) do report results using the dividends = earnings assumption to calculate the terminal value, but their

[68] Additional misspecification is possible because earnings are eventually paid to both common and preferred stockholders, but the abnormal earnings valuation model is implemented without full consideration to preferred shareholders.

[69] See Lundholm and O'Keefe (2000) and Courteau et al. (2000) for further details on this point.

approach is confounded by the fact that they use Value Line's five-year-ahead forecast of the price–earnings multiple. Ironically, either because of the implicit assumption of dividends = earnings or because Value Line is skilled in forecasting the future price–earnings multiple, the value estimates in Francis et al. that implicitly use the dividends = earnings assumption for terminal value, are more accurate than all other models. The former explanation is more likely because otherwise a trading strategy based on the Value Line forecasts would yield huge abnormal returns.

The second conclusion from the empirical literature on valuation models is that simple earnings capitalization models with ad hoc and/or restrictive assumptions do as well as the more rigorous residual income valuation models in explaining cross-sectional variation in prices. The economic intuition underlying the residual income valuation model is appealing. In the spirit of the model, empirical applications generally assume that above-normal rates of returns on investments will decay and there is a careful attempt to account for the wealth effects of growth through reinvestment. Still, Dechow et al. (1999) find a simple model that capitalizes analyst's next period earnings forecast in perpetuity (i.e., a random walk in forecasted earnings and 100% dividend payout, both ad hoc assumptions) does better than the residual income valuation model.[70,71] What explains this puzzle?

To understand the lack of improved explanatory power of the more sophisticated valuation models, consider the variance of the independent variable, forecasted earnings. Forecasted earnings have two components: normal earnings (= the capital charge) and expected abnormal earnings. Since the present value of normal earnings is the book value, which is included as an independent variable, the normal earnings component of forecasted earnings serves as an error in the independent variable that uses forecasted earnings to explain prices. However, for annual earnings data, most of the variance of forecasted earnings is due to expected abnormal earnings. Use of a constant discount rate across the sample firms further reduces the variance accounted for by normal earnings in the residual income valuation model applications (Beaver, 1999).[72] Therefore, in spite of the fact that forecasted earnings are contaminated by normal earnings, which contributes to misestimated

[70] The improved explanatory power of fundamental values estimated using analysts' forecasts vis-à-vis historical earnings information highlights the important role of other information that influences expectations of future earnings beyond the information in past earnings (e.g., Beaver et al., 1980).

[71] Kim and Ritter (1999) find that IPOs are best valued using forecasted one-year-ahead earnings per share and Liu et al. (2000) present similar evidence comparing multiples of forecasted earnings against more sophisticated valuation models.

[72] However, substituting a firm-specific discount rate is unlikely to make a big difference. Use of firm-specific discount rate is not without a cost: discount rates are notoriously difficult to estimate and existing techniques estimate the rates with a large standard error (see Fama and French, 1997).

persistence in the context of valuation, the resulting errors-in-variables problem is not particularly serious. The variance of the measurement error is small relative to the signal variance, i.e., the variance of forecasted earnings minus normal earnings. In addition, any error in estimating the cost of capital employed to calculate normal earnings diminishes the benefit of adjusting forecasted earnings for normal earnings.

While controlling for normal earnings is not helpful in the above context, as an economic concept it rests on solid grounds. The preceding discussion is not intended to discourage the use of discount rates or risk adjustment. It simply highlights one context where the payoff to the use of risk adjustment is modest. Over long horizons, risk adjustment is potentially more fruitful.

There are at least three other empirical attempts (Myers, 1999; Hand and Landsman, 1998, 1999) to test Ohlson's (1995) linear information dynamics valuation model. All three studies as well as Dechow et al. (1999) find evidence inconsistent with the linear information dynamics. I do not think one learns much from rejecting the linear information dynamics of the Ohlson model. Any one-size-fits-all description of the evolution of future cash flows or earnings for a sample of firms is likely to be rejected. While an autoregressive process in residual income as a parsimonious description is economically intuitive, there is nothing in economic theory to suggest that all firms' residual earnings will follow an autoregressive process at all stages in their life cycle. A more fruitful empirical avenue would be to understand the determinants of the autoregressive process or deviations from that process as a function of firm, industry, macroeconomic, or international institutional characteristics. The conditional estimation attempts in Fama and French (2000) and Dechow et al. (1999) to parameterize the autoregressive coefficient (discussed in Section 4.1.2) are an excellent start.

4.3.3.4. Residual income valuation models and discount rate estimation. An emerging body of research uses the dividend-discounting model and the Feltham–Ohlson residual income valuation model to estimate discount rates. This research includes papers by Botosan (1997), Claus and Thomas (1999a, b), and Gebhardt et al. (1999). The motivation for this research is twofold.

First, there is considerable debate and disagreement among academics and practitioners with respect to the magnitude of the market risk premium (see Mehra and Prescott, 1985; Blanchard, 1993; Siegel and Thaler, 1997; Cochrane, 1997) and whether and by how much it changes through time with changing riskiness of the economy (Fama and Schwert, 1977; Keim and Stambaugh, 1986; Fama and French, 1988; Campbell and Shiller, 1988a; Kothari and Shanken, 1997; Pontiff and Schall, 1998). The market risk premium is the difference between the expected return on the market portfolio of stocks and the risk-free rate of return. The historical average realized risk premium has been about 8% per year (Ibbotson Associates, 1999).

Second, the cost of equity capital of an individual firm is a function of both the market risk premium and its relative risk (e.g., beta of the equity in the context of the CAPM). In spite of a vast body of research in finance and economics, the dust has still not settled on the set of priced risk factors. In addition, estimates of a security's sensitivity to priced factors, i.e., estimates of relative risks, are notoriously noisy. Therefore, the state-of-the-art estimate of cost of equity (relative risk times the risk premium plus the risk-free rate) is extremely imprecise (see Fama and French, 1997; Elton, 1999).

Research that uses the Feltham–Ohlson model to estimate equity discount rates attempts to improve upon the cost of equity estimates obtained using the traditional methods in finance. The empirical approach to estimating the cost of equity using the Feltham–Ohlson model is quite straightforward. It seeks to exploit information in analysts' forecasts and current prices, rather than that in the historical time series of security prices, to estimate discount rates. Gebhardt et al. (1999) note that practitioners have long attempted to infer discount rates from analysts' forecasts (e.g., Damodaran, 1994; Ibbotson, 1996; Gordon and Gordon, 1997; Madden, 1998; Pratt, 1998), but that the same approach is not popular among academics.

In an efficient market, price is the discounted present value of the sum of the book value and the discounted present value of the forecasted residual income stream. Analysts' forecasts of earnings and dividend–payout ratios are used to forecast the residual income stream. The cost of equity then is defined as the discount rate that equates the price to the fundamental value, i.e., the sum of book value and the discounted residual income stream. An analogous approach can be employed to infer discount rates using forecasts of future dividends.

Since the information used in the residual income valuation model is identical to that needed for the dividend-discount model, discount rates backed out of a dividend-discount model should be exactly the same as those from the residual income valuation model. However, studies using earnings-based valuation models to back out market risk premiums or equity discount rates claim that earnings-based valuation models yield better estimates of discount rates than using the dividend-discount model. For example, Claus and Thomas (1999a, b, p. 5) state: "Although it is isomorphic to the dividend present value model, the abnormal earnings approach uses other information that is currently available to reduce the importance of assumed growth rates, and is able to narrow considerably the range of allowable growth rates by focusing on growth in rents (abnormal earnings), rather than dividends."

The striking conclusion from the Claus and Thomas (1999a, b) and Gebhardt et al. (1999) studies is that their estimate of the risk premium is only about 2–3%, compared to historical risk premium estimated at about 8% in the literature. In line with the small risk premium, the studies also find that cross-sectional variation in the expected rates of return on equity that would capture differences in firms' relative risks is also quite small. However, Gebhardt et al. (1999) show that the variation in their estimates of costs of equity is correlated with many of the traditional measures of risk. This increases our confidence in the estimated discount rates.

The attempts to estimate the market risk premium and costs of equity address an important question. The intuition for why the estimated discount rates are less dispersed is that rational forecasts are less variable than actual data.[73] Therefore, estimates of discount rates using forecast data are also expected to be less volatile than those obtained using ex post data. While it is appealing to use forecast data to estimate discount rates, there is also a downside, and hence, I think it is premature to conclude that the risk premium is as low as 2–3% for at least two reasons.

First, it is possible that forecasted growth, especially the terminal perpetuity growth rate, used in the abnormal earnings valuation model is too low. The lower the forecasted growth, mechanically the lower the discount rate must be in order for the price-equal-to-the-fundamental-value identity to hold.

Second, the earnings-based fundamental valuation approach used to estimate discount rates assumes market efficiency. However, the same approach is also employed to conclude that returns are predictable and that the market is currently overvalued (e.g., Lee et al. (1999), and many other academics and practitioners). That is, assuming forecasts are rational and accurate estimates of discount rates are used, Lee et al. and others conclude that equities are predictably mispriced. Ironically, another body of research uses the residual income valuation model to conclude that analysts' forecasts are biased, and that the market is naively fixated on analysts' forecasts, and therefore returns are predictable (e.g., Dechow et al., 1999, 2000).

In summary, of the three variables in the valuation model—price, forecasts, and discount rates—two must be assumed correct to solve for the third. Using different combinations of two variables at a time, research has drawn inferences about the third variable. Because the assumptions in the three sets of research are incompatible, the conclusions are weak. Research on stock mispricing relative to fundamental valuation, properties of analysts' forecasts, and market's naïve reliance on analysts' forecasts provides evidence on potential settings where the model fails or the market's pricing is inconsistent with that based on the valuation model. That is, the evidence is inconsistent with the joint hypothesis of the model and market efficiency. These are tests of market efficiency that I review in the next section. A fruitful avenue for future research would be to provide further evidence on the relation between estimated discount rates and subsequent returns (see Gebhardt et al., 1999).

[73] See Shiller (1981) for using this argument in the context of testing the rationality of the stock market. Shiller's work led to a huge literature in finance and economics on examining whether stock markets are excessively volatile.

4.3.4. Fundamental analysis using financial ratios

This stream of research has two objectives. First, it uses information in financial ratios to forecast future earnings more accurately than using other methods (e.g., time-series forecasts and/or analysts' forecasts). Second, it identifies mispriced securities. The underlying premise is that the financial-ratio-based model predicts future earnings better than the alternatives and this superior predictive power is not reflected in current share prices (i.e., market are inefficient).

4.3.4.1. Earnings prediction. There is a long-standing interest in earnings prediction in the accounting literature (see Section 4.1.2). Below I focus on forecasts of future earnings and accounting rates of returns using financial ratios. There is a long history of practitioners and academics interpreting univariate ratios like the price–earnings multiple and price-to-book ratio as leading indicators of earnings growth (see, for example, Preinreich, 1938; Molodovsky, 1953; Beaver and Morse, 1978; Cragg and Malkiel, 1982; Peasnell, 1982; Penman, 1996, 1998; Ryan, 1995; Beaver and Ryan, 2000; Fama and French, 2000). The economic logic for the predictive power of price–earnings and price-to-book ratios with respect to future earnings is straightforward. Price is the capitalized present value of a firm's expected future earnings from current as well as future expected investments, whereas current earnings only measure the profitability of realized revenues from current and past investments. Price thus has information about the firm's future profitability, which contributes to the predictive ability of price–earnings and price-to-book ratios with respect to future earnings growth. In addition to the predictive ability stemming from the forward-looking information in prices about future earnings, the ratio-based earnings prediction literature also examines the role of transitory earnings and accounting methods in forecasting earnings.

Ou and Penman (1989a, b) initiated rigorous academic research on earnings prediction based on a multivariate analysis of financial ratios. The main idea is to examine whether combining information in individual ratios about future earnings growth can yield more accurate forecasts of future earnings. Ou and Penman use statistical procedures to reduce a large number of financial ratios to a subset that is most effective in forecasting future earnings. In holdout samples, they show that the forecasting model using the subset of the ratios outperforms time-series models of annual earnings in terms of forecast accuracy and contemporaneous association with stock returns.

Several extensions of Ou and Penman's earnings prediction research appear in the literature. For example, the innovation in Lev and Thiagarajan (1993) and Abarbanell and Bushee (1997, 1998) is that, unlike Ou and Penman (1989a, b), they use "*a priori* conceptual arguments to study any of their" ratios

(Abarbanell and Bushee, 1998, p. 22). They demonstrate that the earnings prediction signals in variables like growth in accounts receivables relative to sales growth and gross margin rate are incrementally associated with contemporaneous stock returns and are significantly helpful in predicting future earnings.

Other ratio-based earnings prediction approaches typically seek to exploit the information in prices about future earnings. For example, Penman (1996, 1998) develops techniques that combine the information in price–earnings ratios and price-to-book ratios that is superior to using any one ratio to forecast future earnings or the return on equity. Presence of transitory earnings contaminates price–earnings ratio as an indicator of growth. This weakness in price–earnings ratios is in part remedied by also using the price-to-book ratio, which signals growth in book equity and future returns on equity and because it is relatively unaffected by current transitory earnings. Penman (1998) presents empirical evidence on the benefits of combining the information in price–earnings and price-to-book ratios for earnings prediction. Specifically, using historical data, Penman (1998) estimates optimal weights on price–earnings and price-to-book ratios to forecast one- and three-year-ahead earnings. The evidence suggests moderate forecasting gains from optimal weighting of information in the two ratios.

Another example of ratio-based earnings prediction research is Beaver and Ryan (2000). They decompose "bias" and "lag" components of the price-to-book ratios to forecast future book returns on equity. Bias in the book-to-market ratio arises when a firm uses conservative accounting such that its book value of equity is expected to be persistently below the share price. Beaver and Ryan define lag as the time it takes for book values to catch up with stock prices in reflecting a given economic gain or loss. Consistent with economic intuition, Beaver and Ryan (2000) predict an inverse relation between bias and future return on equity, i.e., high book-to-market ratio forecasts low earnings growth. The horizon over which bias is helpful in predicting the return on equity depends on lag or the speed with which book values adjust to reflect an economic gains and losses. If the lag is short-lived, then the prediction horizon is also short. Evidence in Beaver and Ryan is broadly consistent with their predictions.

A final example of ratio-based earnings prediction research is Penman and Zhang (2000). They study the interaction of changes in growth and conservative accounting practices like expensing of research and development and marketing costs. The interaction is helpful in forecasting future earnings because extreme changes in growth are mean reverting and the effect is noticeable in the case of firms that are intensive in research and development and marketing or LIFO inventory reserves, etc. They predict and find that firms exhibiting extreme changes in research and development and marketing expenditures and LIFO reserves exhibit a rebound in their return on net assets.

Penman and Zhang label this phenomenon as the predictive ability of earnings quality.

4.3.4.2. Summary. The ratio-based earnings prediction literature focuses on the forecasting power of financial ratios with respect to future earnings. Empirical evidence is generally consistent with the ratios' ability to predict earnings growth. These models, however, rarely outperform analysts' forecasts of earnings, especially forecasts over long horizons. The primary interest in the ratio-based forecasting models is the lure of above-normal investment returns from simple, cheaply implementable models.

4.3.4.3. Return prediction. A large number of the ratio-based earnings prediction studies also examine whether trading strategies that exploit information about earnings growth earn above-normal rates of return. For example, Ou and Penman (1989a, b), Lev and Thiagarajan (1993), Abarbanell and Bushee (1998), Piotroski (2000), and Penman and Zhang (2000) demonstrate that the information in the earnings prediction signals is helpful in generating abnormal stock returns (see the next section), which suggests market inefficiency with respect to financial statement information.

4.4. Tests of market efficiency: overview

In this section, I discuss the empirical literature in accounting on tests of market efficiency. The review is deliberately narrowly focused on empirical issues. I do not examine market efficiency topics like the definition of market efficiency and tests of mean reversion in aggregate stock returns. These topics are important and essential for understanding the market efficiency research in accounting, but are beyond the scope of my review. Fortunately, several excellent surveys of the market efficiency literature exist. I encourage interested researchers to read Ball (1978, 1992, 1994), Fama (1970, 1991, 1998), LeRoy (1989), MacKinlay (1997), and Campbell et al. (1997).

Market efficiency tests in the financial accounting literature fall into two categories: event studies and cross-sectional tests of return predictability (see Fama, 1991). Event studies examine security price performance either over a short window of few minutes to a few days (short-window tests) or over a long horizon of one-to-five years (long-horizon tests). Section 4.4.1 discusses the attractive features as well as research design and data problems in drawing inferences about market efficiency based on short- and long-window event studies. Section 4.4.2 surveys the empirical literature on event studies. I review event studies from the post-earnings-announcement drift literature in Section 4.4.2.1, studies of market efficiency with respect to accounting methods and method changes and functional fixation in Section 4.4.2.2, and studies on long-horizon returns to accrual management and analyst forecast optimism in Section 4.4.2.3.

Cross-sectional tests of return predictability (or anomalies studies) examine whether the cross section of returns on portfolios formed periodically using a specific trading rule are consistent with a model of expected returns like the CAPM. These are tests of the joint hypothesis of market efficiency and the equilibrium expected rate of return model employed by the researcher. Section 4.4.3 reviews the literature on cross-sectional tests of return predictability. Section 4.4.3.1 summarizes results of tests of the market's (mis)pricing of earnings yields and accounting accruals and Section 4.4.3.2 discusses findings from tests of long-horizon returns to fundamental analysis.

4.4.1. Issues in drawing inferences from event studies

Event studies are tests of market efficiency. They test the impact, speed, and unbiasedness of the market's reaction to an event. In an efficient capital market, a security's price reaction to an event is expected to be immediate and subsequent price movement is expected to be unrelated to the event-period reaction or its prior period return. The modern literature on event studies originates with Fama et al. (1969) and Ball and Brown (1968), who examine security return behavior surrounding stock splits and earnings announcements.[74] Since then hundreds of event studies have been conducted in the legal, financial economics, and accounting literatures. There are two types of event studies: short-window event studies and long-horizon post-event performance studies. The inferential issues for the short-window event studies are straightforward, but they are quite complicated for the long-horizon performance studies. I discuss the salient issues of each type of study below.

4.4.1.1. Short-window event studies. Short-window event studies provide relatively clean tests of market efficiency, in particular when sample firms experience an event that is not clustered in calendar time (e.g., earnings announcement day returns or merger announcement day returns). The evidence from short-window event studies is generally consistent with market efficiency. The evidence using intra-day, daily, and weekly returns to wide-ranging events like earnings announcements, accounting irregularities, mergers, and dividends suggests the market reacts quickly to information releases. In some cases, the reaction appears incomplete and there is a drift, which contradicts market efficiency.

In a short-window test, researchers face few problems of misestimating the expected return over the short event window (e.g., Brown and Warner, 1985). Expected market return per day is about 0.05%, so the misestimation in a

[74] The first published event study is Dolley (1933). Like Fama et al. (1969), it examines the event-period price effects of stock splits.

security's return due to risk mismeasurement (e.g., Scholes and Williams, 1977; Dimson, 1979) in most cases is likely to be less than 0.01–0.02% per day.[75] This is small relative to an average abnormal return of 0.5% or more that is commonly reported in event studies.[76]

One concern in assessing the significance of the average market reaction in the event period is that the event might induce an increase in return variability (e.g., Beaver (1968) reports increased return variability around earnings announcements). Tests that fail to account for the increased return variability excessively reject the null hypothesis of zero average abnormal return (e.g., Christie, 1991; Collins and Dent, 1984). Use of the cross-sectional standard deviation of event period abnormal returns greatly mitigates the potential problem arising from an event-induced increase in return variability.

4.4.1.2. Long-horizon event studies. A long-horizon event study tests whether one-to-five-year returns following an event are systematically non-zero for a sample of firms. These studies assume that the market can overreact or underreact to new information and that it can take a long time to correct the misvaluation because of continued apparently irrational behavior and frictions in the market. The source of underreaction and overreaction is human judgment or behavioral biases in information processing. There is a systematic component to the behavioral biases so that in the aggregate the pricing implications of the biases do not cancel out, but manifest themselves in security prices deviating systematically from those implied by the underlying fundamentals. Several recent studies model the price implications of human behavioral biases to explain apparent long-horizon market inefficiency (e.g., Barberis et al., 1998; Daniel et al., 1998; Hong and Stein, 1999; DeBondt and Thaler, 1995; Shleifer and Vishny, 1997).

Recent evidence in the finance and accounting literature suggests huge apparent abnormal returns spread over several years following well-publicized events like initial public offerings, seasoned equity issues, and analysts' long-term forecasts. Collectively this research poses a formidable challenge to the efficient markets hypothesis. However, before we conclude that markets are grossly inefficient, it is important to recognize that long-horizon event studies suffer from at least three problems: risk misestimation, data problems, and the lack of a theory of market inefficiency as the null hypothesis. For an in-depth

[75] An implicit assumption is that the event does not cause the sample securities' beta risks to increase by an order of magnitude. See Ball and Kothari (1991) for stocks' daily beta risk in event time over 21 days centered around earnings announcements and Brennan and Copeland (1988) for evidence on risk changes around stock split announcements.

[76] The real danger of failing to reject the null hypothesis of no effect when it is false (i.e., a type II error) in a short-window event study stems from uncertainty about the event day (see Brown and Warner, 1985).

discussion of conceptual and empirical problems in drawing inferences from long-horizon tests of market efficiency, see Barber and Lyon (1997), Kothari and Warner (1997), Fama (1998), Lyon et al. (1999), and Loughran and Ritter (2000).

4.4.1.2.1. Risk measurement and risk factors. Misestimation of risk can produce economically and statistically significant magnitudes of apparent abnormal returns because the post-event return measurement period is long. Risk misestimation can arise because sensitivity to a risk factor is measured incorrectly or because a relevant risk factor is omitted from the model of expected returns. Random errors in estimating stocks' risks are not a serious problem because almost all the studies examine performance at a portfolio level.[77] Risk misestimation is a problem, however, if the misestimation is correlated across the stocks in a portfolio. This scenario is plausible because of the endogenous nature of economic events, i.e., the subset of firms experiencing an economic event is not random with respect to the population of firms. Typically unusual performance precedes an event and risk changes are associated with past performance (e.g., French et al., 1987; Chan, 1988; Ball and Kothari, 1989; Ball et al., 1993, 1995).

With regards to potential bias in estimated abnormal performance because of omitted risk factors, the finance literature has not quite settled on the risk factors priced in stock valuations as well as the measurement of the risk factors. Thus, for potential reasons of both risk mismeasurement and omitted risk factors, misestimation of securities' expected returns in a long-horizon event study is a serious concern. Stated differently, discriminating between market inefficiency and a bad model of expected returns is difficult in long-horizon event studies.

4.4.1.2.2. Data problems. A variety of data problems afflict long-horizon event studies and make it difficult to draw definitive inferences about market efficiency. (i) Survivor and data-snooping biases can be serious in long-horizon performance studies, especially when both stock-price and financial accounting data are used in the tests, as is common in many long-horizon market efficiency tests in accounting (see Lo and MacKinlay, 1990; Kothari et al., 1995, 1999b). Since many studies analyze financial and return data for the surviving subset of the sample firms, inferential problems arise due to potential survivor biases in the data. It is not uncommon to observe 50% or more of the initial sample of firms failing to survive the long horizon examined in the study.

(ii) Problems of statistical inferences arise in long-horizon performance studies. Sample firms' long-horizon returns tend to be cross-correlated even if

[77] Random errors in risk estimation and thus in abnormal return estimation can be a serious problem if the researcher correlates estimated abnormal returns with firm-specific variables like financial data and proxies for trading frictions. The random error weakens the correlation and thus the test's power.

the event is not perfectly clustered in calendar time (Bernard, 1987; Brav, 2000). Long-horizon return data are highly right skewed, which poses problems in using statistical tests that assume normality (see Barber and Lyon, 1997; Kothari and Warner, 1997; Brav, 2000). Because of the statistical properties of return data, the literature raises questions whether the appropriate return measure is buy-and-hold returns or monthly returns cumulated over a long period (see Roll, 1983; Blume and Stambaugh, 1983; Conrad and Kaul, 1993; Fama, 1998; Mitchell and Stafford, 2000). Loughran and Ritter (2000) discuss additional inference problems that arise because the timing of events is endogenous. For example, we witness IPO waves either because there are periods of good investment opportunities and/or because issuers believe the market is overvalued. As a result, it is possible that misvalued event firms contaminate the benchmark portfolios (e.g., market, size, and book-to-market portfolios) and inferences from market efficiency tests are flawed.

(iii) Skewness of financial variables (returns and or earnings) coupled with non-randomness in data availability and survivor biases can produce apparent abnormal performance and a spurious association between ex ante information variables like analysts' growth forecasts and ex post long-horizon price performance (see Kothari et al., 1999b). As noted above, in long-horizon studies, it is not uncommon to encounter data availability for less than 50% of the initial sample either because post-event financial data are unavailable or because firms do not survive the post-event long horizon. If this decline in sample size is not random with respect to the original population of firms experiencing an event, then inferences based on the sample examined by a researcher can be erroneous. Kothari et al. (1999b) present evidence to suggest both skewness in financial data and non-random survival rates in samples drawn from CRSP, Compustat, and IBES databases.

Long-horizon market inefficiency studies generally report larger magnitudes of abnormal returns for subsets of firms. These subsets of firms often consist of small market capitalization stocks, stocks that trade at low prices with relatively large proportionate bid–ask spreads, stocks that are not traded frequently (i.e., illiquid stocks), and stocks that are not closely followed by analysts and other information intermediaries in the market (Bhushan, 1994). The pronounced indication of market inefficiency among stocks with high trading frictions and less information in the market is interpreted as prices being set as if the market naïvely relies on biased analyst forecasts. While this is possible, there is at least one alternative explanation. The data problems discussed above are likely more prevalent in samples where we observe the greatest degree of apparent inefficiency. Careful attention to data problems will help discriminate between competing explanations for evidence that currently is interpreted as market inefficiency.

4.4.1.3. A theory of market inefficiency and specification of the null hypothesis. In addition to potential risk measurement and data problems discussed above, there is another challenge in drawing definitive conclusions about market efficiency. While much of the research concludes market inefficiency, further progress will be made if researchers develop a theory that predicts a particular return behavior and based on that theory design tests that specify market inefficiency as the null hypothesis. Researchers should then design powerful tests that fail to reject that null hypothesis. An excellent example of such research is Bernard and Thomas (1990), who specify stock-price behavior under a naïve earnings expectation model as well as a sophisticated earnings expectation model. However, there is still a need for a well-developed theory of naïve investor behavior that can be subjected to empirical testing in other contexts or a theory that would be helpful in explaining observed return behavior in contexts such as those discussed below.

Currently the null of market efficiency is rejected regardless of whether positive or negative abnormal return (i.e., under- or over-reaction) is observed. A theory of market inefficiency should specify conditions under which market under- and over-reaction is forecasted. For example, why does the market overreact to accruals in annual earnings (as in Sloan, 1996), but underreact to quarterly earnings information as seen from the post-earnings announcement drift? What determines the timing of abnormal returns in the long-horizon studies? For example, why does Frankel and Lee's (1998, Table 8 and Fig. 2) fundamental valuation strategy, which is designed to exploit mispricing, produce relatively small abnormal returns in the first 18 months, but large returns in the following 18 months? Sloan (1996, Table 6) finds that more than half of the three-year hedge portfolio return (i.e., lowest minus the highest accrual decile portfolio) return is earned in the first year and a little less than one-sixth of the three-year return is earned in the third year of the investment strategy.

Some have priors that the inefficiency would be corrected quickly, whereas others argue it can take a long time. For example, W. Thomas (1999, p. 19) in his analysis of the market's ability to process information about the persistence of the foreign component of earnings, states: "... I proceed under the assumption that mispricing is more likely to cause only a short-term relation with abnormal returns while unidentified risk is more likely to cause a short- and long-term relation with abnormal returns." If transaction costs, institutional holdings, and other related characteristics are an impediment to speedy absorption of information in stock prices, then long-horizon studies should test whether there is a positive relation between the horizon over which abnormal returns are earned and proxies for the information environment. If large stocks earn abnormal returns for several years, I would interpret that as damaging to the market inefficiency hypothesis.

Another important reason for the demand for a theory of market inefficiency is to understand what might cause markets to be inefficient (i.e., why might prices deviate systematically from economic fundamentals?). Several empirical studies document that intrinsic values estimated using the residual income model predict future returns (see Lee (1999), and discussion below for summaries). However, the residual income model or the dividend-discount model provides little guidance in terms of why we should expect to predict future returns using estimated intrinsic values. Such a prediction requires a theory for why and where prices would deviate systematically from intrinsic values so the theory can be tested empirically.[78] The theory would either use investors' behavioral biases or trading frictions to predict deviations of security prices from their intrinsic values. Accounting researchers' efforts on fundamental analysis and tests of market efficiency would be more fruitful if some energy is channeled into the development and tests of theories of inefficiency.

4.4.1.4. Summary. Long-horizon performance studies and tests of market efficiency are fraught with methodological problems. The problems in data bases, potential danger of researchers engaging in data snooping, non-normal statistical properties of data, and research design issues collectively weaken our confidence in the conclusion that markets are grossly inefficient in processing information in news events quickly and unbiasedly. I foresee considerable research that attempts to overcome the problems faced in long-horizon tests so that we can draw more definitive conclusions about market efficiency. Capital markets researchers in accounting should exploit their knowledge of institutional details and financial data and design more creative long-horizon tests of market efficiency. However, the challenges in designing better tests also underscore the need for a sophisticated training in cutting-edge research in finance and econometrics.

4.4.2. Evidence from event studies

Short-window tests: Like the evidence in the financial economics literature, most of the evidence from short-window event studies in the capital markets literature in accounting is consistent with market efficiency. However, some evidence suggests market inefficiency. This is discussed in the context of post-earnings-announcement drift and functional fixation.

Evidence suggests the market's reaction to news events is immediate and unbiased. Consider the market's reaction to earnings announcements as reported in two illustrative studies: Lee (1992) and Landsman and Maydew

[78] The parallels here are Jensen and Meckling's (1976) agency theory to explain deviations from the Modigliani and Miller (1958) and Miller and Modigliani (1961) no-effects predictions for corporate finance in frictionless markets, and Watts and Zimmerman's (1978) contracting and political cost hypotheses to explain firms' preference among alternative accounting methods in informationally efficient capital markets.

(1999). Lee (1992) uses intra-day return and trading volume data. He observes a statistically significant price reaction of the same sign as the earnings surprise. The reaction occurs within 30 min of the earnings announcement, with no statistically discernible price effect thereafter. Investors' trading volume reaction reported in Lee (1992) is also short lived: less than 2 h for large trades and a few hours for small trades. Landsman and Maydew (1999) analyze the market's reactions to earnings announcements over three decades. They too find that the stock return volatility and trading volume are significantly greater on earnings announcement days, but the activity reverts to normal conditions immediately thereafter.

The above findings reinforce previous evidence in Beaver (1968) and May (1971) using weekly price and trading volume data around annual and quarterly earnings announcement dates and Patell and Wolfson's (1984) intraday return analysis around earnings announcements. Other research offers a variety of refinements to suggest that the market predictably discriminates between different types of news announcements and the information content of those announcements. For example, several studies report an inverse relation between the information content (i.e., price and trading volume reaction) of earnings announcements and transaction costs and pre-disclosure (or interim) information (see Grant, 1980; Atiase, 1985, 1987; Bamber, 1987; Shores, 1990; Lee, 1992; Landsman and Maydew, 1999). Others examine the effects of audit quality, seasonality, accrual errors in first three quarters versus the fourth quarter, transitory earnings, etc. on the stock price reaction to earnings announcements (e.g., Teoh and Wong, 1993; Salamon and Stober, 1994; Freeman and Tse, 1992) and find evidence generally consistent with rationality in the cross-sectional variation in the market's response.

Long-horizon tests: There has been a surge of research on long-horizon tests of market efficiency in recent years. Collectively this research reports economically large abnormal returns following many events. As noted earlier, there are methodological questions about this evidence. I review the evidence of long-horizon abnormal performance following earnings announcements, accrual management, analysts' forecast optimism, and accounting method changes.

4.4.2.1. Post-earnings-announcement drift. Post-earnings-announcement drift is the predictability of abnormal returns following earnings announcements. Since the drift is of the same sign as the earnings change, it suggests the market underreacts to information in earnings announcements. Ball and Brown (1968) first observe the drift. It has been more precisely documented in many subsequent studies.[79] The drift lasts up to a year and the magnitude is both statistically and

[79] See Jones and Litzenberger (1970), Brown and Kennelly (1972), Joy et al. (1977), Watts (1978), Foster et al. (1984), Rendleman et al. (1987), Bernard and Thomas (1989, 1990), Freeman and Tse (1989), Mendenhall (1991), Wiggins (1991), Bartov (1992), Bhushan (1994), Ball and Bartov (1996), and Bartov et al. (2000), among others.

economically significant for the extreme good and bad earnings news portfolios. A disproportionate fraction of the drift is concentrated in the three-day periods surrounding future quarterly earnings announcements, as opposed to exhibiting a gradually drifting abnormal return behavior. Because of this characteristic and because almost all of the drift appears within one year, I characterize the drift as a short-window phenomenon, rather than a long-horizon performance anomaly. The profession has subjected the drift anomaly to a battery of tests, but a rational, economic explanation for the drift remains elusive.

The property of the drift that is most damaging to the efficient market hypothesis is documented in detail in Rendleman et al. (1987), Freeman and Tse (1989), and Bernard and Thomas (1989, 1990). Collectively, these studies show that the post-earnings-announcement abnormal returns are consistent with the market acting as if quarterly earnings follow a seasonal random walk process, whereas the true earnings process is more complicated. In particular, the true process might be more accurately described as a seasonally differenced first-order auto-regressive process with a seasonal moving-average term to reflect the seasonal negative autocorrelation (Brown and Rozeff, 1979). A large fraction of the drift occurs on subsequent earnings announcement dates and the drift consistently has the predicted sign for the extreme earnings portfolios. These properties diminish the likelihood of an efficient markets explanation for the drift.

Numerous studies seek to refine our understanding of the drift. Ball and Bartov (1996) show that the market is not entirely naïve in recognizing the time-series properties of quarterly earnings. However, their evidence suggests the market underestimates the parameters of the true process. So, there is predictability of stock performance at subsequent earnings announcement dates. Burgstahler et al. (1999) extend the Ball and Bartov (1996) result by examining the market's reaction to special items in earnings. Their results also suggest the market only partially reflects the transitory nature of special items. Soffer and Lys (1999) dispute Ball and Bartov's (1996) results. Using a two-stage process to infer investors' earnings expectations, Soffer and Lys (1999, p. 323) "are unable to reject the null hypothesis that investors' earnings expectations do not reflect any of the implications of prior earnings for future earnings". Abarbanell and Bernard (1992) conclude that the market's failure to accurately process the time-series properties of earnings is due in part to dependence in analysts' forecast errors (also see Lys and Sohn, 1990; Klein, 1990; Abarbanell, 1991; Mendenhall, 1991; Ali et al., 1999).

Research attempting to understand whether the market's earnings expectations are naïve has used security prices to infer the expectations. While this approach has many desirable properties, J. Thomas (1999) warns of the danger of incorrect inferences and Brown (1999) proposes an alternative approach examining whether the time-series properties of analysts' forecasts exhibit the naïve property. If not, then the search for alternative explanations for the observed security return behavior gains credibility.

Bhushan (1994) shows that the magnitude of the drift is positively correlated with the degree of trading frictions, which makes commercial attempts to exploit the drift economically less attractive. Bartov et al. (2000) examine whether the magnitude of the drift is decreasing in investor sophistication, as proxied for by the extent of institutional ownership in a stock (see Hand, 1990; Utama and Cready, 1997; Walther, 1997; El-Gazzar, 1998). Brown and Han (2000) examine predictability of returns for the subset of firms whose earnings exhibit first-order auto-regressive property, which is far less complex than the Brown and Rozeff (1979) model. They conclude that the market fails to recognize the autoregressive earnings property only for firms that have relatively less pre-disclosure information (i.e., small firms with relatively unsophisticated investors). Even in these cases, they find the drift ifs asymmetric in that the drift is observed for large positive, but not negative, earnings surprises.[80]

Attempts to explain the drift on the basis of transaction costs and investor sophistication, in my opinion, are not entirely satisfying. Since a non-trivial fraction of the drift shows up on one-to-three-quarters-ahead earnings announcement days, there is a substantial opportunity for a number of market participants to exploit the mispricing, at least in the case of stocks experiencing good earnings news. Many of these market participants likely engage in trades in similar stocks for other reasons, so the marginal transaction costs to exploit the drift are expected to be small. Risk mismeasurement is also unlikely to explain the drift because the drift is observed in almost every quarter and because it is concentrated in a few days around earnings announcements.

Another stream of research in the accounting and finance literature examines whether the post-earnings announcement drift (or the earnings-to-price effect) is incremental to or subsumed by other anomalies (see Fama and French (1996), Bernard et al. (1997), Chan et al. (1996), Raedy (1998), Kraft (1999), and discussion in Section 4.4.3). The anomalies examined include the size, book-to-market, earnings-to-price, momentum, industry, trading volume, long-term contrarian investment strategy, past sales growth, and fundamental analysis effects, and combinations of these effects.[81] Kraft (1999) concludes

[80] Since Brown and Han (2000) focus on a relatively small fraction (20%) of the population of firms, their tests might have lower power.

[81] The following studies report evidence on the anomalies: Banz (1981) on the size effect; Basu (1977, 1983) on the earnings-to-price effect; Rosenberg et al. (1985) and Fama and French (1992) on the book-to-market effect; Lakonishok et al. (1994) on the sales growth (or value-versus-glamour) and cash-flow-to-price effects; DeBondt and Thaler (1985, 1987) on the long-term contrarian effect; Jegadeesh and Titman (1993) and Rouwenhorst (1998) on the short-term momentum effect; Moskowitz and Grinblatt (1999) on the industry-factor effects to explain the momentum effect; Lee and Swaminathan (2000) on the momentum and trading volume effects; and Lev and Thiagarajan (1993) and Abarbanell and Bushee (1997, 1998) on the fundamental analysis effect.

that other anomalies or the Fama–French three-factor model (see Fama and French, 1993) do not subsume the drift, whereas evidence in Fama and French (1996) suggests that their three-factor model explains the earnings-to-price effect.

4.4.2.1.1. Summary. The post-earnings announcement drift anomaly poses a serious challenge to the efficient markets hypothesis. It has survived a battery of tests in Bernard and Thomas (1989, 1990) and many other attempts to explain it away. It appears to be incremental to a long list of anomalies that are inconsistent with the joint hypothesis of market efficiency and an equilibrium asset-pricing model. The survival of the anomaly 30 years after it was first discovered leads me to believe that there is a rational explanation for it, but evidence consistent with rationality remains elusive.

4.4.2.2. Accounting methods, method changes and functional fixation

4.4.2.2.1. Research design issues. Capital markets research has long examined whether the stock market is efficient with respect to cross-sectional differences in firms' use of accounting methods and to changes in accounting methods. Since most accounting method choices do not in themselves create a cash flow effect, tests of market efficiency with respect to accounting methods have been an easy target. However, this has proved to be one of the more difficult topics. Firms' choice of accounting methods and their decisions to change methods are not exogenous. Cross-sectional differences in firms' accounting method choice potentially reflect underlying economic differences (e.g., differences in investment–financing decisions, growth opportunities, debt and compensation contracts, etc.; see Watts and Zimmerman, 1986, 1990). The economic differences contribute to variations in the expected rates of return and price–earnings multiples. Therefore, an assessment of the pricing of accounting effects is clouded by the effect of underlying economic differences among the firms.

Accounting method change events also have their pros and cons in testing market efficiency. Managers' decisions to change accounting methods typically follow unusual economic performance and accounting method changes might be associated with changes in the firms' investment and financing decisions. For example, Ball (1972), Sunder (1975), and Brown (1980) find that the average earnings and stock-return performance of firms switching to income-decreasing LIFO inventory method are above normal in the period leading up to the inventory accounting method change. Since changes in economic performance and changes in investment and financing decisions are generally associated with changes in expected rates of return, accurate assessment of long-horizon risk-adjusted performance following accounting method changes is tricky. Another practical problem with an event study approach to accounting method changes is that many firms do not publicly announce the accounting method change, so there can be considerable uncertainty associated with the date the market learns about the method change.[82]

Another problem is that surprise announcements of accounting method changes themselves often convey information that causes market participants to reassess firm value.[83] For example, the market frequently greets firms' announcements of changes in capitalization and revenue recognition policies with large price swings (e.g., on March 18, 1992, Chambers Development Co. experiences a –63% stock price reaction to its announcement that it would expense instead of capitalize development costs; see Revsine et al., 1999, pp. 19–23). Some academics and the financial press interpret the reaction as the market's fixation on reported accounting numbers because the accounting method change in itself did not affect the firm's cash flow for the accounting period. The reasoning is only partially right in that the accounting method change might easily have influenced the market's expectation of future cash flows. Thus, in order to interpret the market's reaction to accounting method changes as consistent with market efficiency, one must model changes in cash flow expectations concurrent with the accounting method change and other cash flow effects arising from contracting, tax, and/or regulatory considerations.

4.4.2.2.2. Evidence: accounting method differences. A large body of literature examines whether the market is mechanically fixated on reported earnings. The conclusion that emerges from this literature is that broadly speaking the market rationally discriminates between non-cash earnings effects arising from the use of different accounting methods. However, an unresolved and contentious question is whether there is a modest degree of inefficiency. I believe the evidence is fairly strong that managerial behavior is consistent with the market behaving as if it is functionally fixated on reported accounting numbers, but that the security price behavior itself is at worst only modestly consistent with functional fixation.

Beaver and Dukes (1973) is probably the first study to examine whether the stock market rationally recognizes the non-cash effects of accounting methods on reported earnings in setting security prices. They compare the price–earnings ratios of firms using accelerated and straight-line depreciation methods. Consistent with market efficiency, they find that accelerated depreciation firms' price–earnings ratios exceed those of straight-line depreciation method firm. Moreover, the difference more or less disappears once the straight-line depreciation method firms' earnings are restated to those obtained under the accelerated depreciation method. Additional analysis also reveals

[82] With increasing pressure on firms to publicly disclose accounting events like method changes and the decreasing costs of electronically searching for the information, it is easier in today's environment to precisely identify the announcement date of an accounting method change.

[83] See the literature on signaling and voluntary disclosure.

that the accelerated and straight-line depreciation samples of firms did not exhibit statistically or economically significant differences in systematic risk or earnings growth (see Beaver and Dukes, 1973, Table 2).

Many other studies examine market efficiency with respect to accounting method differences. Lee (1988) and Dhaliwal et al. (2000) examine differences in price–earnings ratios between LIFO and non-LIFO firms. Dukes (1976) shows that the market values research and development costs as an asset even though they are expensed for reporting purposes (also see Lev and Sougiannis, 1996; Aboody and Lev, 1998). Evidence also suggests that the market began to reflect pension liabilities even before they appeared on financial statements (Dhaliwal, 1986) and a firm's risk reflects the debt equivalence of operating leases (see Lipe (2000, Section 2.3.2) for a summary of evidence).

While there is considerable evidence consistent with market efficiency, some discordant notes coexist. Vincent (1997) and Jennings et al. (1996) examine stock prices of firms using the purchase and pooling-of-interests accounting methods for mergers and acquisitions. They find that firms using the purchase accounting method are disadvantaged. The authors compare the price–earnings ratios of the firms using the pooling method to those using the purchase method. For this comparison, they restate earnings numbers of the pooling method firms as if these firms used the purchase accounting method. They find that the price–earnings ratios of the pooling method firms are higher than the purchase accounting method users.

The Vincent (1997) and Jennings et al. (1996) evidence is consistent with the conventional wisdom among investment bankers that Wall Street rewards reported earnings and thus prefers pooling-of-interests earnings. Regardless of whether the conventional wisdom is valid in terms of security price behavior, it appears to have a real effect on the pricing of acquisitions accounted for using the pooling or purchase method. Nathan (1988), Robinson and Shane (1990), and Ayers et al. (1999) all report that bidders pay a premium for a transaction to be accounted for as pooling of interests. Lys and Vincent (1995) in their case study of AT&T's acquisition of NCR, conclude that AT&T spent about $50 to possibly as much as $500 million to account for the acquisition using the pooling method.

To complement the analysis of pricing and premium magnitudes in pooling and purchase accounting, researchers also examine long-horizon returns following merger events accounted for using the pooling and purchase methods. Hong et al. (1978) and Davis (1990) are early studies of acquirers' post-merger abnormal returns. They examine whether abnormal returns to acquirers using the purchase method are negative, consistent with the market reacting negatively to goodwill amortization after the merger. Neither study finds evidence of the market's fixation on reported earnings.

Rau and Vermaelen (1998) and Andrade (1999) reexamine post-merger performance of pooling and purchase method users employing state-of-the-art techniques to estimate long-horizon abnormal returns and using larger samples of mergers from recent decades. They reach somewhat opposite conclusions. Rau and Vermaelen (1998) compare the post-merger returns of a third of the acquirers reporting the largest earnings impact of merger accounting against the middle and lowest third of the acquirers ranked according to the merger earnings impact. The post-merger one-, two-, or three-year returns for the three samples are not statistically different from zero or different from each other. Andrade (1999) also examines the post-merger performance, but uses regression analysis with controls for a large number of confounding variables. He finds a positive and statistically significant 18-month abnormal return effect attributable to the merger-accounting impact on earnings. However, the effect is "one order of magnitude smaller than implied by practitioners' views" (Andrade, 1999, Abstract). He therefore concludes that "it makes little sense for managers to expend time, effort, and resources in structuring the deal so as to improve its impact on reported EPS" (Andrade, 1999, p. 35).

Andrade (1999) also analyzes merger announcement-period returns to test whether the market reaction is increasing in the merger-accounting-earnings effect. He observes a statistically significant, but economically small positive impact of merger accounting earnings. This is weakly consistent with functional fixation. Hand (1990) advances an "extended" version of the functional fixation hypothesis. It argues that the likelihood that the market is functionally fixated is decreasing in investor sophistication. Hand (1990) and Andrade (1999) find evidence consistent with extended functional fixation in different types of accounting event studies.[84] This is similar to the negative relation between the magnitude of post-earnings-announcement drift and investor sophistication discussed earlier in this section.

Summary: Differences in accounting methods (e.g., purchase versus pooling accounting for mergers and acquisitions) can produce large differences in reported financial statement numbers without any difference in the firm's cash flows. We do not observe systematic, large differences in the prices of firms employing different accounting methods. This rules out noticeable magnitudes of market fixation on reported financial statement numbers. There is some evidence, however, to suggest that over long horizons differences in accounting methods produce measurable differences in risk-adjusted stock returns. Whether these abnormal returns suggest a modest degree of market in efficiency or they are a manifestation of the problems in accurately measuring long-horizon price performance is unresolved.

[84] See Ball and Kothari (1991) for theory and evidence that calls into question the extended functional fixation hypothesis.

4.4.2.2.3. Accounting method changes. Accounting method changes are distinct from accounting method differences in that method changes are the consequence of a deliberate action to change a method at a point in time and are thus amenable to an event study centered on the event of accounting method change. In contrast, accounting method differences between firms can persist indefinitely so long as firms continue with their respective accounting methods. Thus, there is no accounting event and therefore samples of firms with accounting method differences are typically not amenable to an event study.

Some of the earliest capital markets research analyzes accounting method changes as a means of testing market efficiency (see, for example, Ball, 1972; Kaplan and Roll, 1972; Archibald, 1972; Sunder, 1973, 1975). Collectively this research examines security returns at the time of and surrounding accounting method changes. Conclusions from this research are that the announcement effects of accounting method changes are generally small and the long-horizon performance of firms making accounting method changes is inconclusive with respect to the efficient markets hypothesis. The lack of conclusive results is because of cash flow effects of some method changes (e.g., switch to and from LIFO inventory method) and the endogenous and voluntary nature of accounting method changes. Therefore, there are information effects and potential changes in the determinants of expected returns associated with the method changes. In addition, much progress has been made in estimating the long-horizon performance in an event study (see Barber and Lyon, 1997; Kothari and Warner, 1997; Barber et al., 1999).

Many studies examine the stock-price effects of accounting method changes. Studies on firms' switch to and from LIFO inventory method are particularly popular; see, for example, Ricks (1982), Biddle and Lindahl (1982), Hand (1993, 1995). Evidence from these studies remains mixed. However, with the exception of Dharan and Lev (1993), a study that carefully re-examines long-horizon stock-price performance around accounting method changes using state-of-the-art long-horizon performance measurement techniques is sorely missing from the literature. Such a study would be timely in part because the long-horizon market inefficiency hypothesis has acquired currency in academic as well as practitioner circles.

4.4.2.3. Long-horizon returns to accrual management and analyst forecast optimism

4.4.2.3.1. The logic. Several studies examine long-horizon stock market efficiency with respect to accrual management and analysts' optimistic earnings growth forecasts. The crux of the argument is that information from firms' owners and/or managers and financial analysts about firms' prospects (e.g., earnings growth) reflects their optimism and that the market behaves naively in that it takes the optimistic forecasts at face value.

Firms' owners and managers and financial analysts have an incentive to issue optimistic forecasts.[85] Owners and managers issuing new equity can reap benefits if the issue price is inflated. Owners and managers are hypothesized to attempt to inflate the price of initial public offerings or seasoned equity offerings by influencing the market's expectations of future earnings. Toward this end, they manipulate upward reported earnings through discretionary accounting accruals.

Financial analysts' incentive to issue optimistic forecasts stems from the fact that the investment-banking firms they work for derive benefits from investment banking and brokerage business of the client firms. Optimistic forecasts potentially generate greater business from the clients. In addition, optimistic forecasts might induce client managements to share private information with the financial analysts.

The cost of accrual management and optimistic forecasts is a loss of credibility and reputation for accuracy in the event that accrual management and forecast optimism are detected. In addition, there is the potential danger of facing lawsuits and civil and criminal penalties for fraud in the event of an eventual decline in share prices when future earnings realizations suggest forecast optimism. Owners, managers, and financial analysts must trade off the potential benefits against the costs. The benefits from accrual manipulation and analysts' optimism obviously depend in part on the success in inflating security prices. The market's failure to recognize the optimistic bias in accruals and analysts' forecasts requires a theory of market inefficiency that is still being developed and tested in the literature. There are at least three reasons for systematic mispricing of stocks resulting from the market's naïve reliance on optimistic information. They are the presence of frictions and transaction costs of trading, limits on market participants' ability to arbitrage away mispricing, and behavioral biases that are correlated among market participants (e.g., herd behavior). Capital markets research testing market efficiency primarily examines whether there is evidence of accrual manipulation and forecast optimism and whether securities are systematically mispriced. The literature in accounting is yet to develop theories of market inefficiency, which have begun to appear in the finance and economics journals.

4.4.2.3.2. Evidence. Several studies present challenging evidence to suggest that discretionary accruals in periods immediately prior to initial public offerings and seasoned equity offerings are positive.[86] Evidence in these studies also suggests the market fails to recognize the earnings manipulation, which is inferred on the basis of predictable subsequent negative long-horizon price

[85] Managers' incentives are assumed to be aligned with owners' incentives. In an IPO, this assumption is descriptive because managers are often also major owners and/or managers have substantial equity positions typically in the form of stock options.

[86] See Teoh et al. (1998a–c), Teoh and Wong (1999), and Rangan (1998).

performance. Negative, statistically significant cross-sectional association between ex ante estimated accrual manipulation and stocks' ex post price performance exists, which violates market efficiency.

A well-developed literature examines whether analysts' forecasts are optimistic at the time of initial or seasoned equity offerings. Hansen and Sarin (1996), Ali (1996), and Lin and McNichols (1998a) fail to find optimism in short-term analysts' forecasts around equity offerings. Lin and McNichols (1998a) and Dechow et al. (2000) hypothesize that analysts' long-term forecasts might be optimistic because the market places less emphasis on the accuracy of long-term forecasts and long-term forecasts are more relevant for valuation than short-term forecasts. The Lin and McNichols (1998a) and Dechow et al. (2000) evidence on long-term forecast optimism is conflicting: Lin and McNichols (1998a, Table 2, p. 113) report negligible optimistic bias (lead analysts forecast 21.29% growth versus unaffiliated analysts forecast 20.73% growth), whereas the Dechow et al. (2000, Table 2, p. 16) evidence suggests a large bias (affiliated analysts 23.3% versus unaffiliated analysts 16.5%). Dechow et al. argue that stocks' long-horizon negative performance following seasoned equity offerings is due to the market's naïve fixation on analysts' optimistic long-term earnings growth forecasts. They show that the bias in analysts' long-term growth forecasts is increasing in the growth forecast, and post-equity-offer performance is negatively related to the growth rate at the time of the equity offers. Unlike Dechow et al., Lin and McNichols (1998a) do not find a difference in future returns.

Research also examines whether analysts affiliated with the investment-banking firm providing client services are more optimistic in their earnings forecasts and stock recommendations than unaffiliated analysts' forecasts. Rajan and Servaes (1997), Lin and McNichols (1998a), and Dechow et al. (2000) all report that affiliated analysts issue more optimistic growth forecasts than unaffiliated analysts. Similarly, Michaely and Womack (1999) and Lin and McNichols (1998a, b) find that affiliated analysts' stock recommendations are more favorable than unaffiliated analysts' recommendations.

4.4.2.3.3. Assessment of the evidence. The body of evidence in this area challenges market efficiency. However, there are several research design issues that are worth addressing in future research. Many of these are discussed elsewhere in the review. First, as discussed in the context of discretionary accrual models (Section 4.1.4), estimation of discretionary accruals for non-random samples of firms like IPO firms and seasoned equity offering firms is problematic. Long horizons further complicate the tests. In addition, the evidence in Collins and Hribar (2000b) that previous findings of accrual manipulation in seasoned equity offering firms using the balance sheet method might be spurious is damaging to the market inefficiency hypothesis not only because of problems in estimating discretionary accruals but also for the following logical reason. Consider the evidence in Teoh et al. (1998a) that estimated discretionary accruals of seasoned equity offering firms are negatively correlated with subsequent returns. Collins and Hribar (2000b) show that the estimated discretionary accruals are biased (i.e., accrual manipulation result is spurious) and that the bias is correlated with the seasoned equity offering firms' merger and acquisition activity. This means subsequent abnormal returns are unrelated to management's discretionary accruals, and instead appear to be correlated with firms' merger and acquisition activity. Thus, either the market is fixated on discretionary accruals or the market commits systematic errors in processing the valuation implications of merger and acquisition activity. As always, the possibility of some other phenomenon driving the return behavior following seasoned equity offerings exists.

Second, the association between ex ante growth forecasts or other variables and ex post performance variables might be spuriously strengthened because of survivor biases and data truncation (see Kothari et al. (1999b), and discussion earlier in this section).

Third, long-horizon performance measurement is problematic. Techniques that recognize long-horizon issues should be used to estimate abnormal performance (e.g., the Carhart (1997) four-factor model or the Fama and French (1993) three-factor model, or the Daniel et al. (1997) characteristic-based approach). Some argue that the three- and four-factor models in the finance literature are empirically motivated and lack a utility-based theoretical foundation. More importantly, these models might over-correct for the systematic component in stock returns in that returns to factors like book-to-market might indicate systematic mispricing, i.e., market inefficiency (see, e.g., Dechow et al., 2000). Even if empirically motivated factors were to merely capture systematic mispricing (rather than represent compensation for risk), it is important to control for these factors in estimating abnormal returns. The reason is straightforward. Researchers typically test whether a treatment variable or an event generates abnormal performance. If similar performance is also produced by another variable, like firm size to book to market, then it becomes less plausible that the observed performance is attributable to the treatment variable or the event. Abnormal performance can be realized by simply investing in potentially many stocks of similar characteristics regardless of whether or not they experience the event studied by the researcher.

Finally, classification of affiliated and unaffiliated analysts is not exogenous. As discussed in the section on the properties of analysts' forecasts, it is possible that firms choose those investment bankers whose analysts are (genuinely) most optimistic (i.e., give the highest forecasts) from among all the analysts.[87] So, we expect the affiliated analysts to have larger forecast errors than the

[87] If my assumption is not descriptive of the process of selection of an affiliated analyst investment-banking firm, the criticism is not applicable.

unaffiliated analysts. Therefore, the evidence that affiliated analysts' forecasts are more biased than unaffiliated analysts' forecasts is not particularly helpful. Research must attempt to demonstrate that analysts bias their forecasts upward because of the lure of investment-banking business (i.e., demonstrate causality).

4.4.3. Cross-sectional tests of return predictability

Cross-sectional tests of return predictability differ from event studies in two respects. First, to be included in the analysis, firms need not experience a specific event like seasoned equity issue. Second, return predictability tests typically analyze returns on portfolios of stocks with specific characteristics (e.g., quintile of stocks reporting largest ratios of accruals to total assets or extreme analysts' forecasts) starting with a common date each year, whereas the event date in event studies is typically not clustered in calendar time.

Cross-sectional return predictability tests of market efficiency almost invariably examine long-horizon returns, so they face the problems discussed previously. Four problems are worth revisiting. First, expected return mismeasurement can be serious in long-horizon tests. Second, researchers typically focus on stocks exhibiting extreme characteristics (e.g., extreme accruals) that are correlated with unusual prior performance, so changes in the determinants of expected return are likely to be correlated with the portfolio formation procedure. Third, survival bias and data problems can be serious, in particular if the researcher examines extreme performance stocks. Finally, since there is perfect clustering in calendar time, tests that fail to control for cross-correlation likely overstate the significance of the results.

There are two types of cross-sectional return predictability tests frequently conducted in accounting: predictability tests that examine performance on the basis of univariate indicators of market's mispricing (e.g., earnings yield, accruals, or analysts' forecasts) and tests that evaluate the performance of multivariate indicators like the fundamental value of a firm relative to its market value (e.g., Ou and Penman, 1989a, b; Abarbanell and Bushee, 1997, 1998; Frankel and Lee, 1998; Piotroski, 2000). Both sets of tests provide strong evidence challenging market efficiency. Both univariate and multivariate indicators of mispricing generate large magnitudes of abnormal performance over a one-to-three-year post-portfolio-formation periods. The focus of future research should be to address some of the problems I have discussed above in reevaluating the findings of the current research from return-predictability tests. I summarize below the evidence from the two types of return-predictability tests.

4.4.3.1. Return predictability using univariate indicators of mispricing. Early tests of return predictability using univariate indicators of mispricing used earnings yield (e.g., Basu, 1977, 1983). This evidence attracted considerable attention in the literature and the evidence from the earnings yield and other anomalies eventually led to multi-beta CAPM models like the Fama–French three-factor (i.e., market, size, and book-to-market) model or Carhart (1997) four-factor model that also includes momentum as a factor.

The recent flurry of research in return-predictability tests examines whether indicators other than earnings yield generate long-horizon abnormal performance. Examples of this research include the Lakonishok et al. (1994) tests based on cash flow yield and sales growth; the LaPorta (1996) and Dechow and Sloan (1997) tests of market overreaction stemming from analysts' optimism; and the Sloan (1996), Collins and Hribar (2000a, b) and Xie (1999) tests of the market's overreaction to extreme accrual portfolios.

The theme most common in this literature is that the market overreacts to univariate indicators of firm value and it corrects itself over a long horizon. The overreaction represents market participants' naïve fixation on reported numbers and their tendency to extrapolate past performance. However, because there is mean reversion in the extremes (e.g., Brooks and Buckmaster, 1976), the market's initial reaction to extreme univariate indicators of value overshoots fundamental valuation, and thus provides an opportunity to earn abnormal returns.[88]

While many of the univariate indicators of return-predictability suggest market overreaction, using both cash flow and earnings yield as indicators of market mispricing suggests market underreaction. One challenge is to understand why the market underreacts to earnings, but its reaction to its two components, cash flows and accruals, is conflicting. Previous evidence suggests that the market underreacts to cash flow and overreacts to accruals. Recently research has begun to address these issues theoretically as well as empirically. For example, Bradshaw et al. (1999) examine whether professional analysts understand the mean reversion property of extreme accruals. They find that analysts do not incorporate the mean reversion property of extreme accruals in their earnings forecasts. Bradshaw et al. (1999, p. 2) therefore conclude "investors do not fully anticipate the negative implications of unusually high accruals". While Bradshaw et al.'s explanation is helpful in understanding return predictability using accruals, it would be of interest to examine whether similar logic can explain the cash flow and earnings yield anomalies. Extreme earnings and cash flows are also mean reverting. What is predicted about analysts' forecasts with respect to these two variables and how does that explain the market's underreaction to earnings?

[88] Variations of the overreaction and extrapolation of past performance arguments appear in the following studies. Lakonishok et al. (1994) in the context of past sales growth and current cash flow and earnings yield; Sloan (1996) in the context of accruals; and LaPorta (1996) and Dechow and Sloan (1997) in the context of analysts' forecasts.

While much evidence suggests market over- and under-reaction, other studies are inconsistent with such market behavior. For example, Abarbanell and Bernard (2000) fail to detect the stock market's myopic fixation on current performance, i.e., market overreaction. Ali et al. (1999) undertake a different approach to understand whether market participants' naïveté contributes to cross-sectional return predictability using accruals. As several researchers hypothesize in the post-earnings-announcement drift literature, Ali et al. (1999) test whether returns to the accruals strategy are greater in magnitude for the high transaction cost, low analyst following, and low institutional ownership stocks. The literature hypothesizes these characteristics proxy for low investor sophistication, so a given level of accrual extremity in these stocks should yield greater magnitudes of abnormal returns than high investor sophistication stocks. Ali et al. (1999) do not find significant correlation between investor sophistication and abnormal returns. Zhang (2000) draws a similar conclusion in the context of market's fixation on analyst forecast optimism and auto-correlation in forecast revisions. These findings make it less likely that returns to the accrual strategy and apparent return reversals following analysts' optimistic forecasts arise from investors' functional fixation. The evidence makes it more likely that the apparent abnormal returns represent compensation for omitted risk factors, statistical and survival biases in the research design, biases in long-horizon performance assessment, or period-specific nature of the anomaly. Naturally, further research is warranted.

4.4.3.2. Return predictability using multivariate indicators of mispricing. Ou and Penman (1989a, b) use a composite earnings change probability measure called *Pr*. They estimate the *Pr* measure from a statistical data reduction analysis using a variety of financial ratios. The *Pr* measure indicates the likelihood of a positive or negative earnings change. Ou and Penman (1989a, b) report positive abnormal returns to the *Pr*-measure-based fundamental strategy.

The Ou and Penman (1989a, b) studies attracted a great deal of attention in the literature. They rejuvenated fundamental analysis research in accounting, even though their own findings appear frail in retrospect. Holthausen and Larcker (1992) find that the *Pr* strategy does not work in a period subsequent to that examined in Ou and Penman (1989a, b). Stober (1992) and Greig (1992) interpret returns to the *Pr* strategy as compensation for risk. Stober (1992) reports that abnormal performance to the *Pr* strategy continues for six years and Greig (1992) finds that size subsumes the *Pr* effect.

Lev and Thiagarajan (1993), Abarbanell and Bushee (1997, 1998), and Piotroski (2000) extend the Ou and Penman analysis by exploiting traditional rules of financial-ratio-based fundamental analysis to earn abnormal returns. They find that the resulting fundamental strategies pay double-digit abnormal returns in a 12-month period following the portfolio-formation date. The conclusion of the market's sluggish adjustment to the information in the ratios is strengthened by the fact that future abnormal returns appear to be concentrated around earnings announcement dates when the earnings predictions of the analysis come true (see Piotroski, 2000).

Frankel and Lee (1998), Dechow et al. (1999), and Lee et al. (1999) extend the multivariate fundamental analysis to estimating stocks' fundamental values and investing in mispriced stocks as suggested by their fundamental values. They use the residual income model combined with analysts' forecasts to estimate fundamental values and show that abnormal returns can be earned.[89]

5. Summary and conclusions

In this paper I review research on the relation between capital markets and financial statement information. I use an economics-based framework of demand for and supply of capital markets research in accounting to organize the paper. The principal sources of demand for capital markets research are fundamental analysis and valuation, tests of market efficiency, the role of accounting in contracts and in the political process, and disclosure regulation. In summarizing past research, I critique existing research as well as discuss unresolved issues and directions for future research. In addition, I offer a historical perspective of the genesis of important ideas in the accounting literature, which have greatly influenced future accounting thought in the area of capital markets research. An exploration of the circumstances, forces, and concurrent developments that led to significant breakthroughs in the literature will hopefully guide future accounting researchers in their career investment decisions.

Ball and Brown (1968) heralded capital markets research into accounting. Key features of their research, i.e., positive economics championed by Milton Friedman, Fama's efficient markets hypothesis, and the event study research design in Fama et al. (1969), were the cornerstones of the economics and finance research taking place concurrently at the University of Chicago. History repeated itself with Watts and Zimmerman's positive accounting theory research in the late 1970s. While the above are just two examples, many other developments in accounting are also influenced by concurrent research and ideas in related fields. The important conclusion here is that rigorous training in and an on-going attempt to remain abreast of fields beyond accounting will enhance the probability of successful, high-impact research.

[89] Lee et al. (1999) results are also somewhat frail in that they fail to find abnormal returns unless they use information in the short-term risk-free rates in calculating fundamental values. Since fundamental analysis never emphasized the importance of, let alone the need of, information in short-term interest rates, I interpret their evidence as not strong.

Section 4 surveys empirical capital markets research. The topics include methodological research (e.g., earnings response coefficients, time series and analysts' forecasts, and models of discretionary accruals); research examining alternative performance measures; valuation and fundamental analysis research; and finally, accounting research on tests of market efficiency. The areas of greatest current interest appear to be research on discretionary accruals, influence of analysts' incentives on the properties of their forecasts, valuation and fundamental analysis, and tests of market efficiency. The revival of interest in fundamental analysis is rooted in the mounting evidence that suggests capital markets might be informationally inefficient and that prices might take years before they fully reflect available information. Fundamental valuation can yield a rich return in an inefficient market. A large body of research demonstrates economically significant abnormal returns spread over several years by implementing fundamental analysis trading strategies. Evidence suggesting market inefficiency has also reshaped the nature of questions addressed in the earnings management literature. Specifically, the motivation for earnings management research has expanded from contracting and political process considerations in an efficient market to include earnings management designed to influence prices because investors and the market might be fixated on (or might over- or under-react to) reported financial statement numbers.

Evidence of market inefficiency and abnormal returns to fundamental analysis has triggered a surge in research testing market efficiency. Such research interests academics, investors, and financial market regulators and standard setters. The current rage is examination of long-horizon security price performance. However, this research is methodologically complicated because of skewed distributions of financial variables, survival biases in data, and difficulties in estimating the expected rate of return on a security. Progress is possible in testing market efficiency if attention is paid to the following issues. First, researchers must recognize that deficient research design choices can create the false appearance of market inefficiency. Second, advocates of market inefficiency should propose robust hypotheses and empirical tests to differentiate their behavioral-finance theories from the efficient market hypothesis that does not rely on investor irrationality. The above challenges in designing better tests and refutable theories of market inefficiency underscore the need for accounting researchers trained in cutting-edge research in economics, finance, and econometrics.

6. Uncited References

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Perspectives on Recent Capital Market Research

William H. Beaver
Stanford University

I. INTRODUCTION

The purpose of my remarks is to provide one perspective on major areas of capital markets research that have made important contributions to our understanding of accounting numbers, with an emphasis on those published during the past ten years. I do not intend these remarks to be a survey;[1] instead, I select the five research areas I believe have made the greatest contribution to our knowledge over the past ten years. These areas illustrate the degree to which capital market research has become interconnected. My remarks address why these areas are important, briefly summarize what we have learned, highlight some of the links between these areas, and raise some unresolved issues. Within each area, I identify major issues and some of the key papers, but I do not attempt to be comprehensive. In the process, I have sacrificed depth for breadth.

The five areas I have selected are market efficiency, Feltham-Ohlson modeling, value relevance, analysts' behavior, and discretionary behavior. The first two areas, market efficiency and Feltham-Ohlson modeling, are basic platforms that permit us to organize our thinking about the role of accounting in capital markets. The last three areas are applications that incorporate some form of accounting structure or individual behavior.

II. MARKET EFFICIENCY

Market efficiency is, of course, an important field of study. Much of the regulation of financial reporting is premised on the notion that once firms make accounting data publicly available, the implications will be widely appreciated and reflected in security prices. If the market is inefficient, then financial reporting and disclosure are not as effective, at least with respect to prices fully reflecting that information. Questions for regulators then arise as to whether altering the presentation of the data could mitigate this deficiency.

If investors trade in an efficient market, then they can rely on prices reflecting a rich set of the total mix of information, including financial statement information, and they need

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[1] Kothari (2001) provides an excellent recent survey of capital markets research.

Editor's Note: The Executive Committee of the American Accounting Association has recommended the commission of a series of Presidential Research Lectures, to be delivered at annual meetings of the Association. To encourage broad dissemination, the Committee has requested that *The Accounting Review* publish this lecture given at the 2001 American Accounting Association Annual Meeting in Atlanta, GA.

Author's Note: I am pleased and honored to be the third Presidential Lecturer, following two distinguished colleagues, Shyam Sunder two years ago and Bill Kinney last year. I thank Mary Barth, Wayne Landsman, Maureen McNichols, and Stephen Ryan for many helpful suggestions on earlier drafts of this paper.

not process all of that information directly. In other words, investors become indirect beneficiaries of that information, even if they do not literally process it themselves. Efficient capital markets also have implications for resource allocation and production efficiency, so it is not surprising that market efficiency was one of the earliest areas studied.

Market efficiency is also of interest to researchers because, if they can assume market efficiency in the research design, then researchers can draw a different (and potentially more powerful) set of inferences. Assumptions about market efficiency affect the researchers' choice of the length of the window over which to compute abnormal returns in an event study. Market efficiency also affects the interpretations the researcher places on observed associations between security prices and accounting numbers.

There was a time when we thought that the issue of market efficiency with respect to publicly available data was "resolved." Early capital markets studies largely supported market efficiency. Both Ball and Brown (1968) and Beaver (1968) examined the post-announcement behavior of security returns and tentatively concluded that market efficiency was a reasonable approximation of the empirical results. Early studies examined changes in accounting methods (Archibald 1972; Ball 1972) and reached similar conclusions. Researchers also examined differences in accounting methods (e.g., Beaver and Dukes 1973) and concluded that the market prices behaved in a manner consistent with market efficiency.

Recent studies have reexamined market efficiency, and several have concluded that capital markets are inefficient with respect to at least three areas: post-earnings announcement drift, market-to-book ratios and its refinements, and contextual accounting issues.

Post-Earnings Announcement Drift

Post-earnings announcement drift was one of the first areas to suggest that markets may not be efficient with respect to accounting data. Several studies (Foster et al. 1984, among others) found evidence of post-earnings announcement drift in spite of attempts to control for at least some of the confounding factors. One reason for the finding of post-announcement drift is that the availability of daily return data enhances the power of the tests relative to prior research that used only weekly or monthly return data. The post-announcement drift studies culminated in Bernard and Thomas's (1989, 1990) research, which is an econometric tour de force. Their studies represent a classic example of excellent research design. The studies tenaciously pursue competing explanations, such as transaction costs vs. omitted risk factors, and find them lacking in many respects. Moreover, their studies, along with Freeman and Tse (1989), also explicitly develop an alternative hypothesis as to the nature of the market inefficiency and establish that the subsequent abnormal returns tend to cluster around subsequent earnings announcement dates. Their evidence that the abnormal returns are associated with some inefficient processing of earnings announcements is compelling.

An important extension is Abarbanell and Bernard (1992), whose study examines the question of whether a portion of the post-earnings announcement drift is attributable to the behavior of analysts' earnings forecasts and deficiencies in their processing of accounting data. This study reaches two important conclusions:

(1) The analysts' forecasts appear to underestimate the persistency in earnings, and forecast errors based on analysts' forecasts are serially correlated. If analysts efficiently processed information, then the unconditional expected value of the forecast error would be zero, and the expected serial correlation would be zero.

(2) This phenomenon explains some, but not all, of the post-earnings announcement drift. We would not expect analysts' behavior to be the complete explanation because post-earnings announcement drift is most pronounced in the small capitalization firms, which are not as heavily followed as larger capitalization firms are. Bartov et al. (2000) suggest that institutional holdings are also an important explanatory variable. In a further extension, Bhattacharya (2001) concludes that trade size, a proxy for less wealthy and less informed investors, may also be a factor. These studies represent a key link between market efficiency and the role of information and financial intermediaries.

Studies of post-earnings announcement drift are particularly compelling because earnings changes and earnings forecast errors have lower serial correlation than other candidates for market efficiency, such as market-to-book ratios. High serial correlation raises suspicion that the variable is a proxy for an omitted factor that is priced by the market.

Market-to-Book Ratios and Extensions

A second area of research is abnormal returns associated with portfolio strategies based on market-to-book ratios. Two early studies in this area are Fama and French (1992) and Lakonishok et al. (1994). The negative association between market-to-book ratios and subsequent returns appears to be significant and persistent and not explainable by conventional risk measures or their proxies. This is a controversial area; Fama (1991), among others, suggests that market-to-book ratios may represent some (otherwise unidentified) pricing factor, and Fama and French (1992) have posited a three-factor pricing model that includes the market-to-book ratio. As a result, recent market efficiency tests control for the market-to-book ratio and still find evidence of abnormal returns.

Major extensions of this work refine the market-to-book analysis by computing market-to-value ratios. At its simplest level, the argument for the market-to-book ratio as being a measure of market inefficiency is that the market prices either fail to reflect some factor related to the underlying value, which is reflected in book value, or that they include some factor unrelated to the underlying value. For example, high market-to-book ratio stocks represent so-called "glamour" stocks that are overpriced. From this perspective, one can extend the concept of value to include accounting "fundamentals" in addition to book value. Two major examples are Frankel and Lee (1998) and Dechow et al. (1999). Both studies employ modeling motivated by Feltham-Ohlson to predict the intrinsic value based on book value, earnings, and analysts' earnings forecasts. Both studies conclude that market-to-value ratios are associated with even higher subsequent abnormal returns than are the simpler market-to-book ratio strategies, which is consistent with these value estimates' being better proxies for underlying fundamentals and, hence, being better able to identify overpriced and underpriced stocks. As with research on post-earnings announcement drift, the abnormal returns here appear to be more prevalent in small capitalization stocks.

In another extension of the market-to-book research, Dechow and Sloan (1997) find that stock prices appear to reflect naively analysts' biased forecasts of future earnings growth, and reliance on analysts' earnings growth forecasts can explain over half of the higher returns associated with pursuing "contrarian" (e.g., market-to-book and price-earnings-based) strategies.

Contextual Accounting Issues

A key feature of the previous two areas is that they require little, if any, knowledge of the distinctive characteristics of how financial statements are prepared. They are based on generic treatments of earnings and book value. Our comparative advantage as accounting researchers is in incorporating the richness of our knowledge of accounting institutions, reporting standards, and the composition of accounting numbers. Several recent studies have examined market efficiency based on some key feature of financial reporting.

Sloan (1996) is an excellent example of research that exploits our knowledge of one key feature: accrual accounting. Important aspects of the Sloan (1996) study are (1) an examination of the "consistency" between the weight placed on accruals and cash flow components in forecasting earnings and the implicit weight investors placed on the cash flow and accrual components of earnings in a valuation equation, and (2) the examination of portfolio strategies based on the magnitude of the accruals. Sloan (1996) concludes that capital markets overestimate the persistency of accruals and underestimate the persistency of cash flows from operations, because accruals are more subject to uncertainty of estimation and more subject to management and manipulation. Xie (2001) supports this conclusion by showing the mispricing documented by Sloan (1996) is largely due to abnormal accruals.

Moreover, in an attempt to address the "IPO puzzle," Teoh et al. (1998a, 1998b) and Teoh, Wong, et al. (1998) find that unusual accruals occur at Initial Public Offering dates and subsequently reverse. The accruals appear to be associated with at least a portion of the negative abnormal returns identified in the IPO research. These findings are consistent with those of Sloan (1996), as well as Xie (2001) and DeFond and Park (2001), that security prices do not fully reflect either the nature of accruals or their implications for future earnings and valuation.

However, not all accruals are associated with abnormal returns. Research also indicates that the supplemental disclosures with respect to specific accruals can permit capital markets to form unbiased estimates of the implications of the accrual for future earnings and hence for valuation. For example, Beaver and McNichols (2001) show that increased disclosure regarding the history of policy loss reserves in the property casualty insurance companies can make the accruals transparent to investors, and that revisions policy of loss accruals (development) are not associated with subsequent abnormal returns.

Unresolved Issues

The magnitude and length of the abnormal returns is surprising. For example, Frankel and Lee (1998) report that in the 36 months after portfolio formation, the abnormal returns associated with market-to-value strategies are 31 percent, whereas strategies that also exploit the predictability of analysts' forecasts are associated with abnormal returns of 45 percent.

There are several unresolved issues:

(1) How can widely disseminated and examined data used with simple portfolio strategies that require no knowledge of accounting be associated with abnormal returns? From an economic perspective, widely disseminated data are not likely candidates.

(2) How can studies of arcane disclosures (e.g., nonperforming loans and pensions, as in Beaver et al. [1989] and Barth et al. [1992]) find that such disclosures are apparently reflected in prices, yet more visible variables, such as earnings and book value, are not?

(3) How can studies of security returns in the very short run (e.g., intraday returns, as in Patell and Wolfson [1984]) show evidence of relatively rapid response (within hours, if not minutes), and yet have evidence of abnormal returns that appear to persist for years after the portfolio formation date?

(4) How can the body of research in aggregate show that prices both lead (e.g., Beaver et al. 1980; Beaver et al. 1987; Collins et al. 1997; Ryan 1995) and lag accounting data?

III. FELTHAM-OHLSON MODELING

For better or for worse, capital markets research is primarily empirical, rather than theoretical. One major exception is the modeling by Feltham and Ohlson (hereafter F-O). As one of the few attempts during the last ten years to develop a "theory of accounting" (i.e., a formal representation of value in terms of accounting numbers), the F-O approach is, in my opinion, one of the most important research developments in the last ten years (important articles are Ohlson [1995, 1999] and Feltham and Ohlson [1995, 1996]). F-O modeling is also one of the more controversial research areas in accounting. I will discuss the key features, empirical applications, major criticisms, and prospects for future research.

Key Features of F-O Modeling

One feature is the common set of assumptions that pervades the work. The assumptions include a valuation assumption that the value of equity is equal to the present value of expected future dividends, the clean surplus relation, and some form of a linear information dynamic. Feltham and Ohlson have derived a rich set of implications from these parsimonious assumptions.

In contrast to prior attempts to link accounting data and equity value, the F-O approach is neither a theory of information nor a theory of measurement. However, it permits a representation of the value of equity in terms of accounting numbers (most prominently, book value and expected abnormal earnings), relying essentially on the present value of expected dividends and clean surplus relation assumptions.

The F-O approach provides a role for many important features of the accounting system, including clean surplus, book value as well as earnings, transitory components of earnings, conservatism, and delayed recognition. For example, we can clearly see a progression in adding key features of the financial-reporting system. Early modeling assumed unbiased accounting and the clean surplus relation, while later extensions incorporated conservative accounting (Feltham and Ohlson 1995; Zhang 2000). Feltham-Ohlson alter the assumptions regarding the linear information dynamics to allow for "other information." In doing so, the model provides a role for information that is currently known and reflected in price, but is reflected with a lag in the accounting numbers. The model provides a representation for delayed recognition. By enriching the linear information dynamics, Feltham and Ohlson (1996) construct a theory of depreciation, which distinguishes between two potential sources of conservatism: accelerated depreciation and positive net present value projects. Ohlson (1999) decomposes earnings into permanent and transitory components. In the process, he clearly distinguishes between the concepts of forecasting relevance and the time-series persistence of an earnings component, and he demonstrates how each relevance concept affects valuation relevance of that earnings component. Extensions alter the linear information assumptions to incorporate additional conditioning variables (e.g., different decompositions of earnings, such as cash flows and accruals, Barth et al. [1999]). Thus the F-O approach provides a potentially rich platform for further modifications of the linear information dynamics to address additional accounting issues of interest.

The F-O approach has stimulated considerable empirical research. Frankel and Lee (1998) and Dechow et al. (1999) use the approach in testing market efficiency, which is a very ambitious application of the model. Studies employing a combined book value and earnings approach that either literally relies on the F-O model or is motivated by it are Barth, Beaver, and Landsman (1996, 1998), Barth and Clinch (1998), Burgstahler and Dichev (1997), Aboody et al. (1999), Barth, Beaver, Hand, and Landsman (1999), Collins, Maydew, and Weiss (1997), and Collins, Pincus, and Xie (1999). Other empirical applications include direct tests of the F-O model (e.g., Myers 1999; Barth, Beaver, Hand, and Landsman 1999). Major findings of this literature include the following:

(1) Both book value and earnings are significant pricing factors.
(2) The relative importance of book value is inversely related to the financial health of the firm.
(3) The coefficient on earnings is lower for firms with low return on equity.
(4) The coefficient on positive earnings is positive and significant, while the coefficient on losses is insignificantly different from zero.
(5) Accrual vs. cash flow components of earnings are priced significantly differently from one another. In general, the accrual components are associated with a lower coefficient.

Criticisms of the Feltham-Ohlson Approach

One major criticism is that the model has no endogenous demand for accounting data, but how serious is this charge? The modeling can be informative without including an endogenous demand for accounting, and I believe the criticism is somewhat misplaced or misdirected. By analogy, the Capital Asset Pricing Model (CAPM) has no demand for financial institutions, yet we observe financial institutions empirically. What do we conclude? Do we conclude that the risk-return trade-off derived from the CAPM is of no interest or relevance to investors or to managers of financial institutions? I think not. The F-O models do not attempt to derive a demand for accounting. The F-O approach provides a framework for representing valuation in terms of accounting numbers, while taking accounting as given exogenously. This framework relates published accounting data to equity valuation, allows us to interpret the coefficients on the valuation equation, and allows us to relate the coefficients from the valuation equation to coefficients from the time-series of earnings equation. With contextual accounting arguments added to the general framework, researchers can predict how accounting numbers would relate to value (e.g., predictions on how the coefficients for the cash-flow and accrual components of earnings would be expected to differ in an earnings forecasting equation and a valuation equation).

Another criticism is that there is no information asymmetry, and that hence no strategic uses of accounting data arise within the F-O framework. To be sure, many financial-reporting issues arise out of concern over information asymmetry and incentives to "manage" the accounting numbers. For example, the research on analysts' behavior and discretionary behavior address issues of information asymmetry and incentives. However, the F-O approach is a beginning. As a prelude to developing models that incorporate information asymmetry and strategic uses of accounting data in valuation, it is helpful to start with a model of the relation between the valuation and accounting numbers in a nonstrategic setting. Moreover, not all issues of interest in accounting involve information asymmetry. A large body of research examines empirically the relation between valuation and publicly available accounting numbers in a nonstrategic setting (e.g., value-relevance studies). A conceptual framework, such as the F-O approach, guides the specification and interpretation of the empirical estimating equations.

Of course, it would also be desirable to have a theory where demand for accounting data is endogenous, and to have models of information asymmetry where incentives to report strategically are endogenous. However, it is unreasonable to expect the F-O model to be rich enough to encompass all issues of interest to accounting research. Parsimony is a virtue in modeling. The model focuses attention on specific variables of interest, and the trade-off between insight and comprehensiveness is common in modeling exercises.

Some aspects of the models are unsupported by the empirical data (e.g., Myers 1999; Joos 2000; Barth et al. 1999), such as the linearity properties and the consistency among the coefficients in the system of linear information dynamics and valuation equations. However, the conflicting evidence highlights one of the important features of the F-O framework. Most accounting research is conducted in "reduced form." In other words, we estimate intuitively plausible relations that we hope will allow us to predict the sign of the coefficient. Rarely do we predict the magnitude of the coefficient. Even more rare are opportunities to test structural relations among the coefficients across different equations in the system. The F-O models permit us to predict how the coefficients within and across equations in the system are related. In particular, the coefficients in the valuation equation are a function of the coefficients in the linear information dynamics equations.

Although it may seem disappointing that we can reject the null hypothesis that the predicted coefficients equal the empirically observed ones, it is progress to be in a position to specify a predicted relation among the coefficients. We make further progress by asking what modifications would permit a consistency between the systems of equations. Introducing nonlinearity in information dynamics is a likely candidate. For example, the F-O model does not incorporate bankruptcy or other option-related phenomena that might introduce nonlinearities into the relation. Research is currently underway to incorporate nonlinearities (Yee 2001).

The F-O modeling is one of the few attempts to pursue accounting theory. It is no coincidence that the terminology of accounting (e.g., *income*) is similar to that used in economics and finance. We could have called the difference between revenues and expenses by another name, but we did not. The semantics of accounting was chosen because income theory asserts that the resulting measure is an indicator of firm performance. Hence, it is natural to focus on a theory of measures of accounting net income and their relation to value.

Empirical studies applying the F-O framework often append a contextual accounting theory regarding differences in cash flows vs. accruals, the fair value of financial instruments, or the nature of pension obligations to guide the empirical predictions. Such contextual richness can help fill in some of the substance omitted from the parsimonious F-O representations. Once these contextual theories are appended, the combination of parsimonious modeling and contextual richness provides a rich basis for empirical testing. One of the major applications of the F-O models is the value-relevance literature.

IV. VALUE-RELEVANCE RESEARCH

Value relevance is major area of empirical research in the last ten years.[2] Holthausen and Watts (2001) identify 54 value-relevance studies, only three of which were published before 1990. Value-relevance research examines the association between a security price-based dependent variable and a set of accounting variables. An accounting number is termed "value relevant" if it is significantly related to the dependent variable.[3] Defined in this most

[2] A more complete review of the literature appears in Barth, Beaver, and Landsman (2001).

[3] Beaver (1998, 116), Ohlson (1995), and Barth (2000) provide closely related formal definitions. The key commonality is that an accounting amount is deemed value relevant if it is significantly associated with equity market value.

general sense, value-relevance research has a long history (Miller and Modigliani 1966); however, the term came into common usage in the early 1990s (Easton et al. 1993). Papers by Ohlson (1995, 1999) also use the term "value relevance," in a manner consistent with empirical studies. As with the other research areas, value-relevance research is controversial (Holthausen and Watts 2001; Barth, Beaver, and Landsman 2001).

In this paper I address some basic questions: What distinguishes value-relevance research from other capital market research? Why is timeliness not a key issue in many value-relevance studies? What is the conceptual foundation of the value-relevance studies? What have we learned? What is the role of value-relevance research? What are some major unresolved issues?

What Are the Distinctive Characteristics?

Value-relevance research has two major characteristics. The first is that, more than any of the other four areas discussed, value-relevance research demands an in-depth knowledge of accounting institutions, accounting standards, and the specific features of the reported numbers. This knowledge includes the stated objectives of financial reporting, criteria standard setters use, the basis for specific standards, and details of how to construct the accounting numbers under a given standard (pension reporting is an excellent example). Incorporating the accounting context gives value-relevance research its richness and provides a basis for empirical predictions (Barth 1991), and vividly illustrates accounting researchers' comparative advantage in examining relations between equity value and accounting numbers.

A second distinguishing characteristic is that timeliness of information is not an overriding issue. Although value relevance research encompasses event studies, it also includes studies that examine the relation between the *levels* of stock prices and the accounting data. The timing of the information is of primary concern in the event-study research design. Event studies examine the stock price reaction over short windows of time centered on the announcement date. They identify the date of the public disclosure of the item being studied and examine the price change (usually in percentage terms and adjusted for market-wide movements) surrounding the event date.

In contrast to event studies, levels studies identify drivers of value that may be reflected in price over a longer time period than assumed in event studies. For example, prices may reflect the information before the announcement date. The value-relevance research characterizes market value at a point in time as a function of a set of accounting variables, such as assets, liabilities, revenues, expenses, and net income. This research design does not address timeliness, in contrast to "event-study" research design.

Why Is Timeliness Not the Key Issue?

The accounting system recognizes events later than security prices do (e.g., Ryan 1995). Delayed recognition is a natural implication of accounting standards, such as the revenue recognition principle. Moreover, we know that earnings announcements are largely, but not entirely, preempted by the disclosure of other information (Ball and Brown 1968; Beaver 1968). Landsman and Maydew (2002) conclude this finding has not changed over the last 30 years. Imagine a world in which earnings is the only information relevant to the value of the firm. With no private information search or prior public disclosures that preempt the earnings announcement, we would observe large spikes in price changes at earnings announcement times, in response to the unexpected earnings. However, this prospect creates incentives for private information search to obtain prior information about the forthcoming accounting earnings. To the extent that private information and prior public announcements are reflected in prices before the public earnings announcement, the price reaction at the earnings announcement date is reduced. In the limit, a search for prior information can completely preempt the earnings announcement; however, such preemption does not eliminate the importance of reported earnings. The primary barrier to the complete preemption of earnings is the cost of obtaining the prior information. This cost includes not only the out-of-pocket cost of the information search, but also indirect costs imposed by the legal liability for selectively disseminating or obtaining nonpublicly available information. As the costs approach zero, the announcement effect can approach zero.

Models by Demski and Feltham (1994), McNichols and Trueman (1994), and Kim and Verrecchia (1994) formalize this process. For example, in Demski and Feltham (1994) the sole role of the information obtained before the earnings announcement is to provide information about forthcoming earnings. In short, these models imply there is more to the price-earnings relation than only the short-term price reactions at the announcement date. In fact, the magnitude of price change at the announcement date is informative about the costs of obtaining predisclosure information, but provides limited evidence about how value-relevant earnings are.

The informational approach states that a signal is informative only if the signal can alter beliefs conditional upon the other information available. This would require that the accounting number have some unique component that is not preempted by other information available prior to or simultaneous with the accounting number. This perspective is consistent with event study research designs, which control for other information publicly available prior to and concurrent with the accounting announcement.

However, accounting numbers are not unique representations of the underlying constructs they are designed to capture. It is often possible to find a vector of publicly available information that, collectively, is highly correlated with a particular accounting number. For example, the fair value of bank loans is a function of default risk and interest rate risk (Barth et al. 1996). Some linear combination of book value of the loans, proxies for default risk, and proxies for interest rate risk may be highly correlated with fair value measures, even if those measures "perfectly" capture the underlying construct. However, a key role of financial statements is to summarize relevant information parsimoniously and in a manner consistent with the underlying concept. It is informative to know how well accounting numbers play this role, even if vectors of competing proxies for the same underlying construct exist. In fact, if the accounting number (e.g., fair value of bank loans) is capturing the underlying construct, then we would expect other proxies for the construct (e.g., default risk and interest rate risk) to be correlated with the accounting number. Such correlation would indicate that the accounting number is capturing the underlying construct.

To choose another example, assume that an alternative set of data could produce a variable that is perfectly correlated with depreciation expense. Would this imply that one could exclude depreciation from the calculation of net income? Lambert (1996) concluded that the FASB probably would not exclude depreciation. The balance sheet and income statements are not intended to list only those assets, liabilities, revenues, and expenses not preempted by other publicly available information. The financial statements are intended instead to be "complete" within the constraints and definitions of generally accepted accounting principles. In this broader view of the role of financial statements, timeliness is only one dimension.

This broader view has implications for research design. For example, researchers often use first differences, rather than levels, of a stock-price-related dependent variable to mitigate some econometric problems, such as correlated omitted variables or serial dependency in the regression residuals (Landsman and Magliolo 1988). However, changing the form of the variable may fundamentally change the question addressed. One chooses the levels design when the problem is to determine what accounting numbers are reflected in firm value, whereas one chooses the first differences research design when the problem is to explain changes in value over a specific period of time. Hence, in the first differences formulation, the issue of timing of the information is important. Thus, if the researcher is interested in whether the accounting amount is timely, then examining changes in value can be the appropriate research design choice. However, for the reasons discussed earlier, researchers are interested in a variety of questions, many of which do not involve timeliness.

What Is the Conceptual Foundation of Value-Relevance Research?

The theoretical foundation of value-relevance studies is a combination of a valuation theory plus contextual accounting arguments that allow researchers to predict how accounting variables relate to the market value of equity. There are three major types of valuation models. The oldest is an earnings-only approach—Miller and Modigliani (1966) characterize value as the present value of permanent future earnings. The research of Landsman (1986), Barth (1991), and Barth et al. (1996) adopts a balance-sheet approach. The Feltham-Ohlson model discussed earlier represents firm value as a linear function of book value of equity and the present value of expected future abnormal earnings. Value-relevance studies have relied heavily on a combined book value and earnings approach (Barth, Beaver, and Landsman 2001).

However, the valuation assumption is only half the story. Value-relevance studies typically incorporate contextual accounting arguments to predict the relation between accounting variables and market value. For example, the prediction that pension assets and obligations are priced as if they are assets and obligations of the company is based on the conceptual argument offered by the FASB (among others) regarding the economic substance of the pension contract between the company and employees, under a defined benefit plan (Landsman 1986).

The predictions of the way fair value of financial instruments will be priced in a valuation equation draws upon conceptual arguments concerning relevance and reliability of fair value vis-à-vis historical costs. This is an accounting theory, albeit one couched in terms of measurement of specific assets or obligations rather than a global statement that unequivocally predicts how all assets and liabilities would be measured and priced. Although the lack of a general theory of accounting can frustrate researchers (and others), researchers can use contextual accounting arguments to aid in predicting valuation-accounting number relations.

What Have We Learned?

The hallmark of value-relevance studies is that their execution requires an investment in and understanding of the institutional details of the way financial statements are prepared and of contextual arguments regarding the properties of various measures. What we have learned relates to three questions regarding an accounting number: Is it priced (i.e., does it have a coefficient that is significantly different from zero)? Is it priced consistently with some theoretical value (e.g., for a balance sheet number, is its coefficient equal to 1)? Is a particular accounting number priced equal to or differently from similar accounting numbers (e.g., do all components of net income have the same valuation multiples)? Here are some examples of what we have learned.

Evidence indicates that unrecorded pension assets and liabilities (unrecorded but disclosed in the footnotes) are priced. Landsman (1986), Barth (1991), and Barth et al. (1992) find that the unrecognized portion of pension assets and liabilities is priced in a manner consistent with the capital market viewing pension assets as assets of the company and pension obligations as liabilities. Similar findings with respect to other post-retirement benefits (Amir 1993; Choi et al. 1997) are observed. Fair values of financial instruments are priced (Barth et al. 1996). However, the results are mixed with respect to the fair value of bank loans (Beaver and Venkatachalam 2000; Eccher et al. 1996; Nelson 1996). Moreover, Barth (1994a) shows that pricing multiples vary with the type of investment security in a manner related to the ease with which bank management can estimate the fair values.

Footnote information is often not as prominently displayed and may contain complex, arcane data (concerning such items as pension disclosures) that can be difficult to interpret. The pricing of footnote data is a nontrivial issue. The pricing of pension assets and obligations and the fair value of financial instruments is of interest in its own right. However, they are two prominent examples of the broader issue of whether footnote information is priced. Another example is nonperforming loans, which is footnote information on the default risk of bank loans. Empirical evidence indicates nonperforming loans are significant in explaining the value of bank common equity (Beaver et al. 1989; Wahlen 1994; Beaver and Engel 1996; Barth, Beaver, and Landsman 1996; Venkatachalam 1996).

The value-relevance literature also addresses questions relating to nonfinancial intangible assets. These studies generally find that intangible assets (e.g., capitalized software, brands, and goodwill) are priced (e.g., Aboody and Lev 1998; Barth, Clement, et al. 1998; Barth and Clinch 1998; Chambers et al. 1999). Studies also find that investors perceive research and development and advertising expenditures and bank core deposits as assets of the firm (e.g., Abdel-khalik 1975; Hirschey and Weygandt 1985; Bublitz and Ettredge 1989; Landsman and Shapiro 1995; Barth et al. 1996; Eccher et al. 1996; Lev and Sougiannis 1996; Healy et. al. 1997; Joos 2000). Barth and McNichols (1994) and Hughes (2000) find that unbooked environmental liabilities are also priced.

One would expect various components of earnings to be associated with different pricing multiples based on the persistence of that earnings component (Sloan 1996; Ohlson 1999). Empirical evidence indicates that the accrual components of earnings are not only less persistent than the cash-flow components in forecasting future earnings, but also that the accrual components are associated with a lower earnings multiple (Barth et al. 1999). Also for banks, earnings before security gains and losses is associated with a higher pricing multiple than security gains and losses (Barth et al. 1990).

The Role of Value-Relevance Research

Accounting research can play three roles:

(1) Research can help articulate the nature of the issues, and can provide a paradigm or language with which to frame the questions of interest. The paradigm of the value of information is not a predictive theory in itself, but provides a definitional and taxonomic framework for formulating the informational role of accounting numbers.
(2) Research can provide a theory. This theory can be normative, which leads to prescriptive statements, or positive, which provides hypotheses and testable predictions.
(3) Research can provide empirical evidence.

Empirical evidence is a signal from an information system. The study's research design describes the features of the information system. The researcher forms priors with respect to the relationships of interest (e.g., probabilities that either of two alternative hypotheses is true). The evidence is a signal that leads to a posterior distribution, which must differ from the prior for at least one possible signal for the research to be informative. As the power of the research design increases, the signals generated by the design become more informative.

Value-relevance research provides evidence as to whether the accounting numbers relate to value in the predicted manner. In the pension context, the predictions are based on contextual theory that pension assets are assets of the firm and pension obligations are obligations of the firm. A plausible prediction is that pension assets (obligations) are priced as assets (obligations). A study's findings represent only one of many possible outcomes. However, the subsequent discussions and the subsequent research conducted are informed by and conditioned on the observed evidence.

Unresolved Issues

Some of the unresolved issues affecting the inferences drawn from value-relevance research include market efficiency, econometric issues, and other purposes of financial statements. Does market efficiency affect interpretation of the results? I believe it does, but the findings are important even if markets are inefficient. Are the standard econometric issues more serious with respect to this research area than elsewhere? Most, if not all, of the econometric issues faced here are common to other areas of accounting research. Moreover, value-relevance research incorporates design features to mitigate these concerns. Finally, what other purposes of financial statements should be explored as a complement to the value relevance research? Accounting for contracting purposes is a major candidate (Watts and Zimmerman 1986).

V. RESEARCH ON ANALYSTS' BEHAVIOR

Another major research area is analysts' forecasting abilities and their coverage decisions. Analysts' behavior is important to accounting research, because analysts are among the major information intermediaries who use and interpret accounting data (Schipper 1991). As a result, security prices reflect the results of their analysis. Because the average prudent investor may lack the time, skill, or resources to analyze and interpret financial statements, analysts can be a major way in which accounting data become reflected in security prices. Efficient analysts' information processing can facilitate the efficiency of security prices, as well. If there are limitations and inefficiencies in the analysts' information processing, and if capital markets do not draw on other aspects of the total mix of information to circumvent analysts' limited information processing, then prices may not fully reflect the financial statement data. To the extent that analysts rely on a rich set of publicly available data, their forecasts can be a natural way to incorporate other information into the research design of valuation studies (e.g., via the application of the F-O models). An investigation of analysts' forecasts can assess the importance of accounting data relative to the total mix of information.

The history of analysts' forecasts is rich (Brown 1993). In some respects, it is the successor to the time-series of earnings literature (Beaver 1970; Ball and Watts 1972). The early literature focuses on which time-series model most accurately forecasts earnings. Identifying the process tells us something about the general characteristics of the accounting numbers (e.g., seasonality and adjacent quarter-to-quarter effects). Moreover, researchers use earnings forecasts derived from these models as inputs into other forms of research (e.g., we can use earnings forecast errors in security returns studies). Analysts' earnings forecasts are natural candidates for more accurate forecasts because they can reflect a richer information system than simply the past earnings series. One of the original purposes, learning about the features of the accounting system, has withered. However, the literature has examined issues beyond those related to finding the most accurate earnings forecast. Biases, processing limitations, and strategic considerations have been addressed.

What Have We Learned?

Much prior research has concluded that analysts' forecasts are optimistic (O'Brien 1988, among others), although there appears to be secular reduction in the optimistic bias (Brown 2001). The degree of bias is related to underwriter affiliation. Analysts employed by investment firms that are associated with the underwriting of the firm's securities issue more optimistic forecasts (Lin and McNichols 1998). Analysts' (initially optimistic) forecasts tend to be revised downward during the year (Kasznik and McNichols 2001). Analysts with better forecasting ability appear to have a higher probability of survival (Mikhail, Walther, and Willis 1999; Clement 1999).

Analysts' forecasts outperform the best statistical models (Brown et al. 1987a, among others), which is not surprising, since the analysts can use a richer information set than the past earnings series. However, a model that incorporates both statistically based forecasts and analysts' forecasts outperforms analysts' forecasts alone, which implies that the analysts' forecasts do not reflect all of the information in the past earnings series (Brown et al. 1987b). The forecast errors based on analysts' forecasts are serially correlated, which is also consistent with the idea that analysts' forecasts do not fully reflect all the available information (Dechow et al. 1999; Frankel and Lee 1998). This evidence is also consistent with analysts' underestimating the persistency of earnings (Abarbanell and Bernard 1992).

These findings would be of mild interest in their own right even if capital markets fully adjusted for this behavior. However, they take on added significance, to the extent that capital markets do not appear to unravel these biases and processing inefficiencies. Capital markets appear to reflect naively analysts' forecasts in prices. This finding appears to explain (at least partially) the abnormal returns associated with market-to-book and market-to-value strategies (Dechow and Sloan 1997; Frankel and Lee 1998). Analysts' forecasts appear to be a parsimonious way to capture "other information" (at least in part) in the Ohlson sense of the term (Dechow et al. 1999). Analyst coverage is greater for firms with more institutional investors (O'Brien and Bhushan 1990) and more intangible assets (Barth, Kasznik, and McNichols 2001).

Unresolved Issues

Researchers need a better understanding of the incentives of analysts with respect to forecasting. In particular, why do analysts form biased forecasts? Even in the face of evidence that the bias is associated with underwriter affiliation, there are multiple explanations for the bias. Is it intentional, or is it a manifestation of self-selection (McNichols and O'Brien 1997)? Why do analysts misestimate the persistence of earnings? Why do forecasts not fully reflect the available information?

Do analysts learn over time? Are they more accurate with experience (Clement 1999)? Does the capital market learn over time in its processing of analysts' forecasts? How do analysts make decisions regarding the allocation of their efforts across the firms covered? How does analysts' behavior vary with the financial-reporting environment? For example, Barth, Kasznik, and McNichols (2001) find that analyst coverage increases with the presence of unrecorded intangible assets. What other financial-reporting features are important? Furthermore, what are the mechanisms by which analysts' forecasts are incorporated into price? Why do errors in analysts' forecasts appear to result in the mispricing of securities? Why does the market price appear not to adjust fully for these documented regularities in analysts' forecasts?

Another major issue is to identify the other information besides accounting data that influences analysts' forecasts. Frankel and Lee (1998) and Dechow et al. (1999) have used analysts' forecasts as a proxy for other information. However, from the context of a broader system, analysts' forecasts are endogenous and are a function of underlying exogenous variables. The dimensionality of such other information is quite large. However, it is important to identify at least some of the major exogenous variables that explain analysts' forecasts. Amir and Lev (1996), Deng et al. (1999), Ittner and Larcker (1998), Lev and Sougiannis (1996), and Joos (2000) explore the ability of nonfinancial measures, such as population within licensed areas, penetration ratios, patents, FDA approvals, concentration ratios, and market share to aid in predicting future earnings and in explaining prices. Is this information reflected in analysts' forecasts as well?

VI. RESEARCH ON DISCRETIONARY ACCRUALS

Management can improve or impair the quality of financial statements through the exercise of discretion over accounting numbers.[4] Discretionary behavior includes voluntary earnings forecasting, voluntary disclosure, choice of accounting methods, and estimation of accruals. While research exists in all these areas, I will focus on the management of accruals (also known as earnings management). Accrual accounting is the heart of our financial-reporting system. I will discuss several aspects of earnings management: motives for earnings management, major findings, estimation of discretionary and nondiscretionary components, and unresolved issues.

Motives for Accrual Management

Motives fall into two broad categories: opportunistic or signaling. We tend to perceive the latter as benign, but not the former. Motives for managing accruals relate to compensation contracts, debt covenants, capital market pricing, taxes, litigation, and regulatory behavior (Watts and Zimmerman 1986; Beaver and Engel 1996). Each motive constitutes a broad category that encompasses a variety of specific behaviors. For example, capital market effects include management's attempts to influence the offering price in equity offerings, the terms or the value of stock options, and prices at which management-held securities are sold.

These motives can operate in either opposing or reinforcing ways, often making it difficult to isolate the primary motive (Healy and Wahlen 1999). For example, both capital market and compensation contracts can lead to incentives to overstate earnings. As a result, many researchers have not specified the precise nature of the underlying motivation, seeking instead to determine whether an empirical estimate of the discretionary accrual is related to some firm characteristic (e.g., financial difficulty, loss avoidance, income smoothing, big baths).

What Have We Learned?

Managers exercise discretion in response to a rich set of forces. Researchers use three major approaches to identify earnings management: generic models of discretionary accruals (e.g., Healy 1985; Jones 1991), tests based on discontinuities in the reported earnings distribution (e.g., Burgstahler and Dichev 1997), account-specific models of discretionary behavior (McNichols and Wilson 1988; Petroni 1992; Beatty et al. 1995), and combinations of these approaches (Beaver, McNichols et al. 2000).

[4] McNichols (2000) reviews recent research in earnings management and discretion with respect to accounting data. Schipper (1989) provides an early perspective on earnings management.

Management appears to manage earnings to avoid a loss, to avoid an earnings decline (Burgstahler and Dichev 1997), and to avoid falling below analysts' forecasts (Burgstahler and Eames 1998). Firms that issue earnings forecasts tend to manage earnings toward meeting those forecasts (Kasznik 1999; Matsunaga and Park 2001). Earnings management appears to be widespread and relatively easy to detect, at least as estimated by extant techniques. Loan loss reserves in the banking sector and policy loss reserves in the insurance sector appear to be two major accounts subject to management. Accrual management is only one form of earnings management. Others include hedging activities (Barton 2001) and altering research and development expenditures (Bushee 1998). In the banking sector, management appears to manage the loan loss reserves jointly with other forms of earnings management (Beatty et al. 1995).

Capital markets appear to price differently the nondiscretionary and discretionary components of an accrual. In the banking sector, capital markets treat additional loan loss reserves as good news, not bad news, consistent with signaling interpretations of discretionary reporting of estimated loan losses. In particular, financially stronger banks signal they can afford to take the hit to earnings (Beaver et al. 1989; Wahlen 1994). Capital markets price discretionary components of loan loss reserves differently than nondiscretionary portions (Beaver and Engel 1996).

In the property and casualty sector, the development of policy loss reserves is consistent with earnings management (Beaver and McNichols 1998). The stock prices of property and casualty firms appear to reflect fully the predictability in the policy loss development (Beaver and McNichols 1998, 2001). However, the evidence from the generic accrual studies suggests a different picture with respect to market efficiency and the pricing of accruals. Accruals, considered to be more subject to discretion, are less persistent than stock prices of existing securities imply, whereas cash flow from operations is more persistent than stock prices imply (Sloan 1996; Xie 2001). Unusual accruals occur at initial public offering dates and reverse themselves subsequently. These unusual accruals appear to be correlated with the negative abnormal returns observed in the initial public offering literature (Teoh et al. 1998a, 1998b; Teoh, Wong et al. 1998).

Estimation of Discretionary and Nondiscretionary Accruals

A major issue with respect to the power of this research is the ability to identify proxies or conditioning variables that reflect the discretionary and nondiscretionary components of the accrual. In the Jones (1991) model, sales is the key nondiscretionary variable driving current accruals, and capital expenditures is the key variable driving noncurrent accruals. Needless to say, this is a parsimonious model. Research investigating sector-specific accruals, such as the loan loss provision, typically uses sector-specific variables, such as nonperforming loans, to increase the precision with which one can measure the nondiscretionary component.

Identifying proxies for discretionary accruals can be a challenge. Often, studies regress total accruals on only the nondiscretionary variables and assume the residual is discretionary (e.g., applications of the Jones model). Of course, failure to identify fully the nondiscretionary component implies the regression residual contains both discretionary and nondiscretionary components, and the researcher has measured the estimated discretionary and nondiscretionary components with error. Typically, the explicit conditioning variables for discretionary accruals, such as earnings or leverage, are generic. These generic variables can be proxies for many firm characteristics, which make the interpretation of coefficients of the discretionary accruals in valuation equations challenging.

The development of policy loss reserves in the property-casualty sector provides a unique opportunity to identify the discretionary component of an accrual (Petroni 1992).

Property-casualty firms must report *ex post* estimation error for reserves reported in earlier years, where the amount of this error is called development. Researchers can estimate the discretionary component without a specification of either discretionary or nondiscretionary variables. Development includes *ex post* surprises of a nondiscretionary nature. However, if development is not subject to discretion, then it has an expected value of zero, and, by implication, zero serial correlation. As discussed earlier, empirically, development has a positive expected value for financially weaker firms, implying an understatement of the loss reserve (Petroni 1992), and development is highly positively serially correlated over time, consistent with management recognizing information slowly over several years (Beaver and McNichols 1998). Petroni et al. (2000) further decompose the development into discretionary and nondiscretionary components and find they have different implications for future profitability, risk, and market value.

Unresolved Issues

Much of this discussion implies that extant methods for the identification of discretionary accruals are of potentially low power. Using an empirical simulation, Dechow et al. (1995) provide evidence that extant models are not very powerful. Yet, empirically, the majority of studies observe earnings management. Moreover, many forms of earnings management appear to be identifiable not only by researchers, but also by the capital markets.

Why is it relatively easy to detect earnings management empirically if the models are of low power? One might conjecture that effective earnings management (at least of the opportunistic type) would not be easy to unravel. Why is it relatively easy for the researchers to detect earnings management, typically using contemporaneous (not future) data? Is management naïve? Does earnings management achieve its goals (often unstated) even if it is invertible? What incentives for earnings management are consistent with the capital market's ability to invert the discretionary portion and price it differently? Is discretionary behavior a natural manifestation of contracting in incomplete markets (Demski and Frimor 1999)? The nature of the discretion may be known but not contractible. Incentives and costs to eliminate discretionary behavior are unclear, and discretionary behavior may be an equilibrium outcome, albeit not a "first best" solution.

These questions, of course, raise the possibility that what looks like earnings management may not be. Perhaps what researchers observe is not discretion or management at all, but is a proxy for some other factor. If so, then what might those factors be? McNichols (2000) offers evidence that discretionary accruals are correlated with growth and that the mispricing of accruals may in fact be the "glamour stock" phenomenon (i.e., the mispricing of high-expected-growth stocks) in disguise. In particular, she shows that aggregate accruals models that do not incorporate long-term earnings growth are potentially misspecified and can result in misleading inferences regarding earnings management. The implication is differential behavior observed in prior studies may relate to the performance characteristics of the firms (e.g., correlated with growth) rather than to differential incentives to manage earnings.

VII. CONCLUDING REMARKS

Market efficiency, Feltham-Ohlson modeling, value relevance, analysts' behavior, and discretionary behavior not only have had the greatest impact on capital market research over the last ten years, but they also have the greatest potential to contribute significantly to our knowledge over the next five to ten years. These areas address important questions. They are linked together and build upon one another's knowledge and research designs.

They raise major issues that remain unresolved. Three recurring themes are markets (efficiency, valuation), individual behavior (investors, analysts, managers), and accounting structure or context. Accounting research is distinct and important only insofar as it confronts the first two themes with the third—an observation similar in spirit to the point made by my predecessor (Kinney 2001).

Each of these research areas is controversial in terms of either findings or research method. Is important research by nature controversial? I believe controversy is a natural consequence of conducting important research, especially in the early stages of the research. Innovative research is likely to be the most controversial of all. Thirty-five years ago, many questioned whether capital market research with respect to accounting numbers was legitimate accounting research.

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Accounting and capital markets: a survey of the European evidence

Pascal Dumontier
Pierre Mendès-France University, Grenoble

Bernard Raffournier
University of Geneva

ABSTRACT

The relationship between accounting information and capital markets has been the subject of numerous studies, especially in the US. The purpose of this article is to examine the corresponding evidence in Europe. This review classifies the European literature into three groups: studies of the market reaction to newly released accounting information; studies of the long-term association between stock returns and accounting numbers; studies devoted to the use of accounting data by investors and to the impact of market pressure on accounting choices. The paper reviews and summarizes the main results related to each of these topics. It also addresses some methodological issues and provides suggestions for future research.

1. INTRODUCTION

Since the pioneering work of Ball and Brown (1968), the relationship between accounting information and capital markets has attracted considerable attention, to the point that it is probably one of the most popular issues in the accounting literature. The interest for this subject is legitimate, given the generally accepted statement that accounting figures are aimed at providing investors with relevant information for their investment decisions. Even if accounting data are used in various contexts such as the contracting process within the firm or between the firm and its creditors and suppliers, regarding capital markets they are supposed to facilitate the prediction of firms' future cash flows and help investors assess future securities' risk and returns. This is certainly why innumerable studies have been conducted in the US during the last three decades with the aim of determining to what extent this objective was achieved. This article examines

Address for correspondence
Bernard Raffournier, HEC – University of Geneva, 40 bd. du Pont d'Arve, 1211 Geneva 4, Switzerland. E-mail: Bernard.Raffournier@hec.unige.ch

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the corresponding European evidence. Three types of research are successively considered. (1) Studies of the market reaction to the release of new accounting information that analyse the stock price impact of accounting disclosures in order to determine whether these are useful to market participants. (2) Studies of the long-term association between stock returns and accounting numbers, which examine the extent to which the information conveyed by accounting figures is consistent with that reflected in stock prices. (3) Complementary studies devoted to the use of accounting data by investors and to the influence of market considerations on accounting choices. For practical reasons, this review focuses on the most recent studies and is limited to articles published in English.

2. THE MARKET RESPONSE TO ACCOUNTING DISCLOSURES

The primary objective of capital market research has been to assess whether accounting data provide value-relevant information to investors, incremental to all other sources of publicly available information. The information content of accounting numbers is inferred from changes in the level or in the variability of stock prices and from changes in the volume of security trades over a short time period during which these data are publicly released. After a short description of methodological issues related to market reaction studies, this section summarizes the European evidence on the impact of accounting disclosures on stock returns or trading volumes. It is shown that clear market reactions to accounting announcements have been detected in all European countries where such studies have been conducted. Since these reactions exhibit significant differences between firms, this section also reviews studies that have analysed the determinants of these differences. Finally, it examines the empirical evidence related to the post-announcement drift anomaly and offers conclusions and suggestions for future research on the market response to accounting disclosures.

Empirical design of market reaction studies

If capital markets are efficient, stock prices must reflect quickly and fully any newly released information. Consequently, a change in the level or in the variability of stock prices or a change in the quantity of security trades is expected during the announcement period if the disclosed numbers convey new information to market participants about the timing, the amount or the uncertainty of anticipated future cash flows. In fact, most of these studies focus on the informational characteristics of the bottom-line earnings only. The information content of earnings is inferred from the mean abnormal returns, from the volatility of returns or from changes in the volume of trading over a short period around the announcement date.

The mean abnormal return methodology makes the assumption that earnings should cause a stock price increase if they convey good news, and a price decrease if they communicate bad news. Since the amount of earnings is *per se* meaningless, this number must be contrasted to the market's expectations about earnings. The first step is therefore to disentangle the expected and unexpected components of reported earnings. Expected earnings are generally estimated in two different ways. Assuming that earnings follow a random process, some studies take earnings of a given year as the following year's expected earnings. Other studies use the analysts' consensus forecast as the best available measure of expected earnings. Under the information-content hypothesis, positive unexpected earnings should on average lead to positive abnormal returns, and negative unexpected earnings to negative abnormal returns. Earnings are supposed to convey relevant information if abnormal stock returns are statistically positive for firms with positive unexpected earnings, and statistically negative for companies with negative unanticipated earnings. Abnormal returns are defined as the difference between actual and market-adjusted predicted returns.

The methodology based on the volatility of returns assumes that any announcement that does convey information should cause a price change. The variability of returns is therefore expected to be higher at the announcement date than on any other day. Hence, observing whether there is an increase in the volatility of returns on announcement days can test the hypothesis that earnings convey information to investors. In the same way, if earnings are a relevant source of information for investors, they should lead to portfolio rearrangements and therefore their release should cause significant increases in the number of security trades. The methodologies used to detect these increases are very similar to those adopted to measure mean abnormal returns: the trading volume metric is either the number or the market value of traded shares, and abnormal volumes are defined as the difference between actual and expected volumes at the announcement dates. The methodology based on trades, just like the one based on the volatility of returns, has the advantage of circumventing the problem of specifying an earnings expectation model.

The market reaction to annual and interim accounting disclosures

European studies which have investigated the stock price reaction to earnings announcements confirm the seminal findings of Beaver (1968) in the US: earnings disclosures lead to significant stock price changes or trading volume increases. In the UK, Firth (1981) reported both abnormal absolute stock returns and significant trading volume increases at annual earnings announcement dates under the period 1976–78, for a sample of 120 companies. Similarly, Pope and Inyangete (1992) observed a strong increase in the volatility of security returns around announcement dates for a sample of 3,541 UK annual earnings announcements between 1985 and 1987. With a different approach, Hew *et al.* (1996) confirm that UK annual earnings have information content for investors, since positive (negative) unexpected annual earnings were found to cause significant positive (negative) returns. Results in Finland, Spain or France are consistent with those obtained in the UK. Using data from the Finnish stock market, Kallunki (1996) showed that positive (negative) unexpected annual earnings announcements are associated with positive (negative) abnormal returns at the announcement dates. In the same vein, Gajewski and Quéré (2001) analysed the French market response to annual earnings announcements by comparing actual earnings with those expected by financial analysts. Their data indicate that positive unexpected earnings lead to positive abnormal returns, while negative unexpected ones cause negative returns. This result is consistent with a study by Gajewski (1999) which found that trades on the Paris Stock Exchange increase significantly around earnings announcements. In Spain, Pellicer and Rees (1999) examined the volatility of security returns around 223 annual earnings announcements. By ranking the absolute abnormal returns across a 51-day window centred on the disclosure date, they observed that the volatility of returns was the highest during the two days surrounding earnings announcements. Stating that the information content of earnings announcements should cause a reaction that should be more pronounced on option prices than on stock prices because of the leverage effect of options, Donders *et al.* (2000) studied the impact of earnings releases on the volatility and the trading volume of call options on Dutch stocks at the annual earnings announcement dates. As expected, they found that the volatility of option prices and trading volumes increase around the announcement days and drop afterwards.

Firms regularly release information through quarterly and half-year disclosures that may help investors anticipate the level of annual earnings. Following Kiger (1972) or Foster (1977) in the US, several European studies have been devoted to the usefulness of these interim disclosures. In France, listed companies must disclose their quarterly turnovers and release half-year reports containing a six-month income statement and relevant information on their operations. Since interim disclosures are at once not audited and less abundant than semi-annual releases, Gajewski and Quéré (2001) hypothesized that the market reaction to quarterly disclosures should be lower than the one of half-year reports. Their results for the 1994–96 period indicate that turnover data disclosed by French quoted companies at the end of each quarter do not cause significant market reactions. This leads the authors to question the usefulness of these mandatory disclosures. In contrast, stock price reactions to half-year and annual releases are both statistically significant but, as expected, the information content of half-year disclosures appears to be less than the one of annual reports. With regard to interim accounting information, Spanish firms are subject to more demanding requirements than French ones. They must disclose earnings quarterly and publish a half-year report containing a profit and loss account and a balance sheet. This is certainly why, unlike the French evidence, Pellicer and Rees (1999) did not notice any significant difference in the volatility of returns accompanying annual and interim releases in Spain. In contrast with the French and Spanish evidence, the information content hypothesis of interim reports appears to be rejected in Belgium. In this country, a law implemented in 1990 obliges listed firms to disclose semi-annual earnings. Van Huffel *et al.* (1996) have thus analysed the stock price reaction to half-year report releases just after the establishment of this new legal requirement. Although the sign of unexpected earnings was positively associated with the sign of abnormal returns at the disclosure dates, the authors did not detect any clear announcement effect. Interim disclosures under study were not associated with statistically significant abnormal returns.

Since accounting figures are reported continuously throughout the year, Firth (1981) proposed to examine the incremental information content of four accounting events in order to better understand how investors process accounting data. These events are the release of interim reports, the announcement of preliminary earnings, the release of annual reports and the annual meeting of shareholders. The study covered the 1976–78 period and the sample consisted of 120 randomly selected UK companies listed on the London Stock Exchange. The information content of each event was determined by ranking by size the cross-sectional average of the absolute values of weekly abnormal returns around each announcement. Firth's results indicate that preliminary and interim announcements possess the highest information content. The release of annual reports also exhibits a significant information content. In contrast, the price impact of annual general meetings seems insignificant. Correlation tests showed that abnormal returns associated with preliminary earnings announcements were positively related to abnormal returns at both interim disclosure and annual report dates. This suggests that firms that exhibit highly informative preliminary announcements also have highly informative annual reports and interim disclosures. Rippington and Taffler (1995) replicated Firth's study using daily instead of weekly share returns. Unlike Firth, they noted that stock price reactions to annual reports are frequently low, suggesting that such disclosures do not convey relevant information to investors. However, since some of their sampled firms exhibited outstandingly high abnormal returns at the time of their annual report release, the authors analysed financial press comments on these firms' reports. They ascertained that the observed high returns were due to unexpected specific information in the audit report, the funds statement, the chairman's statement, geographical or activity breakdowns, or in the notes to the accounts. This led Rippington and Taffler to express the view that, although they do not generally induce significant price reactions because they mainly confirm data that are correctly anticipated by investors, annual reports play a significant role in the valuation process due to the extremely relevant information they disclose in a relatively small but nonetheless important number of specific cases.

The information content of specific accounting data

Several European studies have focused on the price effect of specific accounting data. Peasnell *et al.* (1987), for example, have investigated the information content of current cost information disclosed by about 200 companies listed on the London Stock Exchange between 1980 and 1984. Their results showed that this information has a small but real impact on stock returns in days surrounding the earnings announcement. Given that Finnish accounting rules allow firms to manage their reported earnings in a variety of ways and assuming that Finnish companies pay great attention to tax considerations when preparing their financial reports, Booth *et al.* (1996) expressed the view that accounting earnings should be strongly manipulated in Finland, which should restrict their information content. To examine this hypothesis, they measured the price impact of five different income levels that are systematically adjusted for earnings management by Finnish financial analysts, in addition to the traditional net earnings usually reported by firms. Their results suggest that investors react to negative but not to positive unexpected earnings. Moreover, and perhaps more interestingly, the authors noted that the magnitude of unexpected stock returns around announcement days is related to two specific income components which proxy for the intensity of earnings management. This suggests that, contrary to what was expected, investors are more interested in the information potentially conveyed by manipulated earnings than by the tax impact of such manipulations.

Given that Swiss firms can comply either with EU directives, IAS or Swiss GAAP on a voluntary basis, Switzerland offers the opportunity to determine whether different GAAP regimes possess different information content to investors. Using a sample of 247 earnings announcements made by Swiss listed companies which changed their accounting standards to switch from Swiss GAAP to either IAS or EU directives during the period 1985–93, Auer (1996) compared the stock price reactions to earnings announcements before and after the adoption of the new standards. He observed that the switch from Swiss GAAP to IAS or EU directives was accompanied by an increase of stock price volatility at the earnings announcement date. This suggests that earnings based on IAS or EU directives have an information content higher than those based on Swiss GAAP. The results also showed that there is no significant difference in the information content between EU directives earnings and IAS-based earnings. In the same line, Caramanolis-Çötelli *et al.* (1999) have examined the influence of disclosure quality on the Swiss market reaction to annual report releases. Using a rating measure computed by the Swiss Financial Analyst Federation as a proxy for disclosure quality, they observed a positive relationship between this variable and absolute abnormal stock returns. Given that this influence was significant for positive abnormal returns only, the authors suggest that 'good' firms might adopt a policy of high quality disclosure to signal their type to the market.

The determinants of the market reaction to accounting disclosures

Since the market reaction to accounting disclosures differs among firms, several studies have analysed the possible determinants of these differences. Following Beaver *et al.* (1979) in the US, European studies have investigated the magnitude of unexpected earnings, considering that the greater the surprise, the larger the investors' reaction. The results of studies by Firth (1981) in the UK, Pellicer and Rees (1999) in Spain or Gajewski and Quéré (2002) in France confirmed the US evidence: trading volumes, volatility of returns or mean abnormal returns are positively related to the size of unexpected annual or interim earnings.

Following Grant (1980), who found that the information content of earnings announcements was greater for small OTC firms than that for large companies listed on the New York Stock Exchange, several European studies investigated whether the market reactions induced by accounting disclosures are more pronounced for small firms. Results by Firth (1981) or by Rippington and Taffler (1995) in the UK and by Gajewski and Quéré (2001) in France confirm this intuition: the larger the market value of the firm, the smaller its abnormal returns at the preliminary or the interim announcement dates. The hypothesis put forward to explain this relation suggests that small firms tend to disclose less information and to receive less attention from professional investment analysts and fund managers than large firms. Consequently, their accounting figures should convey higher amounts of information than those of large firms because they have not been pre-empted by non-accounting information disclosed and extensively analysed during the reporting period. To determine whether the information content of accounting disclosures is negatively related to the amount of information that was available to market participants prior to these disclosures, Pope and Inyangete (1992) have tested whether cross-sectional differences in returns around announcement dates are statistically related to firm size, but also to the number of market makers, which is expected to increase with the amount of available information, and to the frequency of press comments. All these variables were highly significant, suggesting that the amount of information available before accounting announcements explains the information content of these announcements.

Elsharkawyand and Garrod (1996) tried to determine whether the positive association between price changes and the sign and magnitude of unexpected earnings was caused by sophisticated investors who are aware of the relevance of the disclosed numbers for valuation purposes, or whether the market reaction emanates from unsophisticated investors who react mechanically to reported earnings. The authors used two proxies proposed by Hand (1990) for measuring the level of investor sophistication: the percentage of each firm's stock held by non-institutional investors and the market value of the firm scaled by the difference between the market values of the largest and smallest firms in the sample. They used regression techniques to determine whether abnormal returns surrounding earnings announcements were related to the two proxies for investor sophistication, but also to the magnitude of unexpected earnings and to firm size. Using a sample of 511 UK companies listed on the London Stock Exchange between 1988 and 1991, they observed a positive investor sophistication effect that was significant even after having controlled for firm size. Their results showed that less sophisticated investors react to good news but tend to under-react to negative unexpected earnings in comparison with their sophisticated counterparts.

The post-announcement drift anomaly

The efficient market hypothesis states that stock prices should react instantaneously and completely to any value-relevant information and that subsequent price changes should not be related to these reactions. In contradiction with this hypothesis, several empirical studies have shown that stock price reactions at earnings announcement dates are incomplete, because prices adjust only gradually to the new information. Therefore, significant abnormal returns can be achieved in the days following these announcements. Since these abnormal returns have the same sign as unexpected earnings, investors seem to underreact to the information contained in earnings. First documented by Ball and Brown (1968), this phenomenon, referred in the literature as the 'post-earnings-announcement drift', has been extensively analysed by Bernard and Thomas (1990) in the US.

Hew *et al.* (1996) investigated the post-earnings announcement drift in the UK. Using data from 206 companies listed on the London Stock Exchange, they found evidence of such a drift for both interim and final announcements. However, this drift was statistically insignificant for large companies. This led the authors to suggest that transaction costs, trading volumes or the amount of information available to investors before the announcement date may explain this post-earnings announcement anomaly. Isakov and Pérignon (2001) have studied the post-announcement drift on the implied volatility of Swiss call options over the 1989–98 period. They observed a persistent increase of implied volatility after the announcement day. Dividing their sample into a good news subsample and a bad news one using the abnormal return on the event date and the analysts' forecast errors, they found that the market reaction depends on whether the announcement can be regarded as conveying good or bad news.

In a study of the Finnish stock market reaction to earnings announcements, Kallunki (1996) observed that unexpected returns disappear after the announcement day in case of good news (i.e. positive unexpected earnings) but persist during the period that follows the announcement of bad news. Kallunki proposes a very simple and convincing explanation of this drift with regard to Finland. Since short-selling is forbidden in the Finnish stock market, he considers that the lag in stock price reactions in case of bad news is due to the fact that sophisticated traders can immediately take an advantage of good news in their investment decisions, which they cannot do in case of bad news because of the short-selling restrictions. Contrary to Kallunki's findings, Booth *et al.* (1996) report that the post-announcement drift of Finnish companies is higher in case of good news (i.e. positive earnings surprises). More interestingly, after splitting their sampled firms into earnings smoothers and non-smoothers, they show that the larger part of the drift comes from the market reaction to announcements of firms that do not smooth earnings. This suggests that the assimilation of the information conveyed by earnings is complicated when these are not smoothed, which can be a motivation for the income-smoothing practices largely documented in the literature.

The market response to accounting disclosures: synthesis and suggestions

Studies summarized in this section provide several interesting results that shed light on the way investors process accounting information. These results indicate first that annual and interim announcements by European companies cause significant stock price changes and trading volume increases. If European capital markets are efficient in the sense that quoted prices do not significantly deviate from fundamental values, this evidence is consistent with the hypothesis that released accounting figures are useful to market participants. Moreover, the magnitude of stock price reactions is positively related to the level of surprise in the disclosed numbers and negatively related to the market value of firms. If market value is a good proxy for the amount of information available to market participants prior to accounting disclosures, the negative link between firm size and market reaction validates the hypothesis that numerous events related to earnings are publicly observed prior to accounting announcements. Therefore, at least for large firms, a substantial proportion of abnormal stock returns arises prior to the actual release of earnings. Finally, in contradiction with the efficient capital market hypothesis, several studies have shown that in Europe just like in the US, profitable strategies can be designed to benefit from abnormal returns that persist during the period following earnings announcements, particularly for small or medium-sized firms.

European studies reviewed in this section tend to concentrate on mandatory disclosures. However, in addition to mandatory reports, firms release more and more frequently voluntary information. Empirical evidence related to investors' reaction to voluntary disclosures by European firms might help understand the usefulness of such disclosures for anticipating firms' future prospects. Similarly, the Internet gives managers the opportunity to have a direct access to all investors and to disclose frequent updates of important information. Since the use of the Internet by firms and investors is likely to increase, future research aimed at analysing the information content of mandatory accounting disclosures in an environment where alternative continuously updated information is rapidly and easily available is of crucial importance.

Several recent US studies have reported a decline in the value relevance of accounting figures. Lev and Zarowin (1999) put forward the hypothesis that this decline may be due to the inability of financial statements to reflect in a timely manner the phenomenal technological innovations that occurred during the last twenty years. Studies of market reactions to accounting disclosures by firms strongly involved in technological innovations might help support or invalidate this argument. This could be done for instance by comparing security returns of firms that expend huge R&D outlays with those of firms not involved in R&D activities.

The growing literature devoted to earnings management offers another opportunity for future research on the information content of accounting figures. Several researchers such as Healy and Palepu (1993) or Subramanyam (1996) hypothesize that firms choose accounting policies or include discretionary accruals in earnings to reveal management's private information about the firm's future prospects. If discretionary accruals are really informative, then abnormal stock returns around financial statement releases should be related to the sign and the proportion of earnings that result from manipulations. Comprehensive analyses of the link between abnormal returns, earnings surprise and manipulated accruals, as in Wilson's (1986) study, may shed more light on the motivations and stock price impacts of earnings management.

With regard to the post-announcement drift, it might be interesting to investigate the persistence of this anomaly in Europe since the profits resulting from trading strategies based on this anomaly should dissipate once they become apparent to investors. A recent study by Johnson and Schwartz (2000) shows that the post-announcement drift persists in the US among small firms and among firms with little or no analyst coverage. However, profit opportunities do not seem large enough to compensate the substantial costs related to the trading strategies simulated in this study.

3. THE RELATIONSHIP BETWEEN STOCK RETURNS AND ACCOUNTING NUMBERS

Unlike event studies that concentrate on the market reaction to accounting disclosures over a short time interval, association studies analyse the relationship between stock returns and accounting data over a long period. While the former studies examine the role of accounting data in providing incremental information that may affect investors' perception of the firm's future prospects, the latter provide evidence of the role of these data as a summary of the events that have affected the firm during the reporting period. Contrary to market reaction studies, association studies do not infer any causal connection between accounting figures and stock prices. They do not even presume that market participants use accounting data in their valuation process. They only posit that if accounting data are good summary measures of the events incorporated in security prices, they are value-relevant because their use might provide a value of the firm that is close to its market value.

After a description of the theoretical and empirical foundations of association studies, this section summarizes the European evidence on the relationship between earnings and security returns. Research devoted to the value relevance of competing accounting practices, to the value relevance of various GAAP regimes and to the value relevance of accounting numbers other than earnings is successively reviewed. General comments and suggestions conclude the section.

Empirical and theoretical foundations of association studies

Association studies regress accounting figures on market data in order to test for any significant relationship. Ball and Brown (1968) in the US were the first to document an empirical relationship between earnings and stock returns. A study by Martikainen *et al.* (1993) that duplicates the Ball and Brown study, provides a good illustration of such research. The authors analysed the daily abnormal stock returns of thirty firms listed on the Helsinki Stock Exchange, 300 days before and 300 days after their shareholders' annual meeting for the 1977–86 period. Each year, firms were split into two portfolios on the basis of the sign of their unexpected earnings. These were estimated in two different ways. First, assuming that earnings follow a random walk process, unexpected earnings were defined as the difference between two successive earnings. Second, considering that all reported earnings are influenced by the same economic factors, the change in earnings for each firm in the sample was regressed with the change for all other firms. The estimated regression coefficients were used to forecast the change in each firm's earnings. For the ten years under study, abnormal returns were calculated over the year ending with the earnings release. The results indicated that stock prices move in the same direction as the sign of unexpected earnings. At the dates of earnings releases, the positive unexpected earnings portfolio exhibited positive abnormal returns, and conversely. The fact that unexpected earnings, which are supposed to convey new accounting information, are positively related to abnormal returns, suggests that earnings capture a portion of the information used to value stocks. This suggests also that a large part of the information conveyed by earnings is already incorporated in stock prices when these are disclosed, probably because investors have access to various sources of information about firms' future prospects which are likely to be more timely than reported earnings.

Following Ball and Brown, numerous empirical studies have measured the intensity of the relation between earnings changes and security returns to determine how earnings changes summarize the information incorporated in stock prices. Most association studies do not refer explicitly to a valuation model to specify how or which accounting data should be related to security prices. However, Ohlson's (1995) model, which offers a formal linkage between valuation and accounting numbers, is more and more frequently cited as the theoretical foundation of such research. This model extends the residual income model proposed by Preinreich (1938). Defining stock prices as the present value of expected future dividends and assuming the clean surplus relation, the residual income model views the market value of security j at time t, $p_{j,t}$ as the sum of two components: the book value of its equity at time t ($b_{j,t}$) and the present value of its expected future abnormal earnings $[E(x^a_{j,t+\tau})]$:

$$p_{j,t} = b_{j,t} + \sum_{\tau=1}^{\infty}\left[\frac{E(x^a_{j,t+\tau})}{(1+\rho)^{\tau}}\right] \tag{1}$$

where abnormal earnings are defined as the difference between reported earnings $[x_{j,t+\tau}]$ and a capital charge obtained by applying the discount rate $[\rho]$ to the book value of equity:

$$x^a_{j,t+\tau} = x_{j,t+\tau} - \rho b_{j,t+\tau}$$

Ohlson extends the residual income relation by imposing the following autoregressive behaviour on abnormal earnings:

$$x^a_{j,t+1} = \omega_j x^a_{j,t} + v_{j,t} + \varepsilon_{j,t+1} \tag{2}$$

$$v_{j,t+1} = \gamma_j v_{j,t} + \varsigma_{j,t+1} \tag{3}$$

where v denotes information not incorporated in abnormal earnings, ω is the persistence parameter of abnormal earnings, γ is the persistence parameter of the information not yet captured in earnings, and ε_t and ζ_t are error terms. Equation (2) states that abnormal earnings follow a one-period lagged autoregressive process. Equation (3) implies that value-relevant information not incorporated in accounting figures will be gradually integrated into earnings following another one-period lagged autoregressive process. Combining the residual income model given by (1) with the information dynamics given by (2) and (3) yields the following valuation function:

$$p_{j,t} = b_{j,t} + \alpha_{1j} x^a_{j,t} + \alpha_{2j} v_{j,t} \tag{4}$$

where $\alpha_{1j} = \omega_j/(1 + \rho - \omega_j)$ and $\alpha_{2j} = (1 + \rho)/(1 + \rho - \omega_j)(1 + \rho - \gamma_j)$. The empirical form of this model is given by the following relation:

$$p_{j,t} = a_0 + a_1 b_{j,t} + a_2 x_{j,t} + \mu^1_{j,t} \tag{5}$$

where a_1 and a_2 are regression coefficients, a_0 is the intercept and $\mu^1_{j,t}$ is an error term.

Although this relation provides strong motivation for regressing raw accounting data on stock prices, it can be rewritten to provide a theoretical basis for regressions of changes in accounting figures on returns. Replacing $x^a_{j,t}$ with $[x_{j,t} - \rho b_{j,t}]$, invoking the clean surplus relation, taking first differences and dividing both sides of the equation by the beginning-of-period price $p_{j,t-1}$, equation (4) can be restated as

$$\begin{aligned}\frac{p_{j,t} - p_{j,t-1} + d_{j,t}}{p_{j,t-1}} &= (1 - \rho\alpha_1)\frac{x_{j,t}}{p_{j,t-1}} + (1 + \rho)\alpha_1 \frac{x_{j,t} - x_{j,t-1}}{p_{j,t-1}} \\ &\quad + (1 + \rho)\alpha_1 \frac{d_{j,t-1}}{p_{j,t-1}} + \alpha_2 \frac{v_{j,t} - v_{j,t-1}}{p_{j,t-1}}\end{aligned} \tag{6}$$

The empirical form of this relation is given by

$$R_{j,t} = \beta_0 + \beta_1 \frac{x_{j,t}}{p_{j,t-1}} + \beta_2 \frac{\Delta x_{j,t}}{p_{j,t-1}} + \mu^2_{j,t} \tag{7}$$

where $R_{j,t}$ is the rate of return of security j for the period t, $\Delta x_{j,t}$ denotes earnings changes between period t and period $t-1$, β_1 and β_2 are regression coefficients, β_0 is the intercept and $\mu_{j,t}^2$ is an error term.

Equations (5) and (7) suggest regressions of accounting figures on market data. The strength of the association, as given by the regression R-squares, is often taken as a measure of the value relevance of the accounting numbers under study. A low association (R-square ≈ 0) suggests that these are useless to estimate prices or returns. Conversely, a strong association (R-square ≈ 1) means that any investor who would have to value a company from its accounting figures only, would obtain a price close to the market value. While equation (5) suggests regressions of the levels of book value and earnings per share on stock prices (price regressions), equation (7) leads to regress earnings and changes in earnings deflated by beginning-of-period stock prices on returns (return regressions). As a matter of fact, price regressions and return regressions are both commonly used to analyse the relation between market and accounting data. However, as shown by Brown *et al.* (1999), statistical associations inferred from price regressions suffer from a spurious effect of scale because large security prices tend to be mechanically related to large book value and large earnings per share, and conversely. Consequently, the value relevance measured by R-squares of price regressions are unwisely overstated, and comparisons of R-squares to infer changes or differences in value relevance are invalid if there is no explicit control for this scale effect. In contrast, return regressions are not affected by potentially serious scale problems because stock data and accounting figures per share are all scaled by beginning-of-period stock prices. Therefore, empirical studies should preferably rely on returns specifications. This is why the following review of European association studies concentrates mainly on results inferred from return regressions.

The association between earnings and security returns: the accumulated evidence

The relation between earnings and contemporaneous security returns has been analysed with data from most European stock exchanges. Results show that, in Europe like in the US,[1] this relation is weak, suggesting that reported earnings do not provide good summary measures of the value-relevant events that have been incorporated in stock prices during the reporting period. Even if coefficients obtained by regressing earnings and earnings changes scaled by beginning-of-period stock prices on stock returns are generally statistically significant, R-squares are relatively low. In the UK, Strong (1993) found an average R-square of about 10%, suggesting that only 10% of the cross-sectional variance of returns is explained by the cross-sectional variance of earnings. With regard to Germany, Harris *et al.* (1994) obtained R-squares that range from 7% to 17%. In Denmark, Plenborg (1998) reported yearly R-squares varying from 1% to 29% between 1985 and 1991. From a sample of French firms over the 1981–90 period, Dumontier and Labelle (1998) obtained *R*-squares ranging from 1% to 49% depending on the year under consideration. Vafeas *et al.* (1998) obtained similar results on a sample of firms listed on the Cyprus Stock Exchange.

The relatively low association observed between earnings and stock returns suggests that earnings capture only a weak proportion of the information incorporated in security prices. It is often argued that information included in stock prices is richer than the one reflected by earnings because investors focus on all events that affect expected future cash flows, while earnings incorporate only those that have met the conditions for accounting recognition. Since relevant events that are not captured in contemporaneous earnings should normally be captured in subsequent periods, there should be a lag in the inclusion of new information into earnings, and stock prices should be more prompt than earnings in reflecting new information. This recognition lag causes both an errors-in-variable problem and an omitted variable problem because earnings do not reflect some information captured in current returns, whereas they reflect some information that was captured in prior returns. Since this lag is potentially negatively correlated with earnings, *R*-squares of regressions of current returns with contemporaneous earnings are biased toward zero.

To correct for this lag effect, Dumontier and Labelle (1998), following Easton *et al.* (1992) in the US, have expanded both the returns and earnings windows by regressing multiple-year returns on multiple-year earnings. They showed that the correlation between earnings and returns improves with increases in the time interval under consideration. They obtained average *R*-squares ranging from 15% for a one-year interval to 28% for a two-year interval and to 39% for a five-year interval. In the same vein, Cormier *et al.* (2000) regressed the market returns of a sample of Swiss firms not only on contemporaneous earnings, but also on the previous and following year earnings. Their results indicate that lead, lag and contemporaneous earnings are all significantly related to returns. Moreover, when lead and lag earnings are added to contemporaneous earnings as explanatory variables for returns, *R*-squares strongly increase from 37% to 52%. This procedure is, however, not free of bias because of the well-documented positive serial correlation in earnings. Instead of using previous and subsequent earnings as additional explanatory variables for returns, Beaver *et al.* (1980) suggest to regress earnings on both current and past returns. Such 'reverse regressions' are less likely to suffer from multicollinearity since stock returns are supposed to be uncorrelated through time if capital markets are efficient.

Pope and Walker (1999) investigated extensively the magnitude of the recognition lag by analysing the effect of conservatism in accounting on the timeliness of earnings. They proposed a formal analysis of the different speeds of recognition of good and bad news in order to capture two distinct consequences of conservative accounting: delay in reporting good news and early recognition of bad news. Following Basu (1997), they took security returns as an indicator of the bad or good news that have affected the firm during the reporting period. Because stock prices are not likely to anticipate events incorporated in future earnings more than three years ahead, they used the following reverse regression to determine how quickly accounting data reflect information incorporated in stock prices:

$$\frac{x_t}{p_{t-4}} = \gamma_0 + \gamma_1 D_t + \sum_{t=0}^{3} \lambda_t R_{t-\tau} + \sum_{t=0}^{3} \theta_\tau R_{t-\tau} D_{t-\tau} + \mu_t$$

where x_t and p_t denote respectively reported earnings of period t and security price at the end of period t; $R_{t-\tau}$ is equal to $(p_{t-\tau} - p_{t-(\tau-1)})/p_{t-4}$; $D_{t-\tau}$ is a dummy variable for year $t - \tau$ which takes the value one in case of bad news (i.e. if $R_{t-\tau}$ is less than zero) and zero otherwise; γ_0, γ_1, λ_τ and θ_τ are regression coefficients. The λ_τ and θ_τ coefficients are associated respectively to good and bad news, μ_t is an error term.

Developing a formal analysis, Pope and Walker demonstrated that λ_τ coefficients should increase and θ_τ should decrease as the lag increases. Based on a sample of UK and US listed firms over the period 1976–96, their results showed that λ_τ coefficients are statistically significant and increase from lag zero to lag one, suggesting that most good news is delayed in earnings with a lag of one year. With regard to θ_τ coefficients, they are significant and they decrease until lag two, suggesting that bad news is anticipated in earnings by up to two years.

Lubberink and Huijgen (2002) hypothesized that earnings conservatism reflects not only financial reporting standards, but also managers' preferences. They stated that risk-averse managers, who are more concerned about their reputation among outside parties, report earnings more conservative than less risk-averse managers in order to lower the likelihood of conflict about the distribution of the firms' cash flows. To assess whether earnings reported by risk-averse managers are more conservative than those reported by non-risk-averse ones, Lubberink and Huijgen used a regression model similar to the one developed by Pope and Walker. Assuming that the coefficient of a regression of time-series levels of compensation on time-series variance of compensations provides a good proxy for managers' risk aversion, they partitioned their data into two distinct groups. In accordance with their intuition, their results obtained on a sample of listed Dutch companies, show that firms employing the most risk-averse managers report earnings significantly more conservative than firms with the less risk-averse managers. More precisely, differences in earnings conservatism between the two groups are mainly related to the fact that more risk-averse managers tend to anticipate the recognition of bad news: whereas the good news coefficients are significant for the two groups, the bad news ones are significant for the risk-averse group only.

Another explanation for the low association between earnings and returns is that negative earnings are not value-relevant because losses are not expected to perpetuate indefinitely. Consequently, sampled firms that report losses tend to weaken the strength of the association between earnings and returns. To validate this assumption already tested by Hayn (1995) in the US, Martikainen *et al.* (1997) split a sample of 498 earnings reported by Finnish companies into a sub-sample of positive earnings and a sub-sample of losses. While positive earnings were positively related to returns, losses were statistically insignificant in explaining returns. Consequently, the exclusion of loss observations strengthens the estimated relation between earnings and returns, probably because losses do not provide information about the firm's ability to generate future cash flows.

The value relevance of competing accounting practices

As explained above, the strength of the association between earnings and returns (i.e. *R*-squares obtained in regressing returns with earnings) can be taken as a measure of the value relevance of accounting data. Postulating that the higher the value relevance, the better the accounting numbers, several empirical studies used this simple criterion to determine the 'best' accounting practice among several competing alternatives.

Since German companies financing is based primarily on self-financing and private borrowings rather than on equity issues or public debts, German GAAP tend to focus more on the protection of lenders than on the information needs of investors. To remedy this situation, the German Financial Analysts' Association (*DVFA – Deutscher Vereinigung für Finanzanalyse und Anlageberatung*) developed an earnings metric aimed at reflecting the profitability of companies' ongoing operations without being contaminated by non-recurring events or by the exercise of accounting options related to tax purposes. Using the association methodology, Harris *et al.* (1994) and Booth *et al.* (1997) examined whether DVFA earnings provide information in addition to that included in earnings reported under German GAAP. Since regressions of returns on DVFA earnings exhibit the highest *R*-squares, both studies conclude that DVFA earnings are more value-relevant than German GAAP profits. In the same vein, Martikainen *et al.* (1997) tested the value relevance of earnings adjusted on the basis of the Finnish Committee for Corporate Analysis Recommendations. These statements stipulate to remove certain items from reported earnings in order to increase their relevance. Contrary to the German evidence, the results of this study indicate that adjusted earnings do not contain incremental information with respect to all-inclusive earnings.

In an attempt to test the usefulness of IAS, Niskanen *et al.* (1994) estimated IAS-based earnings of a sample of Finnish firms by adjusting reported earnings for six important differences between IAS and Finnish GAAP. Both reported and adjusted earnings were then entered in a regression with stock returns. Results indicated that adjusted earnings exhibit statistically significant coefficients, which gives support to the hypothesis that IAS-based earnings convey incremental information over those based on Finnish GAAP. IAS (or US GAAP) disclosure requirements exceed those of most European countries. The adoption of these standards may thus contribute to reduce information asymmetry, especially for firms from low-regulated countries. This hypothesis is validated by Leuz and Verrecchia (2000) who, after controlling for various firm characteristics, found that German companies which switched to IAS or US GAAP exhibit lower bid-ask spreads and higher share turnover than firms using German GAAP only.

Nevertheless, the assumption can be made that IAS-based earnings are more useful to foreign than to local investors. A characteristic of the Finnish market gave Kinnunen *et al.* (2000) the opportunity to test this hypothesis. From 1984 to 1992, the Finnish stock market was segmented into two categories of shares: one restricted to domestic investors, the other available to anybody, irrespective of its nationality. In order to isolate the respective information content of IAS and local earnings for each category of investors, Kinnunen *et al.* conducted separate regressions with returns of restricted and unrestricted shares. Their results showed that both IAS-based and local earnings are informative to foreign investors but that Finnish investors find information content in local earnings only. This led the authors to the conclusion that restating local GAAP earnings to conform to the IAS helps to meet foreign investors' information needs, but is of limited use to domestic investors.

Most European corporate annual reports include consolidated statements and parent company statements. Both consolidated and parent company earnings are potentially informative since parent earnings provide information about the ability of the company to pay dividends while consolidated earnings reflect the performance of the entire economic entity. This raises the question of whether consolidated earnings provide additional value-relevant information with regard to parent company earnings. Harris *et al.* (1994) hypothesized that the strength of the association between earnings and returns is positively related to the degree of consolidation. Apportioning their sample of German firms among parent-only, domestic-only and full consolidation, they showed that the explanatory power of earnings for returns increases with the level of consolidation. Using a sample of Finnish companies, Niskanen *et al.* (1998) found evidence that consolidated earnings have an incremental information content beyond that of parent companies, but the reverse was not true. These findings indicate that consolidation improves the value relevance of earnings. They suggest that parent earnings have no interest in terms of value relevance when consolidated earnings are disclosed. In Spain, as in most European countries, consolidated financial statements must report separately the minority interest component of earnings and equity. Using a sample of Spanish companies listed in the Madrid Stock Exchange between 1991 and 1997, Abad *et al.* (2000) investigated the value relevance of these requirements. Their results support those obtained in Finland and in Germany since they show that consolidated earnings are more strongly associated with security data than parent company earnings. However, they found no support for the value relevance of the minority interest portion of earnings and equity. This leads them to question the usefulness of requirements related to minority interest reporting.

The value relevance of different GAAP regimes

Several studies have focused on international differences in the propensity of earnings to reflect value-relevant information. Using a sample of seventeen countries to obtain evidence from a variety of accounting standards and information environments, Alford *et al.* (1993) provided a country-by-country comparison of the value relevance of earnings between US and non-US firms. They observed considerable variation in the explanatory power of earnings for contemporaneous returns across the countries under study. Regarding Europe, by comparing the *R*-squares of country regressions, they observed that earnings from France, the Netherlands and the United Kingdom were more value-relevant and more timely than US earnings. In contrast, those from Denmark, Germany, Italy and Sweden were less timely and reflected less value-relevant information than US earnings. Results from Belgium, Ireland, Norway and Switzerland were inconclusive.

Focusing on accounting practices in France, Germany and the United Kingdom, Joos and Lang (1994) found evidence of significant differences in the stock market valuation of accounting data. These three countries were selected to permit a comparison of the effects of two extreme and one intermediate example of alternative approaches to earnings measurement. While the UK accounting model traditionally focuses on equity holders, allows discretion in the preparation of financial statements and dissociates tax and financial reporting, the German model concentrates on debt holders, codifies reporting requirements and imposes a strong link between financial and tax reporting. Although the French model is basically close to the German one, it tends to draw near to the UK model in a number of respects. However, in so far as the Fourth and the Seventh Directives of the European Union have, to some extent, harmonized accounting practices throughout Europe, differences in the degree of association between stock returns and earnings were expected to be lower after these directives have been implemented. Surprisingly, while UK accounting practices are significantly more investor-oriented than French or German ones, *R*-squares for the pre-directives period were higher in France and Germany than in the UK, which invalidates the assumption that earnings reported in the UK were more value-relevant than those of French and German companies. Moreover, results for the post-directives period do not show that these differences have been reduced following the implementation of the directives. Regarding Germany, Harris *et al.* (1994) confirmed these results. They did not report a significant change in the explanatory power of earnings after the adoption of the new Accounting Law that changed the German reporting system by incorporating the Fourth and Seventh European Directives.

Using data from sixteen countries, Ali and Hwang (2000) regressed market returns with scaled earnings to explore the impact of several country-specific factors on the value-relevance of accounting data. Their results show that the degree of association between security returns and earnings is lower in countries with bank-oriented (as opposed to market-oriented) financial systems, in countries where private-sector bodies are not involved in the standard-setting process and, more generally in countries which belong to the continental model, as defined by Mueller *et al.* (1994). More precisely, earnings in bank-oriented countries seem more conservative and consequently less timely than those in market-oriented ones.

Focusing on differences between US and UK GAAP, Pope and Walker (1999) provided evidence that apparent differences in conservatism between these two regimes are sensitive to the inclusion or exclusion of extraordinary items. They showed that US earnings measured before and after extraordinary items have similar timeliness properties. In contrast, UK earnings are significantly less timely when measured before extraordinary items. Consequently, US earnings before extraordinary items are more timely than UK ones. However, UK earnings after extraordinary items are more timely than US ones, especially with respect to bad news. These results suggest that inferences regarding the relative timeliness of earnings under different regimes are highly sensitive to the earnings measure analysed. Therefore, the conclusions of international studies reported above should be regarded cautiously.

The value relevance of non-earnings data

Several studies have investigated the information provided by non-earnings data. A first set of these studies focused on the components of earnings commonly reported by firms in order to determine whether the decomposition of earnings provides incremental value-relevant information beyond the bottom-line earnings. With regard to Europe, the evidence is somewhat conflicting. On the one hand, Strong and Walker (1993) support the view that the decomposition of earnings is useful in the UK since earnings components tend to be significantly related to security returns. Their results show that partitioning earnings into pre-exceptional, exceptional and extraordinary components improves the association between earnings and stock returns. On the other hand, Giner and Reverte (1999) provide evidence that corporate taxes are the only earnings component that is related to security prices in Spain. They find that extraordinary items do not exhibit real information content. However, a contextual analysis of their results suggests that the decomposition of earnings may be particularly useful for small and for risky companies.

One specific feature of financial accounting is accrual adjustments that are added to or subtracted from cash flows from operations to obtain earnings. In order to determine the respective value relevance of cash flows and earnings, several researchers have studied which of the former or of the latter is the most highly correlated with stock prices. In the UK, Board and Day (1989) and Ali and Pope (1995) have provided evidence that earnings dominate cash flows in the sense that cash flows do not have incremental information content beyond earnings. Using a sample of UK companies, Clubb (1995) showed that cash flows from operations, accruals and accounting earnings are all positively related to stock returns, but accrual adjustments appear to possess information content beyond that reflected by cash flows and earnings. Following Dechow (1994), Charitou (1997) hypothesizes that the value-relevance of cash flows with respect to that of earnings depends on (a) the magnitude of accrual adjustments, since timing and matching problems in cash flows are minimized when accrual adjustments are small; (b) the length of the firm's operating cycle, since the shorter the operating cycle, the smaller the working capital requirements and consequently the smaller the volatility of accruals; and (c) the measurement interval under consideration, since the longer the measurement interval, the smaller the timing and matching problems in cash flows. Charitou's results are in conformity with these hypotheses. Using a sample of listed UK companies, he observed that earnings are more highly correlated with stock returns than cash flows for short measurement intervals, but earnings and cash flows tend to exhibit the same level of correlation with returns when measurement intervals increase, when accruals are relatively small or when firms have short operating cycles. In the same vein, Green (1999) showed that the value-relevance of UK cash flows was unsurprisingly related to the correlation between accounting earnings and cash flows from operations.

Considering that accruals may be affected by arbitrary estimations due to management's discretion over their recognition, a new stream of research uses association studies to determine whether discretionary accruals are aimed at manipulating earnings opportunistically or whether these accruals convey managers' private information about the firm's prospects. If earnings are manipulated through the use of discretionary accruals, they should not reflect accurately the firm's ability to generate future cash flows and their correlation with returns should be low. Conversely, if accruals are manipulated in order to report more value-relevant earnings, then discretionary component should be positively related to stock returns. With regard to Switzerland, results reported by Cormier *et al.* (2000) suggest that discretionary accruals are informative, not opportunistic. By splitting earnings into cash flow from operations, non-discretionary and discretionary accruals, the authors showed that these three components of earnings are all significantly related to stock returns. The statistically positive relationship between returns and discretionary accruals confirms the value relevance and the information content of the discretionary component of accruals.

Earnings obviously are not the only potential relevant accounting data. Other accounting variables are likely to reflect events that have affected the firm value during the reporting period. Using a sample of twenty-eight Finnish companies over the period 1975–86, Martikainen (1993) investigated the relationship between stock returns and various accounting data that served as proxies for four characteristics that determine the conditions under which firms generate future cash flows. These characteristics are profitability, financial leverage, operating leverage and growth. They resulted from a principal component analysis aimed at reducing original data into a smaller set of common factors. Results based on purely industrial firms indicate that profitability and financial leverage are the two characteristics the most strongly related to returns. Other characteristics do not affect returns. This led Martikainen to conclude that the calculation of a large number of accounting raw data or ratios is of little interest and that analysts should concentrate on a relatively low number of key data.

Using a sample of UK industrial companies that did not change their financial year-end between 1983 and 1992, Al-Debie and Walker (1999) examined the incremental value relevance of various fundamentals beyond that of accounting earnings. Following Lev and Thiagarajan (1993), they selected seven non-earnings data which signal abnormal changes in stocks of finished goods, debtors, capital expenditures, research and development expenses, gross margin, distribution and administration expenses or labour force. Moreover, since the value of these data depends both on the firm's industry and the state of the economy, Al-Debie and Walker adopted a conditional approach by using regression techniques that allow regression parameters to vary with each firm's industry and with the state of the economy. They considered fifteen industries and three states of the UK economy defined on the basis of the inflation rate, the real GNP growth and the unemployment rate. While their basic model with a constant intercept and a constant earnings variable provided an R-square of only 15%, they obtained R-squares of 36%, 40% and 43% when they allowed regression parameters to vary with the state of the economy, the industry, or with both variables. These results show that the inclusion of non-earnings variables increases strongly the correlation between returns and accounting data. They also indicate that allowing the regression parameters associated with accounting data to vary with various firms' characteristics improves significantly the performance of regression models. This confirms the need to adopt a conditional approach in association studies.

Association studies: synthesis and suggestions

Studies described in this section have investigated the ability of accounting data to summarize the relevant events that have affected the firm during the reporting period. They provide at least four interesting results. First, they show that the relation between security returns and contemporaneous earnings is low. Second, they validate the relevance of accrual accounting. Third, they find that consolidated accounting data are more value-relevant than non-consolidated ones. Fourth, they suggest that non-earnings data reported in financial statements help better perceive the events incorporated in security prices.

The most important result of association studies is certainly the low level of association between security returns and contemporaneous earnings. The lack of timeliness of earnings due to financial reporting conservatism is likely to explain a large part of this weak value relevance. If the conclusions of international studies are not significantly biased by differences in earnings measurement, it is clear that reported earnings in Anglo-Saxon countries exhibit greater timeliness than reported earnings in countries which belong to the continental accounting model. Moreover, in spite of the low association between earnings and returns, European association studies provide evidence on the usefulness of accrual adjustments. All studies devoted to the relative usefulness of cash flows and earnings show that earnings dominate cash flows in the sense that earnings and accrual adjustments possess information beyond that reflected in cash flows. In the same way, it is clear that consolidated accounting data have more value relevance than parent-company ones. Lastly, even if a large majority of association studies have focused on the bottom-line earnings only, studies that take various non-earnings accounting numbers into consideration show that these are incrementally associated with contemporaneous security returns.

The foundations of association studies, and consequently inferences drawn from their results, are however subject to several limitations. The most obvious is the validity of the efficient capital market hypothesis and consequently the validity of stock data as a proxy for value-relevant events that affect firms. If stock prices are assumed to represent fundamental values, then there is no doubt that a low relation between accounting figures and market data is a proof of the weak value relevance of accounting data. However, several recent studies, especially in the emerging field of behavioural finance, suggest that stock prices reflect mostly investors' myopic behaviour, so that stock prices might not be a reliable benchmark to analyse the value relevance of accounting data. Future research should address this limitation and investigate the value relevance of accounting figures with other benchmarks than market data.

Another limitation of association studies is that they concentrate mainly on bottom-line earnings without analysing the value relevance of other accounting data. Yet, several accounting numbers other than earnings can help investors perceive the value-relevant events that have affected the firm. Those numbers should be more extensively explored. Since their value relevance is likely to be related to the firm environment, future research should concentrate on the value relevance of specific accounting data under various contexts that characterize firms.

4. THE USE OF ACCOUNTING DATA BY INVESTORS AND THE INFLUENCE OF CAPITAL MARKETS ON ACCOUNTING DECISIONS

Studies described above provide indirect tests of the usefulness of accounting information for valuation purposes in so far as they do not analyse directly how investors process accounting data. They only focus on stock price reactions induced by accounting disclosures and on the association between accounting and market data. However, the usefulness of accounting numbers for market participants can also be assessed directly by questioning investors themselves. Several

European studies have adopted this latter approach. These are reviewed in the first part of this section. Moreover, even if market-based accounting research concentrates mainly on the usefulness of accounting data for firm valuation, a few studies have examined whether capital markets exercise pressures on accounting decisions of listed companies. Their main findings are explored in the last part of this section.

Direct tests of the usefulness of accounting information

Studies devoted to the use of accounting data by market participants have three main purposes. First, they analyse the importance of accounting figures with respect to other sources of information. Second, they examine the valuation techniques effectively used by investment professionals in order to assess whether they are based on accounting numbers or not. And last, they try to determine whether firms favour decisions which maximize accounting measures of profit rather than cash flows, because of the importance of earnings for market participants.

Day (1986) reports a laboratory experiment on the use of financial statements by UK investment analysts. Two sets of accounts were submitted to fifteen professionals who had to perform their initial review as if they were studying them for the first time. The participants were asked to think aloud so that a tape-recording could be made. The results tend to confirm that financial statements are seen by investment analysts as only one source of information, which does not generally contain price-sensitive information but which is nevertheless useful as a reference document. Barker (1998) expanded this analysis to finance directors and fund managers. On the basis of questionnaires and semi-structured interviews, he obtained evidence on how investment professionals perceive the role of accounting information. Annual reports and financial statements appear to be only a secondary source of information for market participants, after direct contacts or meetings with senior company management. This observation contrasts with a previous study by Arnold and Moizer (1984) which concluded that financial statements are the primary source of information for analysts. It is also in contradiction with a questionnaire study by Vergoossen (1993) which showed that accounting data are considered as the most important source of information by Dutch investment analysts.

As pointed out by Breton and Taffler (2001: 92), 'asking analysts or investors directly about the relative importance of different types of information may provide little real insight into what they use in practice'. Rather than considering financial statements globally, it may thus be more judicious to focus on data that are supposed to be the most relevant for security valuation. This was done by Barker (2000) who interviewed thirty-two British analysts on their use of reported earnings. He observed that analysts attach great importance to earnings announcements and particularly to deviations with forecasts, but their use and interpretation of accounting information is rather superficial. In particular, analysts seem to have a limited understanding of underlying issues of recognition and measurement, and more curiously of the interactions between earnings and the balance sheet items. This observation suggests that analysts, and more generally most market participants, may be fixated on accounting earnings and unable to detect earnings management. This issue was addressed by Vergoossen (1997) who examined the reports written by Dutch investment analysts about companies that made changes in their accounting policies. Two levels of fixation were defined: fixation at a strong level when analysts did not mention accounting changes in their reports, and fixation at a weak level when they noted these changes but did not discuss their quantitative effects on accounting figures. A fixation index was computed for each accounting change, ranging from 0 (no analyst was fixated) to 1 (all analysts were fixated at the strong level). The results showed an extreme diversity of fixation, values of the index varying from 0 to 0.867. These studies suggest that although annual reports are seen as a primary source of information by investors, numerous market participants are likely not able to correctly analyse the accounting information. This could incite some firms to manipulate accounting figures opportunistically.

Indications on the usefulness of accounting data may also be drawn from the examination of valuation techniques used by investment professionals. If analysts base their recommendations primarily on methods involving accounting data; i.e. fundamental analysis, accounting information can be considered as useful to the market participants. Adversely, if they use mainly non-accounting methods, as for example technical analysis or beta analysis, this will be an indication that accounting data are not particularly useful to investors. A questionnaire study by Arnold and Moizer (1984) clearly shows that fundamental analysis is the technique most frequently used by UK investment analysts. The study reports that 90% of respondents view fundamental analysis as 'extremely useful' or 'very useful', while the corresponding percentages are 16% for technical analysis and 5% for beta analysis. Moreover, the results also show that analysts base their recommendations essentially on price–earnings (PE) ratios, which emphasizes the role of earnings in stock valuation. This latter observation is consistent with a more recent study by Barker (1998) which reveals that British analysts and fund managers view the PE ratio and the dividend yield as the most important valuation methods. Olbert (1994) repeated Arnold and Moizer's analysis in Sweden. He also found that fundamental analysis was the most frequently used technique in stock valuation and noted an extensive use of PE ratios. A similar study conducted by Pike *et al.* (1993) in the UK and Germany confirms these findings: although German analysts place significantly more emphasis on technical analysis, fundamental analysis using PE ratios remains the dominant method in both countries. This result is consistent with Vergoossen's study (1993) that emphasizes the importance of fundamental analysis in The Netherlands. All these studies confirm the major role played by accounting data, and particularly earnings, in the way analysts appraise investments. They also clearly show that approaches recommended in the academic literature, such as discounted future cash flows, are still largely less popular than traditional techniques, even among investment professionals.

The importance of earnings for market participants may incite companies to favour decisions that maximize accounting measures of profit rather than cash flows. Although there is limited evidence on this matter, several European studies give some support to this conjecture. Using data from forty UK companies which made recent debt or equity issues, Davidson and Mallin (1998) compared the actual earnings-per-share (EPS) to the corresponding amount which would have been obtained if the company had chosen the other type of financing. As expected, results show that the type of the selected capital issue was that which gave the highest EPS, after controlling for other factors such as leverage and industry classification. The authors interpret this as an evidence of functional fixation on EPS. Collison *et al.* (1996) adopted a quite different methodology to assess how managers' decisions may be affected by their perceptions of investors' reasoning. They sent finance directors of the largest UK companies a questionnaire with several statements such as 'Top management will not accept proposals for increasing expenditure in the following separate categories if it results in a significant fall in profits from the previous year: (a) Research and development, (b) Advertising, (c) Training'. Respondents were asked to mention their relative agreement with each statement on a Likert scale. An analysis of the responses led the authors to conclude that managers consider that investors place heavy emphasis on earnings, which could lead them to favour the short-run, to the detriment of longer-term progress of their business. This corroborates the assumption of short-termism frequently expressed against market participants. In an attempt to test the validity of this assumption, Goodacre and McGrath (1997) conducted an experimental study in which a sample of UK investment analysts were asked to forecast earnings and market values of two companies, based on simulated financial statements. These firms were identical in all respects except for the method used to account for R&D expenditures. The mean market value estimates for the companies were almost identical, a result which is inconsistent with the hypothesis of functional fixation. In another experiment, the only difference between the two companies was that one invested in tangible fixed assets rather than in R&D. In that case, analysts attributed a higher value to the R&D spender, which is inconsistent with the short-termism hypothesis. The authors conclude that the managers' preoccupation with short-run earnings is not as obvious as is often ascertained.

Research on the influence of accounting considerations on managerial decisions is scarce, probably because decisions that would have resulted from other accounting treatments are not observable. This problem could be circumvented with the use of other methodological approaches, in particular interviews with managers. Such research should be encouraged because of its high value for standard setters who, before adopting a new accounting regulation, must anticipate its potential effects on firms' decisions.

The influence of market pressure on accounting decisions

Several empirical studies have examined the influence of market pressures on accounting choices and the disclosure policy of firms. These pressures come from investors as well as market authorities. On the one hand, listed companies must meet the information needs of market participants, and thus disclose more information than non-listed ones. For example, it is generally assumed that an extensive disclosure policy may contribute to lower the company's cost of capital. On the other hand, listed firms must adapt their disclosure policy to comply with the requirements of market authorities. The pressure for larger and specific disclosures is even stronger for firms that are listed on several markets since these firms have to comply with different market regulations and meet the needs of a larger set of investors.

Although accounting decisions may be influenced by many variables such as ownership diffusion or analyst following, listing status is probably the best proxy for market pressures since it is the only variable that captures both the influence of investors and market authorities. Empirically, its relationship with voluntary disclosure is clearly established. Firth (1979) in the UK, Cooke (1989) in Sweden, Wallace *et al.* (1994) in Spain, Patton and Zelenka (1997) in the Czech Republic, all found that the extent of disclosure of listed firms does exceed that of unlisted companies. With regard to international listing, Meek *et al.* (1995) studied voluntary annual report disclosures by a sample of multinational companies from the US, the UK and continental Europe. They also found evidence of larger disclosure by firms listed on several markets. Herrmann and Thomas (1996) for their part, focused on segment reporting. Their study based on annual reports of 223 companies from ten EU countries shows that the quality of segment reporting (as measured by the number of items disclosed per geographical segment) is better for firms listed on multiple stock exchanges than for those listed on their domestic market only. Moreover, Dumontier and Raffournier (1998) and Murphy (1999) have demonstrated that Swiss firms listed on foreign markets are more likely to voluntarily adopt IAS than those listed in Switzerland only. To the extent that IASB disclosure requirements exceed largely those of the Swiss Stock Exchange, this result can be considered as an evidence of the influence of market pressure on voluntary disclosures.

For a few years, there has been a growing interest for studying whether the disclosure requirements of stock exchange authorities affect the management decisions of companies. Muller (1999) provides a good example of such research in the accounting field. UK firms are used to write-off goodwill to equity in the year of acquisition rather than capitalize it on the balance sheet. The problem is that the London Stock Exchange (LSE) uses financial ratios with reported net assets as the denominator to determine whether acquisitions and disposals require shareholder approval. Firms with active merger or disposal plans should thus be reluctant to write-off goodwill against reserves, unless they can limit the impact of this treatment on equity. A solution was to separate the value of brand names from goodwill and capitalize this amount. Muller formulated thus the hypothesis that the recognition of brand names was positively correlated with the number of future transactions that could avoid LSE-mandated shareholder approval through brand name recognition. The empirical findings support this hypothesis, suggesting that capital markets may have a significant impact on the accounting choices made by listed firms.

5. CONCLUDING REMARKS

This short survey highlights the variety of issues addressed by European studies devoted to the relationship between financial accounting and capital markets. Like in the US, the empirical evidence relates mainly on the informational perspective of accounting figures that holds that accounting data are relevant for valuation purposes if they reflect information that influences stock prices or if they provide incremental information that affects investors' perception of the firm. Overall, this type of research is aimed at explaining how accounting numbers and stock returns are related. As suggested by Healy and Palepu (1993), however, these studies provide little evidence useful to standard-setting bodies for the assessment of accounting standards or to managers in forming disclosure strategies to communicate effectively with investors. Future research should address this limitation and respond to questions such as: What types of disclosures should firms provide? Which are useful and credible, which are not? Moreover, instead of focusing on large samples of heterogeneous firms without taking specific contexts into consideration such as the industry, the economic environment or the life-cycle stage of firms, future empirical studies should concentrate on contextual research. Such analyses, based on a judicious partitioning of firms, should improve our understanding of the value relevance of individual financial statement items under specific circumstances. In the same way, market-based research generally focuses on accounting data even though investors also use non-accounting information for valuing companies. The relation between non-accounting data and stock prices represents thus a potentially fruitful area for future research that deserves a more extensive exploration.

Although European capital markets have theoretically been unified, important differences remain across countries. This provides numerous research opportunities. A low association between market returns and accounting numbers is generally considered as an evidence that accounting information is not relevant for security pricing, but it may also be possible that prices do not reflect the true value of firms because stock markets are not as efficient as generally assumed. Comparative studies involving several markets would thus be useful inasmuch as they would make it possible to measure the influence of different levels of market efficiency on the value relevance of accounting information. It would also be interesting to more deeply explore the consequences of various financing traditions within Europe, opposing countries where capital is provided mainly by the banking sector (Germany and France) to others which make a larger use of stock markets (UK). Mixing country-specific factors with individual characteristics of firms would also permit to determine the influence of each type of variables on the attitude of companies with regard to capital markets.

Inasmuch as most European studies are based on British data, this survey confirms the dominance of UK over European accounting research. Our choice to restrict the review to studies published in English may partially explain this observation already suggested by Carmona *et al.* (1999). This language effect should not, however, be overestimated. There are, for example, only a few studies in the French accounting literature that could have been included in this survey. As far as it is possible to generalize from the French example, the inclusion of research published in other languages would probably not have substantially altered the UK dominance. More fundamentally, the preponderance of British studies may be a consequence of the Anglo-Saxon approach of accounting, which views investors as the primary users of financial statements. In continental Europe, the pre-eminence of investors over all users of accounting information is not as widely accepted as in the UK. This may explain that research on the relationship between accounting and financial markets is less developed in these countries. The overrepresentation of UK studies may also reflect differences in the way accounting research is viewed. While the positivist methodology is largely dominant in the Anglo-Saxon world, it is still contested in many countries of continental Europe where the normative or constructivist traditions are more popular.

A general limitation of European studies is that most of them have replicated research already conducted in the US, without questioning the applicability and relevance of the methodology and hypotheses in a different context. Accounting systems and financial markets are nevertheless the result of history and cultural traditions. Gray (1988) proposed several hypotheses relating the characteristics of accounting systems to cultural variables of countries but his work remained largely short-lived. A notable exception is Taylor Zarzeski (1996) who studied the influence of both cultural and market forces on the disclosure policy of companies from seven countries. Her results show that firms domiciled in cultures possessing more individualism, more masculinity and less uncertainty avoidance are more likely to disclose higher levels of information. Such research that takes into account the cultural dimensions of accounting and financial systems is highly desirable, especially when countries recently converted to a market economy are considered.

Generally speaking, Europe provides a unique and exciting field of investigation for accounting research, because of its economic, cultural and legal diversity. Significant contributions to the accounting literature could be made by multinational research teams that would systematically explore these differences.

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NOTE

1 See Lev (1989) for a review of the US evidence.

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An empirical examination of the value relevance of intellectual capital using the Ohlson (1995) valuation model

GE Swartz

School of Accountancy
University of the Witwatersrand

N-P Swartz

School of Accountancy
University of the Witwatersrand

S Firer

School of Accountancy
University of the Witwatersrand

Abstract

The debate on the determinants of firm value is ongoing; and the increasing gap in the book-to-market ratio (Lev & Sougiannis 1999) has yet to be explained in the financial literature. This article contributes to the debate by examining whether intellectual capital measured using the value added intellectual coefficient (VAIC™) (Pulic 1998) contributes to the explanation of the book-to-market ratio. This study used Ohlson's 1995 valuation model and JSE Securities Exchange (SA) (JSE) data in an attempt to identify whether the book value of assets, accounting (accrual) earnings and VAIC™ explain the behaviour of South African share prices. The panel data least squares model results indicate a significant relationship between share prices three months after year end, and abnormal earnings, abnormal cash dividends, book value of assets, the capital employed coefficient, and the human capital coefficient.

Keywords

Accrual Accounting
Intellectual Capital
JSE Securities Exchange
Ohlson Model
Pulic
Security Valuation
South Africa
Value Added Intellectual Coefficient

1 Introduction

The increasing gap in the book-to-market ratio creates a problem which confronts businesses, users of accounting information, standard setters and regulators: it has highlighted the insufficiency of financial statement information to explain the market value of a firm (Lev & Sougiannis 1999). Furthermore, the efficient market hypothesis has discredited many of the objectives that were ascribed to financial statements. This study aims to explore whether intellectual capital, together with information from the financial statements, can explain a firm's market value.

Barth, Beaver and Landsman (2001) have identified three main arguments used to explain the widening book-to-market ratio. First, Fama and French (1993, 1995) suggest that higher returns are demanded to hedge against the possibility of financial distress than in the past. Second, Lakonishok, Schleifer and Vishny (1994) associate the gap with a mispricing of 'glamour companies'. Finally, Frankel and Lee (1998) attribute the difference to errors in the market's expectation of future earnings. Although these explanations do provide interesting insights into the book-to-market ratio gap, they do not yield a satisfactory explanation (Lev & Sougiannis 1999).

A number of recent studies have attempted to test whether elements of financial statements are 'value relevant'. Three competing explanations for the role played by the book value of assets in valuing companies are explored by Collins, Pincus and Xie (1999): the first relates to the use of the book value as a control for scale differences (Barth & Kallapur 1996); the second relates to the use of the book value as a proxy for expected normal earnings (Ohlson 1995; Penman 1992); and the final explanation relates to the use of the book value as a proxy for an abandonment option, or liquidation value (Berger, Ofek & Swary 1996). According to Collins *et al.* (1999), their results support the second and third explanations, namely that book value serves as a value relevant proxy for expected normal earnings, and as a proxy for an abandonment value.

In a series of papers, Ohlson (1995, 2001) and Feltham and Ohlson (1995, 1996) developed a valuation model that identifies the distinct roles played by accrual earnings, book value and dividends in equity valuation. The papers devise a cohesive theory of company value by relying on the concept of 'clean surplus': a concept that can easily be traced to residual income theory and Modigiliani and Miller's (1958) 'MM' valuation models. However, unlike other present value models, the Ohlson (1995) model uses data obtained from annual financial statements only. The valuation model incorporates both the bottom line items of the two traditional financial statements (accrual earnings from the income statement and net total assets from the balance sheet). The model does however include an 'other information' variable that is difficult to specify. Most recent empirical studies which use the Ohlson (1995) model, for example, Garrod and Rees (1998), Amir (1993), Louder, Khurana and Boatsman (1996) and Swartz (2005), use dividends as a surrogate for the 'other' information variable. However, these studies conclude that additional work is required to specify this variable fully.

One possible specification that is omitted by the book values used in the Ohlson (1995) model is intellectual capital. The results and findings from previous studies investigating the relationship between company performance and intellectual capital predict that intellectual capital will increasingly become the 'pivotal factor in corporate growth and development', and is 'becoming the preeminent resource for creating economic wealth' (Luthy 1998: 2). The role of intellectual capital in creating value has become crucial in achieving a competitive advantage in the market (Usoff, 2002). This role is also highlighted by Drucker (1993:54), who states that 'knowledge has become the key economic resource and the dominant and perhaps even the only source of competitive advantage. In this light, this article includes an intellectual capital variable as part of the 'other' information specification, and aims to test whether accrual accounting information and intellectual capital contribute to the explanation of share prices. The value added intellectual co-efficient (VAIC ™) (Pulic 1998) is used to measure intellectual capital performance.

This study is important in the South African context because of the significance of emerging economies for the overall well-being and balance of the global economy – it is important to achieve greater understanding of the development of intellectual capital in different socio-political and economic settings (Firer & Mitchell Williams 2003).

A panel data least squares approach was used in this study to test the original Ohlson (1995) model directly, adjusted for an intellectual capital variable (VAIC^{TM}), and for characteristics peculiar to emerging markets. The data used in the analysis was obtained from the Bureau of Financial Analysis (the BFA McGregor database for JSE-listed firms). The testing sample included 154 firms and the data covered a period of eight years. Only firms reporting the required information were included in the final sample. The results indicated that book value (net asset value per ordinary share), earnings (abnormal earnings per share), abnormal dividends and intellectual capital (the value added intellectual co-efficient (VAIC^{TM})) were significantly related to share price.

The remainder of the article is organised as follows: Section 2 provides a review of the relevant literature. Section 3 depicts the research environment, specifies the model and discusses the methodology and data selection process. The results of the empirical work are presented in Section 4. Finally, the conclusion, implications, limitations and possible directions for future research are set out in Section 5.

2 Literature review

Most recent empirical studies which use the Ohlson (1995) model, for example, Garrod and Rees (1998), Louder *et al.*, (1996), Woldegabir (2004) and Swartz (2005), conclude that, although the model provides a useful foundation for value relevance research, additional work is required to fully specify the additional information variable. This is evidenced by the low coefficients of determination, which range from 0.15 to 0.46. Stober (1999) and Ohlson (2001) in reviewing the empirical applications of the model emphasise the omission of difficult to measure, knowledge intensive intangible assets, or intellectual capital, from the Ohlson (1995) model specification.

The link between systems of high performance work practices and company performance was investigated by Huselid (1995), who concluded that these practices have a significant impact on company performance. Youndt, Snell, James and David (1996) examined the relationship between human resource management, manufacturing strategy and company performance. They concluded that human resource systems are directly related to a company’s performance. Van Buren (1999) examined the relationship between a core set of intellectual capital indicators and a company’s performance. The study concluded that intellectual capital is associated with a company’s performance. Low (2000) identified the importance of non-financial intangibles, examining their role in a company’s performance, concluding that improvements in critical intangible resources result in increased market value.

Firer and Stainbank (2003) investigated whether the performance of a company’s intellectual capital can explain organisational performance. The study concluded that the performance of a company’s intellectual capital can explain profitability and productivity, but not market valuation.

The above review of literature on empirical studies in this field clearly indicates the usefulness of intellectual capital. Hence, it was deemed essential to undertake an empirical investigation into intellectual capital in the context of the South African economy.

3 Research environment and model specification

3.1 *Ohlson's (1995) model*

The determinants of firm value in value relevance research remain an enigma. The usefulness of annual financial statements in determining a company's share price in particular has been increasingly questioned due to the increasing gap between book values (as reflected in the annual financial statements) and the market prices of equity (obtained from the stock markets). A large body of finance and accounting research has emerged attempting to test whether firms' book values are related to the market values of those firms. This article focuses on Ohlson's (1995) model.

Ohlson's (1995) model is a balanced model, relying on the 'clean surplus' relation ($X_t - d_t$) as the retained earnings of a given period:

$$bv_t = bv_{t-1} + x_t - d_t \tag{1}$$

where:

bv_t = company book value at Time t,

x_t = earnings for Period t,

d_t = dividends for Period t.

The clean surplus relation can be analysed further by ruling out infinite growth in book value, implying an accrual accounting-based expression for equity value, namely:

$$P_t = bv_t + \sum_{\tau=1}^{\infty} R_f E_t[\overset{\sim a}{x}_{t+\tau}] \tag{2}$$

where abnormal earnings (~a denotes abnormal) are defined as follows:

$$\overset{\sim a}{x_t} \equiv x_t - (R_f - 1)bv_{t-1} \tag{3}$$

Abnormal earnings are therefore equal to earnings less a capital charge (the risk free rate), based on the concept that the inclusion of book value in the model represents normal earnings on capital invested. Any earnings in excess of normal earnings are therefore abnormal.

The third specification made by Ohlson's (1995) model concerns the time variant behaviour of normal earnings. Hence, the role of other information is recognized. The information dynamic is formulated by adding another information variable, v_t, to include information other than abnormal earnings, which is yet to have an impact on the information available.

$$\overset{\sim a}{x}_{\tau+1} = \omega \overset{a}{x}_\tau + v_t + έ1\ t{+}1 \tag{4a}$$

$$vt{+}1 = \gamma vt + έ2\ t{+}1 \tag{4b}$$

where the disturbance terms $έ_{1\,t+1}$ and $έ_{2\,t+1}$ are with zero means and constant variances. The parameters of the process ω and γ are fixed and known. The superscript 'a' on coefficient x_τ denotes abnormal earnings.

Combining equation (2) with equations (4a) and (4b) yields a linear function for P_t:

$$P_t = bv_t + \alpha_1 x^{a}_{\tau} + \alpha_2 v_t \qquad (5)$$

Hence, Equation 5 implies that the market value is equal to the book value of the firm's assets, adjusted for abnormal earnings and other information that modifies the prediction of future profitability. The model therefore elegantly incorporates accrual accounting variables, distinguishing it clearly from other valuation models such as Modigliani and Miller's (1958) earnings (cash flows) capitalization model, or Gordon's dividend growth model.

3.2 *Cost of capital*

Thus far the model has not included any measure of risk, as the discount rate used has been the risk free rate, R_f (see Equations 2 and 3), based on risk neutrality. The model can be modified to introduce risk in the anticipated dividend sequence. One possible approach suggested is replacing R_f with some factor ρ, which adjusts R_f for risk by introducing a risk premium, determined by the company's cost of capital or the expected market return determined from models such as the capital asset pricing model (CAPM), which implies that $\rho = R_f + \beta$. However, this approach has been criticised as being empirically inadequate – so, for example, Fama and French (1996) argue that betas do not explain average return or size. Similarly, Bowie and Bradfield (1998) investigated beta stability on the JSE and found that thin trading conditions caused distortions. Van Rensburg and Robertson (2003), in a similar study on the JSE, found an unambiguous empirical contradiction of the CAPM.

Fama and French (1992) suggest using variables such as the price earnings (PE) ratio and the cash flow to price ratio as a surrogate for the discount rate. The use of the PE ratio is further supported by Cheng and McNamara (2000), who argue that the PE ratio captures the risk and growth of companies. This study adopted a similar approach to that used by Cheng and McNamara (2000) in using the PE ratio as a surrogate for the cost of capital.

3.3 *Specification of the 'other' information variable*

The empirical application of Ohlson's (1995) and Feltham and Ohlson's (1995, 1996) valuation models was reviewed by Stober (1999), who concluded that the collective models provide a rigorous foundation for value relevance studies, and emphasized the need to pay close attention to specification issues, in particular of the 'other' information variable.

Ohlson (1998) himself has discussed the specification issues in greater detail, and he emphasizes the crucial role of the 'other' information variable in predicting the expectations of future earnings. Ohlson (2001) stresses the need for the correct measure of the 'other' information variable, arguing that current residual income is unlikely to explain goodwill adequately.

Hand and Landsman (1998) take a different view on the specification of the 'other' information variable: they set v_t at zero, and then split net dividends into cash dividends and other capital flows (share repurchases and issuances). They conclude that including cash dividends is consistent with information theories of dividends, where dividends signal future profitability, and therefore act as a surrogate for v_t.

3.4 *Intellectual capital*

Stober (1999) and Ohlson (2001) emphasize the omission from Ohlson's (1995) model specification of assets that are difficult to measure, knowledge intensive and intangible, or intellectual capital. The creation, management, and maintenance of intellectual capital fall within a field that is broadly known as knowledge management, according to Firer and Mitchell Williams (2003), whose paper investigates intellectual capital valuation models, attempting to place a value on three intangible factors of an organisation identified as its knowledge and know-how, created by and stored in its people (human capital), its relationships (social capital), and its organisational information technology systems and processes (organisational capital).

Previous studies have illustrated the increasing importance of a company's intellectual capital to its overall value. For example, the Brookings Research Institute found that in 1962, 62% of a company's value was represented by its physical capital, but that this percentage had declined to 38% in 1992. Luthy (1998) described the growing significance of intellectual capital by stating that intellectual capital was becoming the pre-eminent resource for creating wealth and that the relative importance of tangible assets had decreased over time, due to the increasing importance of intangible, knowledge-based assets.

Resource-dependence theories have resulted in a number of intellectual capital valuation models which indicate that all facets of human resources need to be fully incorporated into valuation models (see, for example, Barney 1991; Grant 1991; Pulic 1998; Sveiby 2000, 2001). These theories argue that human resource assets enable a firm to increase its performance and wealth-creation potential.

Thus far, intellectual capital has been described as a broad term that is considered to be synonymous with a firm's intangible assets. However, to date, there is no precise agreement on the definition of intellectual capital. Stewart (1997:67) defines intellectual capital as 'packaged useful knowledge'. Brookings (1996:12) offers a more comprehensive definition, stating that intellectual capital refers to the 'combined intangible assets which enable a company to function'. It is beyond the scope of this article to assess the respective merits of the various definitions of intellectual capital. Hence, for the purposes of this study, intellectual capital is simply defined as the enhanced value of a firm attributable to assets, generally of an intangible nature, resulting from the company's organisational function, processes and information technology networks, the competency and efficiency of its employees and its relationship with its customers (Mitchell Williams 2000c).

As yet there is no fully accepted measure of intellectual capital and the success of its application by a business. Generally speaking, the methods used to measure intellectual capital can be classified into two main groups (Firer & Mitchell Williams 2003).

The first group adopts an approach where the value of intellectual capital is expressed in financial terms at an organisational level, with a specified benchmark of a perceived value, such as shareholders' equity. Common measures of intellectual capital at the organisational level are the calculated intangible value, Tobin's q, and the market-to-book ratio (Stewart 1997). The primary premise of these measures is the relationship of intellectual capital to shareholder value.

The second group of measures uses a component-by-component analysis of the intellectual capital held by a firm. So, for example, intellectual capital may be considered to consist of three main components, namely human capital, customer capital and infrastructure capital. If the component-by-component approach is used, each component is valued separately using a measure appropriate for that component. Difficulties in aligning various component measures have led to criticism of the component-by-component approach to measuring intellectual capital (Firer & Mitchell Williams 2003). Another limitation of the component-by-component approach is that such measures have usually been designed to fit the characteristics of one single company or industry. The generalisability of such measures is therefore questionable (Firer & Mitchell Williams 2003).

Mindful of the respective criticisms of the various measures of intellectual capital, two screening criteria were adopted in selecting the measure for intellectual capital performance for this article. These criteria were, first, that the basic underlying feature of the measure should be based on a key component of intellectual capital rather than a measure of physical capital; and, second, that the measure should be simple enough to enhance understanding and to allow relative ease in collecting data. The use of an uncomplicated intellectual capital measurement model can be supported for various reasons, including behavioural, cognitive and cost/benefit reasons (Firer & Mitchell Williams 2003). With increased complexity, there is an increased risk of ambiguity and thus there is the potential that the measure may reduce the understandability and applicability of the intellectual capital model. It is also suggested that the value of an intellectual capital measurement model comprising log checklists and complicated simulations between indicators may be compromised by the inability of stakeholders to comprehend all the indicators at once (Mitchell Williams 2000a). Finally, from a pragmatic perspective, it can be argued that if the cost of designing, implementing, administering and updating the intellectual capital measurement model outweighs the benefits derived from it by company management and its stakeholders, there is little incentive to use it.

In view of the two screening criteria outlined above, the value added intellectual coefficient (VAIC^{TM}) (Pulic 1998) was selected to underpin the measurement of intellectual capital performance in this study. This measure is considered to be a 'universal indicator showing [the] abilities of a company in value creation and representing a measure for business efficiency in a knowledge based economy' (Pulic 1998:9). VAIC^{TM} is an analytical procedure designed to enable the management of a company, its shareholders and other stakeholders to effectively monitor and evaluate the efficiency of value added (VA) by a company's total resources and by each key resource component. VAIC^{TM} is the sum of three separate indicators: first, capital employed efficiency (CEE) – an indicator of the value added (VA) efficiency of the capital employed; second, human capital efficiency (HCE) – an indicator of the value added (VA) efficiency of human capital; and third, structured capital efficiency (SCE) – an indicator of the value added (VA) efficiency of structured capital. The following formula can be employed:

$$VAIC^{TM}_i = CEE_i + HCE_i + SCE_i \quad (9)$$

Where VAICTMi	=	VA intellectual coefficient for Firm i;
CEEi	=	VAi /CEi ; VA capital employed coefficient for Firm i;
HCEi	=	VAi /HCi ; human capital coefficient for Firm i; and
SCEi	=	SCi / VAi ; structured capital coefficient for Firm i;

VAi	=	Ii+ DPi + Di +Ti + Mi + Ri ; VA for Firm i computed as the sum of interest expenses (Ii); depreciation expenses (DPi); dividends (Di); corporate taxes (Ti); equity of minority shareholders in the net income of subsidiaries (Mi); profits retained for the year (Ri);
CEi	=	book value of the net assets for Firm i;
HCi	=	total investment in salaries and wages for Firm i;
SCi	=	VAi - HCi ; structured capital for Firm i

Human capital is measured through the total investment in salaries and wages (staff costs) for the financial year (Pulic 1998). The book value of net assets of a company is measured by the physical capital employed by a company (Mitchell Williams 2000b, 2001; Pulic 1998). Human capital and structural capital are reverse proportional; the less human capital participates in value creation, the more structural capital is involved (Pulic 1999).

The main reasons to support the use of the above measure are described as follows (Firer & Mitchell Williams 2003):

- the measure is unique in its flexibility for application to both the macro and the micro economic levels. The methodology can therefore be applied in developing an understanding of the intellectual capital performance of a single company, a group of companies, specific business sectors or an entire capital market;
- the methodology provides a standardised and consistent basis of measurement, thereby enabling national and international comparison; and
- all data used in the equation are based on audited information; calculations can therefore be considered to be objective and verifiable.

The documented evidence therefore illustrates that Ohlson's (1995) valuation model has been revised and re-specified for specific purposes and environments, and empirically tested. Furthermore, the inclusion of Pulic's (1998) measure of intellectual capital as an additional specification of the 'other' information variable appears to be appropriate. The remaining sections of this article depict the research environment and specify the v_t variable.

3.5 *Research environment*

A central feature of this study is its focus on South Africa. There were a number of reasons for this focus: South Africa is an emerging economy seeking to attract foreign capital and investment and it is not always easy to distinguish South Africa from the common perception of the entire southern African region, as illustrated by the Rand's volatility and the events in Zimbabwe (PricewaterhouseCoopers 2003). Valuation problems in emerging markets include thin trading, illiquidity, pyramid structures and information asymmetry (Bruner *et al.* 2002).

3.6 *Model specification*

The following model was used to test the value relevance of intellectual capital:

$$P^{*}_{it} = \overset{a}{\zeta}_t + \beta_1 x_{it} + \beta_2 bv_{it} + \beta_3 d_{it} + \beta_4 CEE_{it} + \beta_5 HCE_{it} + \beta_6 SCE_{it} + \delta_{it} + u_{it} \qquad (10)$$

where:

P_{it}^{*} = the value of Firm i's equity at Year t + 3 months (per share)

ς_t = an intercept

x_{it} = abnormal accrual earnings per share for Firm i at Time t

bv_{it}^{a} = book value of Firm i's assets at Time t (per share)

d_{it} = a proxy for 'other' information, abnormal dividends of Firm i at Time t (per share) $DPS_t - DPS_{t-1}$

CEE_{it} = VA_{it}/CE_{it} ; VA capital employed coefficient for Firm i at Time t;

HCE_{it} = VA_{it}/HC_{it} ; human capital coefficient for Firm i at Time t; and

SCE_{it} = SC_{it}/VA_{it} ; structured capital coefficient for Firm i at Time t;

VA_{it} = $I_{it} + DP_{it} + D_{it} + T_{it} + M_{it} + R_{it}$; VA for Firm i at Time t is computed as the sum of interest expenses (I_{it}); depreciation expenses (DP_{it}); dividends (D_{it}); corporate taxes (T_{it}); equity of minority shareholders in the net income of subsidiaries (M_{it}); profits retained for the year (R_{it});

CE_{it} = book value of the net assets for Firm i at Time t;

HC_{it} = total investment in salaries and wages for Firm i at Time t;

SC_{it} = $VA_{it} - HC_{it}$; structured capital for Firm i at Time t;

Δ_i = an unobservable individual (fixed) specific effect;

u_{it} = an error term (remainder disturbance).

Note that δ_i is time-invariant and accounts for any firm-specific effect, while the disturbance u_{it} varies from firm to firm and across time.

Abnormal earnings are calculated using normal earnings less a charge for capital. In line with Cheng and McNamara (2000), the weighted average cost of capital is estimated using the PE ratio as a base, charged on the net book value of the company's assets. Hence abnormal earnings are defined as follows:

$$X_{it}^{a} = X_{it} - WACC.TA^{*}$$

where:

X_{it}^{a} = Operating earnings after taxation and finance charges

WACC = Weighted average cost of capital

TA^{*} = Total assets – total debt

Total debt is subtracted from total assets because operating earnings X_{it}^{a} are after finance charges. Thus, to avoid double counting the cost of debt, this is removed as a form of finance by subtracting the value thereof from total assets.

The other information variable, v_{it}, can either be other financial statement information or any other publicly available information. 'Other' information v_{it} is estimated using dividends (d_t) and intellectual capital ($VAIC_{it}$) as proxies. The use of dividends is in line with the results of Cheng and McNamara (2000) and Garrod and Rees (1998). As noted earlier, dividends as a form of information are particularly important on the JSE, as in other emerging markets, where liquidity is important (Bhana 1991). Changes in dividends are used to avoid conflict with the abnormal earnings variable. Hence, for the purposes of this study, 'other' information is defined as follows:

$d_t \quad = \quad DPS_t - DPS_{t-1}$

Colinearity between abnormal earnings and abnormal dividends should not be a problem as earnings are accrual earnings, and dividends per share refers to the movement in dividends and therefore only represents the informational effect.

Intellectual capital is estimated using Pulic's (1998) model, as discussed earlier, with specifications included for the capital employed coefficient (CEE_{it}), the human capital coefficient (HCE_{it}), and the structural capital coefficient (SCE_{it}).

As the model is essentially predictive using historical information, a problem of leads and lags is present for the dependent variable P_{it}. Even though there are a number of studies that confirm the JSE's semi-strong stage of market efficiency, share prices three months after each company's year-end were used to allow time for the publication and analysis of financial statements.

4 Results and discussion

The results of the panel data least square regression are presented in Table 1 below. The results of the basic T-statistic indicate that the Ohlson (1995) regressors of book value of assets (bv_{it}), abnormal earnings (x_{it}), and abnormal dividends (d_{it}) all have a statistically significant and robust effect on the dependent variable. Furthermore, the Pulic (1998) regressors for the capital employed coefficient (CEE_{it}), and the human capital coefficient (HCE_{it}) have a statistically significant and robust effect on the dependent variable. However, the structural capital coefficient (SCE_{it}) displays a weak relationship with the dependent variable, and therefore is not considered to be value relevant. Structural capital has been defined as value added minus human capital. Human capital and structural capital are reverse proportional; the less human capital participates in value creation the more structural capital is involved (Pulic 1999). The lack in significance of the SCE_{it} coefficient is therefore not unexpected, as the same structural information is contained in the book value assets, measured at T0, and therefore the information includes the value added in the current year; and in the abnormal earnings coefficient.

The regression statistics indicate that the panel equation fits the data relatively well; an R^2 of 0.9114 and adjusted R^2 of 0.9110 indicate that the equation explains around 91% of the variation in share prices during the sample period. In addition, all coefficient estimates, with the exception of SCE_{it}, are significantly different from zero at 95% confidence levels.

Table 1 Panel data results

Model:

$$P^{*}_{it} = \zeta_t + \beta_1 x^{a}_{it} + \beta_2 bv_{it} + \beta_3 d_{it} + \beta_4 CEE_{it} + \beta_5 HCE_{it} + \beta_6 SCE_{it} + \delta_{it} + u_{it} \quad (10)$$

Dependent variable: P^{*}_{it}

Method: Panel least squares

Sample: 1997 2004

Cross-sections included: 154

Variable	Coefficient	Std. error	t-Statistic	Prob.
β_1	8.493600	0.111578	76.12258	0.0000
β_2	45.44563	7.814148	5.815814	0.0000
β_3	-1.999493	0.230031	-8.692285	0.0000
β_4	-1289.808	477.4625	-2.701381	0.0070
β_5	289.0229	72.75019	3.972813	0.0001
β_6	-3.28E-06	1.92E-05	-0.170351	0.8648

R-squared	0.911409	Mean dependent variable	4156.530
Adjusted R-squared	0.910872	S.D. dependent variable	5262.436
S.E. of regression	1571.067		
Sum squared residuals	2.03E+09		

The lack of a significant relationship reflected in the structural capital coefficient (SCE_{it}) was further investigated by performing a panel data analysis using the Pulic (1998) coefficients only, as reflected in Table 2 below. The results indicate that all three of the Pulic (1998) coefficients have a statistically significant and robust effect on the dependent variable, and therefore that the SCE_{it} coefficient is indeed value relevant. The contradictory results in the two panel data models indicates that although the SCE_{it} coefficient is value relevant, such information is already incorporated in the Ohlson (1995) model coefficients as discussed above, and supports the conclusion that the inclusion of the structural capital coefficient as part of the other information variable is inappropriate.

The results therefore indicate that abnormal earnings, abnormal dividends, book value of assets, the capital employed coefficient and the human capital coefficient all have a significantly positive and robust effect on the share price three months after the year-end for South African listed firms.

Table 2 Panel data results

Model:

$$P^*_{it} = \zeta_t + \beta_1 CEE_{it} + \beta_2 HCE_{it} + \beta_3 SCE_{it} + \delta_{it} + u_{it} \quad (11)$$

Dependent variable: P^*_{it}

Method: Panel least squares

Sample: 1996 2004

Cross-sections included: 154

Variable	Coefficient	Std. error	t-Statistic	Prob.
β_1	818.4691	367.3473	2.228053	0.0261
β_2	275.5066	63.80884	4.317687	0.0000
β_3	0.000370	4.83E-05	7.660574	0.0000

R-squared	0.191327	Mean dependent variable	3820.742
Adjusted R-squared	0.189773	S.D. dependent variable	4853.521
S.E. of regression	4368.781		
Sum squared residuals	1.99E+10		

5 Concluding remarks and suggestions for future research

This study investigated the relevance of accrual accounting data and intellectual capital measured using VAIC™ to determine share prices. The results indicate that abnormal earnings, the net book value of assets, abnormal dividends and intellectual capital all provide information relevant to the establishment of market prices in an emerging market environment.

The annual financial statements not only report earnings and the book value of assets, but also report other accounting information such as various revenues, expenses, assets, liabilities and cash flow information, each of which have different measurement attributes and thus different characteristics in respect of any particular valuation model. Disaggregation of the summary measures used in this study provide a rich field for future research.

The focus of this study was on one single measure of intellectual capital performance. Future studies could explore a different standardised measure for intellectual capital performance.

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Is fair value accounting information relevant and reliable? Evidence from capital market research

Wayne R. Landsman*

Abstract—In financial reporting, US and international accounting standard-setters have issued several disclosure and measurement and recognition standards for financial instruments. The purpose of this paper is to review the extant capital market literature that examines the usefulness of fair value accounting information to investors. In conducting my review, I highlight findings that are of interest not just to academic researchers, but also to practitioners and standard setters as they assess how current fair value standards require modification, and issues future standards need to address. Taken together, evidence from the research suggests that disclosed and recognised fair values are informative to investors, but that the level of informativeness is affected by the amount of measurement error and source of the estimates – management or external appraisers. I also provide a discussion of implementation issues of determining asset and liability fair values.

1. Introduction

Accounting standards setters in many jurisdictions around the world, including the United States, the United Kingdom, Australia, and the European Union, have issued standards requiring recognition of balance sheet amounts at fair value, and changes in their fair values in income. For example, in the US, the Financial Accounting Standards Board (FASB) requires recognition of some investment securities and derivatives at fair value. In addition, as their accounting rules have evolved, many other balance sheet amounts have been made subject to partial application of fair value rules that depend on various ad hoc circumstances, including impairment (e.g., goodwill and loans) and whether a derivative is used to hedge changes in fair value (e.g., inventories, loans, and fixed lease payments). The FASB and the International Accounting Standards Board (IASB) are working jointly on projects examining the feasibility of mandating recognition of essentially all financial assets and liabilities at fair value in the financial statements.

In the US, fair value recognition of financial assets and liabilities appears to enjoy the support of the Securities and Exchange Commission (SEC). In a recent report prepared for a Congressional committee (SEC, 2005), the Office of the Chief Accountant of the SEC states two primary benefits of requiring fair value accounting for financial instruments. First, it would mitigate the use of accounting-motivated transaction structures designed to exploit opportunities for earnings management created by the current 'mixed-attribute' – part historical cost, part fair values – accounting model. For example, it would eliminate the incentive to use asset securitisation as a means to recognise gains on sale of receivables or loans. Second, fair value accounting for all financial instruments would reduce the complexity of financial reporting arising from the mixed attributed model. For example, with all financial instruments measured at fair value, the hedge accounting model employed by the FASB's derivatives standard would be all but eliminated, making it unnecessary for investors to study the choices made by management to determine what basis of accounting is used for particular instruments, as well as the need for management to keep extensive records of hedging relationships.

But, as noted in the SEC report, there are costs as well associated with the application of fair value accounting. One key issue is whether fair values of financial statement items can be measured reliably, especially for those financial instruments for which active markets do not readily exist (e.g., specialised receivables or privately placed loans). Both the FASB and IASB state in their Concepts statements that they consider the cost/benefit tradeoff between relevance and reliability when assessing how best to measure specific accounting amounts, and whether measurement is sufficiently reliable for financial statement recognition. A cost to investors of fair value measurement is that some or even many recognised financial instruments might not be measured with sufficient precision to

*The author is KPMG Professor of Accounting at Kenan-Flagler Business School, University of North Carolina, USA. E-mail: Wayne_Landsman@unc.edu

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help them assess adequately the firm's financial position and earnings potential. This reliability cost is compounded by the problem that in the absence of active markets for a particular financial instrument, management must estimate its fair value, which can be subject to discretion or manipulation.

The purpose of this paper is to review the extant capital market literature that examines the usefulness of fair value accounting information to investors. In conducting my review, I highlight findings that are of interest not just to academic researchers, but also to practitioners and standard-setters as they assess how current fair value standards require modification, and issues future standards need to address. Taken together, evidence from the research suggests that disclosed and recognised fair values are informative to investors, but that the level of informativeness is affected by the amount of measurement error and source of the estimates – management or external appraisers. I also provide a discussion of implementation issues of determining asset and liability fair values. In doing so, I also look to evidence from the academic literature.

As a prelude to my literature review, I begin by discussing the definition of fair value used in standard setting, and reviewing the accounting standards issued by the FASB and IASB that relate to fair value accounting and have been the subject of study by academic research.

2. Background of fair value accounting in standard setting

2.1. Definition of fair value

The FASB defines 'fair value' as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date' (FASB, 2006a).[1] As the FASB notes, 'The objective of a fair value measurement is to determine the price that would be received to sell the asset or paid to transfer the liability at the measurement date (an exit price).' Implicit in this objective is the notion that fair value is well defined so that an asset or liability's exchange price fully captures its value. However, in practice, fair value may not be well defined. This occurs when no active market exists for the asset or liability. In this situation, it becomes difficult to disentangle an asset or liability's fair value from its value-in-use to the entity. For example, the estimate of fair value of a non-market traded swap derivative to a bank is likely to depend on the existing assets and liabilities on the bank's balance sheet. I will return to the implications of this problem when discussing fair value estimate implementation issues below.

2.2. Applications to standard setting

In the US, the FASB has issued several standards that mandate disclosure or recognition of accounting amounts using fair values. Among the most significant are those standards that explicitly relate to financial instruments. Two important disclosure standards are Statement of Financial Accounting Standards (SFAS) No. 107, *Disclosures about Fair Value of Financial Instruments* (FASB, 1991) and SFAS No. 119, *Disclosure about Derivative Financial Instruments and Fair Value of Financial Instruments* (FASB, 1994). SFAS No. 107 requires disclosure of fair value estimates of all recognised assets and liabilities, and as such, was the first standard that provided financial statement disclosures of estimates of the primary balance sheet accounts, including securities, loans, deposits, and long-term debt. In addition, it was the first standard to provide a definition of fair value reflecting the FASB's objective of obtaining quoted market prices wherever possible. SFAS No. 119 requires disclosure of fair value estimates of derivative financial instruments, including futures, forward, swap, and option contracts. It also requires disclosure of estimates of holding gains and losses for instruments that are held for trading purposes.

Among the most significant fair value recognition standards the FASB has issued are SFAS No. 115, *Accounting for Certain Investments in Debt and Equity Securities* (FASB, 1993), SFAS No. 123 (Revised), *Share-based Payments* (FASB, 2004), and SFAS No. 133, *Accounting for Derivative Instruments and Hedging Activities* (FASB, 1998). SFAS No. 115 requires recognition at fair value of investments in equity and debt securities classified as held for trading or available-for-sale. Fair value changes for the former appear in income, and fair value changes for the latter are included as a component of accumulated other comprehensive income, i.e., are excluded from income. Those debt securities classified as held to maturity are recognised at amortised cost. SFAS No. 123 (Revised) requires the cost of employee stock options grants be recognised in income using grant date fair value by amortising the cost during the employee vesting or service period.[2] This

[1] The IASB recently issued a discussion paper, *Fair Value Measurements Part 1: Invitation to Comment* (IASB, 2006), that explicitly asks the question of whether the FASB's focus on exit value for fair value measurement is appropriate and under what circumstances exit value or other approaches (i.e., entry value and value-in-use) are more appropriate.

[2] Although SFAS No. 123 (Revised) requires the cost of option grants be recognised at fair value, it is not strictly a fair value standard. First, amortisation of the cost of option grants is based on the grant date fair value – i.e., the historical cost of the grants. Second, the standard requires vesting features be reflected in the grant date fair value estimate by adjusting the number of options rather than their price. As discussed below, Landsman et al. (2006) advocate also recognising in income changes in fair value of option grants.

requirement removed election of fair value or intrinsic value cost measurement permitted under the original recognition standard, SFAS No. 123, *Accounting for Stock-based Compensation* (FASB, 1995). Until recently, most firms elected to measure the cost of employee stock options using intrinsic value. However, for such firms, SFAS No. 123 required they disclose a *pro forma* income number computed using a fair value cost for employee stock option grants, as well as key model inputs they use to estimate fair values.

SFAS No. 133 requires all freestanding derivatives be recognised at fair value. However, SFAS No. 133 retains elements of the existing hedge accounting model. In particular, fair value changes in those derivatives employed for purposes of hedging fair value risks (e.g., interest rate risk and commodity price risk) are shown as a component of income, as are the changes in fair value of the hedged balance sheet item (e.g., fixed rate loans and inventories) or firm-commitments (i.e., forward contracts). If the so-called fair value hedge is perfect, the effect on income of the hedging relationship is zero. In contrast, fair value changes in those derivatives employed for purposes of hedging cash flow risks (e.g., cash flows volatility resulting from interest rate risk and commodity price risk) are shown as a component of accumulated other comprehensive income because there is no recognised off-setting change in fair value of an implicitly hedged balance sheet item or anticipated transaction.[3]

Outside the US, standards issued by the IASB are accepted or required as generally accepted accounting principles (GAAP) in many countries. For example, since 2005, the EU generally requires listed companies in member states to issue financial statements prepared in accordance with IASB GAAP. IASB GAAP comprises International Accounting Standards (IAS) issued by its predecessor body, the International Accounting Standards Committee (IASC), as well as those International Financial Reporting Standards (IFRS) that it has issued since its inception in 2001. The IASC issued two key fair value standards, both of which have been adopted by the IASB, IAS 32: *Financial Instruments: Disclosure and Presentation* (IASB, 2003a), IAS 39, *Financial Instruments: Recognition and Measurement* (IASB, 2003b). The former standard is primarily a disclosure standard, and is similar to its US GAAP counterparts, SFAS Nos. 107 and 119. IAS 39, which has been amended several times since its initial issuance, describes how particular financial assets and liabilities are measured (i.e., amortised cost or fair value), and how changes in their values are recognised in the financial statements. The scope of IAS 39 roughly encompasses accounting for investment securities and derivatives, which are covered under SFAS Nos. 115 and 133, although there are some minor differences between IAS and US GAAP.

The IASB has also issued *IFRS* 2, *Accounting for Share-based Payments* (IASB, 2004). *IFRS 2* is similar to SFAS No. 123 (Revised) (FASB, 2004) in requiring firms to recognise the cost of employee stock option grants using grant date fair value.[4]

As part of their efforts to harmonise US and international accounting standards, the IASB issued in November 2006 a two-part discussion paper on Fair Value Measurement (IASB, 2006). Part 1 of the discussion paper describes issues and concerns with the FASB's approach to fair value measurement; part 2 reproduces SFAS No. 157. Regarding disclosure, the IASB issued *International Financial Reporting Standard 7, Financial Instruments: Disclosures* (IASB, 2005a). *IFRS 7* requires disclosure of detailed information for recognised financial instruments, both those measured at fair value and those that are not. *IFRS 7* builds on IAS 32 by requiring disclosure of fair value amounts at the end of each accounting period (year, quarter), how the fair values are determined, and the effect on income arising from each particular class of assets or liabilities (i.e., separate disclosure of recognised and unrecognised gains and losses). In addition, *IFRS 7* mandates disclosure of qualitative information relating to financial instruments' liquidity, credit, and market risks.

Regarding recognition, in 2005 the IASB amended IAS 39 by describing conditions under which firms can elect fair value measurement for financial instruments.[5] Under this so-called fair value option, entities can designate, at the time of acquisition or issuance, a financial asset or financial liability be measured at fair value, with value changes recognised in income. This option is available even if the financial asset or financial liability would ordinarily be measured at amortised cost, but only if fair value can be reliably measured. Once an instrument is designated as a fair

[3] The FASB has issued several other standards with elements of fair value recognition or disclosure. For example, SFAS No. 87, *Employers' Accounting for Pensions* (FASB, 1985) requires footnote disclosure of the fair value of pension plan assets and the pension obligation associated with defined benefit plans. However, the standard requires balance sheet recognition of only the net of the unrecognised asset, liability, and equity amounts. The SEC report (SEC, 2005) recommends that pension assets and liabilities be recognised at fair value in the body of the financial statements. Recently, the FASB issued SFAS 158 (FASB, 2006c), partially implementing the SEC's recommendation. Evidence in Landsman (1986) and Barth (1991) is consistent with equity prices reflecting pension asset and liability fair values. See the literature review on pricing effects of financial instruments' fair values in the next section.

[4] The comment in footnote 2 relating to SFAS No. 123 (Revised) applies also to *IFRS 2*.

[5] IASB (2005b).

value instrument, it cannot be reclassified. A goal of the fair value option is to mitigate the effects of income volatility arising from the mixed attribute model without having to apply hedge accounting. In 2006, the FASB issued an Exposure Draft, *Proposed Statement of Financial Accounting Standards, The Fair Value Option for Financial Assets and Financial Liabilities* (FASB, 2006b), which largely mirrors the IAS 39 fair value option standard. Critics of the fair value option raise the concern that permitting two different entities to classify the same financial instrument differently will reduce cross-firm financial statement comparability.

As noted earlier, the FASB issued *Statement of Financial Accounting Standards No. 157, Fair Value Measurements* (FASB, 2006a), which provides a definition of fair value.[6] However, SFAS 157 also establishes a framework for measuring fair value and expands disclosures about fair value measurements. The FASB recognises that active markets may not always exist for a specific asset or liability, and therefore develops a hierarchy of preferences for measurement of fair value. The preferred *Level 1* fair value estimates are those based on quoted prices for identical assets and liabilities, and are most applicable to those assets or liabilities that are actively traded (e.g., trading investment securities). *Level 2* estimates are those based on quoted market prices of similar or related assets and liabilities. *Level 3* estimates, the least preferred, are those based on company estimates, and should only be used if Level 1 or 2 estimates are not available. With its emphasis on market prices, the FASB requires that firms should base their Level 3 estimates on market prices as model inputs wherever possible (e.g., use of equity market volatility estimates when employing the Black-Scholes valuation model to estimate the fair value of employee stock options). Fair value estimates can be constructed using entity-supplied inputs (e.g., discounted cash flow estimates) if other models employing market inputs are not available.

Critics of SFAS 157 express both conceptual and practical concerns.[7] The key conceptual concern is that exit value may not appropriately capture the value of an asset (or liability) to a firm's shareholders even if an active market exists for the asset. This can occur if there is a significant divergence between an asset's value-in-use and its exit value. An asset's value-in-use reflects management skill as well as how the asset is used in conjunction with other assets with which it is combined to generate income. The key practical issue is that because active markets may not exist for an asset or liability, much of the time fair value will have to be measured based on Levels 2 and 3 estimates. Level 2 or 3 estimates are subjective, subject to manipulation, and potentially difficult to verify (audit).[8]

3. Are fair values useful to investors? Evidence from research

3.1. US-based research

When assessing the quality of fair value information, a natural question to ask is whether fair value information is useful to investors. For example, when it was deliberating SFAS No. 107, the FASB was concerned with policy questions relating to the relevance and reliability of disclosed amounts. Regarding relevance, the FASB was interested in whether SFAS No. 107 disclosures would be incrementally useful to financial statement users relative to items already in financial statements, including recognised book values and disclosed amounts. Regarding reliability, the FASB was concerned with whether fair values estimates, especially those relating to loans, would be too noisy to disclose.[9]

As Barth et al. (2001) note, policy-based accounting research cannot directly address these questions, but can provide evidence that helps standard-setters assess relevance and reliability questions. A common way to assess the so-called value relevance of a recognised or disclosed accounting amount is to assess its incremental association with share prices or share returns after controlling for other accounting or market information.

Much of the value relevance research assessing the relevance and reliability of fair value information focuses on banks, since banks are largely comprised of financial assets and liabilities.[10] Several studies address the value relevance of banks' disclosed investment securities fair values before issuance of SFAS No. 115 mandating recognition of investment securities' fair values and effects of their changes on the balance sheet and the income statement. For a sample of US banks with data from 1971–1990, Barth (1994)

[6] As noted above in footnote 1, the IASB has yet to settle on a definition of fair value.

[7] See, for example, Ernst & Young (2005) and AAA FASC (2005).

[8] Even though the goal is always, for all estimates, regardless of the level, exit value, Level 3 estimates will, almost by necessity, have a strong value-in-use flavour in that inputs may often be entity-supplied rather than those based on models employing market inputs. In addition, any adjustments that are made to model-based estimates to arrive at exit value are likely to be highly subjective.

[9] Bank regulators are also interested in these and related questions. See footnote 12 below.

[10] Note that prior to issuance of SFAS 157, 'fair value' was not clearly defined as exit value, nor was the procedure for estimating fair values in the absence of active markets clearly laid-out. Thus, studies examining the value relevance of fair value information are not necessarily based on exit value prices as defined in SFAS 157.

finds that investment securities' fair values are incrementally associated with bank share prices after controlling for investment securities' book values. When examined in an annual returns context, the study finds mixed results for whether unrecognised securities' gains and losses provide incremental explanatory power relative to other components of income. One leading candidate for the ambiguous finding for securities gains and losses is that the gains and losses estimates contain too much measurement error relative to the true underlying changes in their market values.[11] Using essentially the same database, Barth et al. (1995) confirm the Barth (1994) findings and lend support to the measurement error explanation by showing that fair value-based measures of net income are more volatile than historical cost-based measures, but the incremental volatility is not reflected in bank share prices.[12]

Barth et al. (1996), Eccher et al. (1996), and Nelson (1996) use similar approaches to assess the incremental value relevance of fair values of principal categories of banks assets and liabilities disclosed under SFAS No. 107 in 1992 and 1993, i.e., investment securities, loans, deposits, and long-term debt. Supporting the findings of Barth (1994) using pre-SFAS No. 107 data, all three studies find investment securities fair values are incrementally informative relative to their book values in explaining bank share prices. However, using a more powerful research design that controls for the effects of potential omitted variables, Barth et al. (1996) also find evidence that loans' fair values are also incrementally informative relative to their book values in explaining bank share prices. Barth et al. (1996) also provide additional evidence that the fair values of loans reflect information regarding the default and interest rate risk of those loans. In addition, the study's findings suggest that investors appear to discount loans' fair value estimates made by less financially healthy banks (i.e., those banks with below sample median regulatory capital), which is consistent with investors being able to see through attempts by managers of less healthy banks to make their banks appear more healthy by exercising discretion when estimating loans fair values.

Finally, Venkatachalam (1996) examines the value relevance of banks' derivatives disclosures provided under SFAS No. 119 for a sample of banks in 1993 and 1994. Findings from the study suggest that derivatives' fair value estimates explain cross-sectional variation in bank share prices incremental to fair values of the primary on-balance accounts (i.e., cash, investments, loans, deposits, and debt).

3.2. International research

Because Australian and UK GAAP permit upward asset revaluations but, as with US GAAP, require downward revaluations in the case of asset impairments, several studies examine the dimensions of value relevance of revaluations in these countries.[13] Most studies, including Easton et al. (1993), Barth and Clinch (1996), Barth and Clinch (1998), and Muller and Riedl (2002), focus on tangible fixed asset revaluations. These studies are potentially informative to standard-setters as they consider requiring disclosure or recognition of tangible fixed assets at fair value. Such assets, of course, are likely to fall into the Level 3 category in the fair value measurement hierarchy, and hence are likely to be subject to a greater amount of management discretion than is the case for financial assets.[14]

Using a sample of Australian firms with data from 1981–1990, Easton et al. (1993) estimate annual return regressions and find that asset revaluations of tangible long-lived assets have incremental explanatory power relative to earnings and change in earnings. Also using a sample of Australian firms but from a later period, 1991–1995, Barth and Clinch (1998) estimate annual stock price regressions to determine if financial, tangible, and intangible asset revaluations have incremental explanatory power relative to

[11] Another equally plausible explanation is that investment securities' fair value gains and losses are naturally hedged by fair value changes of other balance sheet amounts, which are not included in the estimating equations. Ahmed and Takeda (1995), who include other on-balance sheet net assets in the estimating equations, provide support for this explanation by providing evidence of incremental explanatory power for unrecognised securities gains and losses in explaining banks' stock returns.

[12] Of particular interest to bank regulators, Barth et al. (1995) also find that banks violate regulatory capital requirements more frequently under fair value than historical cost accounting, and fair value regulatory capital violations help predict future historical cost regulatory capital violations, but share prices fail to reflect this increased regulatory risk.

[13] See Black et al. (1998:1,289–1,291) for a brief discussion of accounting standards applicable to asset revaluations in the UK, Australia, and New Zealand.

[14] In response to concerns about the effects of inflation on balance sheets and income statements, the FASB issued SFAS 33, *Financial Reporting and Changing Prices* (FASB, 1979), which mandated disclosure of *current cost* information for tangible assets, principally inventories and plant and equipment. The current cost data are similar to revaluation data. The general conclusion reached by studies assessing the value relevance of the current cost data is the failure to detect, relative to historical cost earnings, incremental explanatory power for stock prices or returns for any of the alternative income measures based on the current cost information (see, e.g., Beaver and Landsman, 1983; Beaver and Ryan, 1985). Reasons for the lack of incremental explanatory power include unbiased estimation error and bias arising from exercise of managerial discretion. Factors contributing to the low data quality were that the data were unaudited and subject to a 'sunset' provision, whereby the disclosure requirement would expire after five years unless the FASB made the provision permanent (it did not). See Barth et al. (2001, section 2.2) for more discussion.

operating earnings and equity book value less the book value of revalued assets. Consistent with US-based research, Barth and Clinch (1998) find revalued investments are incrementally priced. Contrary to the view that intangible asset revaluations are likely to be noisy and uninformative, the study finds a positive association between such revaluations and share prices. However, with the exception of mining firms, they fail to find a significantly positive association between share prices and property, plant and equipment revaluations. Regarding managerial discretion in determination of revaluation amounts, the study also finds little evidence indicating independent appraiser-based revaluations are more relevant than director-based estimates. This finding is of potential importance to the FASB and IASB, as it bears directly on the issue of whether Level 3 fair value estimates will lack value relevance because investors will be concerned about managerial manipulation and measurement error. In particular, the study concludes that the findings suggest that the relevance of directors' private information about asset fair values has the potential to outweigh the effects of self-interest on the estimates.

In contrast to the findings in Barth and Clinch (1998), Muller and Riedl (2002) find evidence that the market finds asset revaluations estimates made by external appraisers are more informative than those made by internal appraisers. Using a sample of UK investment property firms for the period 1990–1999, the study shows that information asymmetry as measured by the adverse-selection component of the firms' average stock price bid-ask spread in the seven months subsequent to fiscal year-end is greater for firms employing internal appraisers. Muller and Riedl (2002) interpret this as evidence that the market finds asset revaluation estimates based on external appraisals to be more reliable. One potential explanation for the difference in findings between the two studies is that the Muller and Riedl (2002) research design is more powerful than the Barth and Clinch (1998) research design. However, this conclusion must be made with caution because the Muller and Riedl (2002) sample of firms is limited to a specialised industry, investment property firms, where external appraisals are an institutional feature. Moreover, the Muller and Riedl (2002) findings do not suggest that the market finds asset revaluations made by internal appraisers to be uninformative.

Cotter and Richardson (2002) also find that external appraisals are more reliable than those made by directors for a sample of Australian firms from 1981–1994. Their measure of reliability is the amount of subsequent years' reversals of upward asset revaluations. However, Cotter and Richardson (2002) also find that independent appraisers are more likely to be used for revaluations of land and buildings and directors are more likely for investments, plant and equipment and identifiable intangibles. The authors interpret this as evidence of firms relying on directors' superior knowledge of asset values for assets that are more specialised and difficult for outside appraisers to value.

Aboody et al. (1999) examine the performance prediction and pricing implications of fixed asset revaluations for a sample of UK firms from 1983–1995. The study finds that upward revaluations are significantly positively related to changes in future performance, measured by operating income and cash from operations. Regarding pricing, using annual regressions similar to those employed in Easton et al. (1993) and Barth and Clinch (1998), the study finds that current year revaluations are significantly positively related to annual stock returns, and current year asset revaluation balances are significantly positively related to annual stock prices. However, regarding the effects of managerial incentives to manipulate asset revaluation amounts, the study also finds that relations between revaluations and future performance and prices are weaker for higher debt-to-equity ratio firms. That is, managerial manipulation affects the usefulness of asset revaluations made by managers of firms facing the pressures of financial distress.[15]

One reason accounting standard setters state in support of fair value measurement is that it mitigates incentives for firms to time asset sales to manage earnings. If gains and losses are recognised in income when assets are revalued and gains on sale are based on fair value rather than historical cost, then the incentive to time asset sales for earnings management purposes evaporate. Black et al. (1998) find evidence in support of this reasoning. In particular, for a sample of UK, Australian, and New Zealand firms in 1985–1995, the study finds no difference in earnings management behaviour for asset revaluing and non-asset revaluing firms. The finding does not hold for UK firms in the pre-1993 period when asset-revaluing firms were permitted to include in income gains and losses based on historical cost, which is further evidence that mandating fair value measurement for gain/loss recognition for firms that elect to use fair value measurement reduces the practice

[15] In the discussion of Aboody et al. (1999), Sloan (1999) states that the study's findings are inconclusive because of the potential confounding effects of other variables unrelated to, but correlated with asset revaluations. Aboody et al. (1999) do include several controls for such omitted variables, although it is never possible to determine whether important controls are absent. This criticism applies, of course, not just to Aboody et al. (1999) but also to all similar pricing studies.

of timing asset sales for income management purposes.[16,17]

One interesting study of Danish banks, Bernard et al. (1995), focuses on the impact of fair value accounting on bank regulatory capital as opposed to the value relevance of fair values for investors. Denmark is an interesting research setting because Danish bank regulators have used mark-to-market accounting to measure regulatory capital for a long period of time. Bernard et al. (1995) find that although there is evidence of earnings management, there is no reliable evidence that 'mark-to-market' numbers are managed to avoid regulatory capital constraints.[18] In addition, when compared to US banks, Danish banks' mark-to-market net equity book values are more reliable estimates of their equity market values, thereby providing indirect evidence that fair value accounting could be beneficial to US investors and depositors.[19]

3.3. US-based stock option research

As noted above, estimates of employee stock options fair values have been required to be disclosed for several years under SFAS No. 123. Several studies examine the value relevance of such disclosures, including Bell et al. (2002), Aboody et al. (2004), and Landsman et al. (2006). Findings in Bell et al. (2002) differ somewhat from those in Aboody et al. (2004), although both studies provide evidence that employee option expense is value relevant to investors. Landsman et al. (2006) provide theoretical and empirical support for measuring the fair value of employee stock option grants beyond grant date, with changes in fair value recognised in income along with amortisation of grant date fair value.

Because quoted prices for employee stock options typically are not available because of non-tradability provisions, the fair value estimates are based on models that rely on inputs selected by reporting firms. Aboody et al. (2006) find evidence that firms select model inputs so as to manage the pro forma income number disclosed in the employee stock option footnote. This finding is potentially relevant to accounting standard-setters as well as bank regulators in that it is additional evidence that managers facing incentives to manage earnings are likely to do so when fair values must be estimated using entity-supplied estimates of values or model inputs if quoted prices for assets or liabilities are not readily available.[20] If managers have the incentive to use discretion when estimating fair values of on- and off-balance sheet asset and liability amounts when such values are not recognised in the financial statements, it is reasonable to assume the incentive will only increase if fair value accounting is used for recognition of amounts on the balance sheet and in the income statement.

4. Fair value implementation issues

Estimating fair value, i.e., exit value, for assets and liabilities is relatively easy if they are actively traded in liquid markets. The problem becomes more complicated if active markets do not exist, which is why the FASB offers Level 2 and Level 3 estimation categories in SFAS 157. Although absence of active markets is an obvious problem for non-financial assets, the problem is no less obvious for financial instruments, particularly if the financial instrument is a compound instrument comprising several embedded option-like features, values for which depend on inter-related default and price risk characteristics.

In this section, I discuss issues relating to implementation of fair value estimates when market prices for particular financial instruments are not readily available by focusing on findings from two related studies by Barth et al. (1998, 2000) on the use of binomial option pricing models to estimate fair values for corporate debt and its components. The issues I discuss should provide some insights to the FASB and IASB regarding the relevance and reliability of Level 3 fair value estimates.

4.1. Binomial option pricing of corporate debt

Barth et al. (1998) uses a binomial option pricing model to estimate the fair values of corporate debt and its components, i.e., conversion, call, put, and sinking fund features, to provide evidence on

[16] In another study using the same sample of firms as that used in Muller and Riedl (2002), Dietrich et al. (2001) find that UK investment property firms in the pre-1993 period appear to select the valuation approach – historical cost or fair value – that results in smoother earnings. Because post-1993 UK firms were required to disclose income from property sales separately on the income statement, the authors interpret this as evidence that changes in disclosure requirements altered manager's use of property sales to smooth earnings. Dietrich et al. (2001) also find evidence that property appraisal estimates of fair value better reflect asset selling prices than historical costs, and interpret this as evidence consistent with greater reliability of fair value estimates, at least with respect to assets that are ultimately disposed.

[17] See Lin and Peasnell (2000) for a discussion of managerial strategic considerations in the timing asset revaluations. The study provides evidence that firms appear to time asset revaluations to offset the effects of so-called equity depletion arising from immediate write-off of goodwill.

[18] The ability to mark-to-market an asset suggests the existence of a reasonably liquid market for the asset. From this perspective, mark-to-market values can be viewed as approximating Level 1 or Level 2 fair value estimates.

[19] Bernard et al. (1995) caution that drawing inferences from the Danish experience with fair value accounting for banks regarding the benefits of requiring fair value accounting for US banks is subject to many caveats. These include differences in the relative size of the US and Danish banking sectors, as well as relative differences in US and Danish banking regulatory systems.

[20] See also the discussion above of the Barth et al. (1996) findings relating to loans fair values estimates by banks with lower regulatory capital.

the relevance and reliability of estimated fair values. A companion study, Barth et al. (2000), describes details of how the binomial model is implemented. The 1998 empirical study is based on data from 1990 for a sample of 120 publicly traded US firms that have corporate debt with multiple embedded option features. The binomial model the study implements is based on the models of Cox et al. (1979) and Rendleman and Bartter (1979), and considers directly only default risk, but includes information in the interest rate yield curve.

Findings from Barth et al. (1998) reveal component value estimates are relevant in that they represent large fractions of estimated total bond fair value. In addition, implementing a fundamental components approach in which call options are classified as assets, conversion options as equity, and put options as debt, indicates there are material changes to recognised balance sheet accounts and debt-to-equity ratios for sample firms.[21] The study also finds that estimates of component fair values depend on whether a bond has multiple features. For example, the value of the conversion feature for a convertible, callable bond depends on the value of the call feature and vice versa. In addition, because components' values are interdependent, the order in which components are considered when estimating each bond's total fair value can materially affect each component's estimated fair value. This issue is particularly important if a fundamental components approach is used for separate recognition of bond components as assets, liabilities, and equity.

However, additional evidence in Barth et al. (1998) suggests model estimates of total bond value may lack reliability. In particular, when the authors re-estimate bond fair values excluding from the sample those bonds with available market prices (such bonds comprise approximately half of sample bonds), estimated bond values for those bonds that are not publicly traded differ significantly from value estimates when all bonds are included in the estimation procedure. This finding suggests that financial instruments' fair value estimates are sensitive to whether actual market price information from other instruments an entity has on its balance sheet is available for use as model inputs.

Barth et al. (1998) reach several conclusions regarding limitations to implementation of binomial option pricing models for estimating bond fair values that generalise to all financial instruments issued or held by an entity. First, the authors had to make several educated guesses for values of model inputs (e.g., conversion schedules and equity volatility). In principle, managers of the reporting entities likely have access to better information than financial statement users (including academic researchers), and the authors suggest that fair value estimates could improve if firms were required to disclose them.[22] Second, models quickly become too complex and difficult to implement if they are to incorporate all of the dimensions of risk and value that can affect an instrument's fair value. For example, presently, few models consider both interest rate and default risk. In addition, financial instruments' fair values are interdependent. For example, the fair value of one debt instrument issued by an entity is dependent upon actions that holders of another debt instrument issued by that entity can take. The model Barth et al. (1998) implement considers some sources of bond value interdependence (e.g., debt priority) but basically ignores the issue because of its complexity. The issue of financial instruments' value interdependence is another illustration of the issue raised by Barth and Landsman (1995) that a financial instrument's fair value – i.e., its exit value – may not adequately capture the value of the instrument to the entity that owns it. When an asset's value-in-use departs significantly from its exit value because of value interdependence, fair value will be less informative to investors who are using the information to value the entity's equity.

4.2. *Manipulation of model inputs*

Having to rely on managers' estimates of asset and liability fair values introduces the general problem of informational asymmetry.[23] That is, in the case of Level 3 fair value estimates, managers have private information regarding appropriate values to select for model inputs as well the true

[21] See FASB (1990, 2000) for a description of the fundamental components approach to accounting for complex financial instruments. In addition to the FASB, several other standard-setters have considered or require separating compound financial instruments into components, including the CICA (Section 3860 of the *CICA Handbook*, 'Financial Instruments – Disclosure and Presentation') and the AASB (AASB Accounting Standard 1033, *Presentation and Disclosure of Financial Instruments*). Under the revised version of IAS 32 (IASB, 2003a), firms that issue compound financial instruments with debt and equity components must account for, and present separately, the components according to their substance based on the definitions of liability and equity.

[22] Relatedly, as noted above, Cotter and Richardson (2002) also suggest managers have superior information about non-investment property values and therefore rely on director estimates of fair value rather than appraisals for these assets. However, this does not preclude requiring managers to disclose assumptions they make as inputs to the valuation process.

[23] This is not to suggest that informational asymmetry is peculiar to fair value estimation by managers. Informational asymmetry arises in accounting whenever managers have discretion regarding the timing or amount of non-market adjustments to amounts arising from past transactions, e.g., allowances bad debt, allowances for loan losses, and impairment charges.

underlying economic value of an asset (or liability) to the firm.[24] Informational asymmetry creates two somewhat different problems, adverse selection and moral hazard.

An important implication of adverse selection is that the market will tend to value apparently similar, but different, assets held by two firms similarly when assessing their fair values and the values of the firms' equities. Thus, for example, in the absence of credible and verifiable information, two property investment firms that are otherwise equivalent except one has a higher quality portfolio of investments than the other will have their stocks valued similarly by the securities market. How can the firm with the higher quality portfolio of investments signal its fair value estimates are a more reliable indicator of economic value? One solution is for the firm to sell a portion of its portfolio to establish that the selling price is close to the fair value estimate of the property sold. Another solution is to permit the firm to disclose its valuation assumptions, the quality of which can be verified by others. For example, the firm can select a high cost external appraiser to value its properties. Both of these solutions illustrate the same point: for the signal to be credible, it must be costly, but less costly for the property investment firm with the higher quality investment portfolio. The investment firm with the lower quality portfolio could mimic the actions of the higher quality firm, but doing so would be more costly as the market would learn its portfolio of investments was of lower quality.[25]

The problem of moral hazard is that managers will tend to use their private information to their personal advantage by manipulating the information that they disclose to the securities markets and regulators. For example, under a fair value measurement regime, managers have the incentive to value assets upward to increase income and their bonus-based compensation, and to time any impairments or upward revaluation reversals to minimise the effect on their compensation, e.g., in a period when the firm's income is otherwise depressed and the manager will not get any bonus regardless. This is the so-called 'big bath' problem.

As noted above, the findings in Aboody et al. (2006), which indicate that managers select model parameters to manage estimates of disclosed employee stock option fair values, raise the broader question of whether managers will behave similarly when selecting model parameters for fair value estimates of other financial instruments, including those whose values are recognised in the body of the financial statements. The Barth et al. (1998) conclusion that managers can provide better estimates of bond fair values because they have access to private information, presumes implicitly that managers apply their private information in a neutral fashion – i.e., they do not succumb to the temptation to manipulate bond fair value estimates for private gain.

If fair value accounting for financial instruments or non-financial assets is generally applied for financial statement recognition, accounting standard-setters and securities regulators face the challenge of determining how much latitude to give managers when they estimate fair values, balancing the benefit of permitting managers to reveal private information, thereby mitigating the adverse selection problem, and the moral hazard cost of their exercising discretion to manipulate earnings and balance sheet ratios that affect contracting relationships with lenders and, in the case of financial institutions, financial statement-based regulatory capital used by bank regulators interested in stability of the banking system.

Although the securities market tends to act as a disciplinary force to keep firms and its managers honest, it does so with a lag. One solution advanced here to the problem of balancing the adverse selection and moral hazard problems is to require extensive disclosure of the underlying assumptions used when estimating fair values, whether the fair value estimates be Level 1, 2, or 3. For example, in the case of Level 2 estimates, investors should be provided with sufficient information to determine which assets or liabilities are used as a basis for comparison. In the case of Level 3 estimates, investors should have access to all relevant model inputs. The FASB appears to require ample disclosure in SFAS 157. For example, regarding Level 3 estimates the FASB (FASB, 2006a, p. 12, para. 32) requires that 'the reporting entity shall disclose information that enables users of its financial statements to assess the inputs used to develop those measurements and for recurring fair value measurements using significant unobservable inputs (Level 3).' Whether investors find SFAS 157 disclosures to be useful in assessing the relevance and reliability of the firms' fair value estimates is an empirical matter that will undoubtedly be the subject of much future study by accounting researchers.

[24] Managers also have private information regarding appropriate Level 1 or Level 2 fair value estimates (see discussion of Cotter and Richardson, 2002, in footnote 22).

[25] One can view the election of fair value or historical cost (with impairment) measurement that was permitted under UK GAAP as an opportunity for higher quality firms to signal their quality through the selection of fair value. For example, suppose both a high quality and low quality property investment firm selected fair value measurement and revalued their assets by the same amount. The firm with the lower quality property investment portfolio would be more likely to reverse the revaluation in future years, which would hurt the firm's credibility with the financial markets, thereby reducing its incentive to revalue its assets, and possibly avoid election of fair value measurement.

4.3. Fair values measurement error

One problem that remains even in the absence of managerial manipulation of fair value estimates is that fair value estimates of assets and liabilities are likely to contain measurement error. If the findings in Barth et al. (1995) relating to banks' investment securities generalises to other bank assets and liabilities, implementation of a full fair value model for recognition of financial instruments at fair value could yield unrecognised gains/losses that could cause earnings (and, in the case of banks, regulatory capital) to be more volatile than earnings based on the current historical cost model. This would be expected to occur particularly if measurement error in assets' fair values – which is likely to be positively correlated across assets – is not fully offset by measurement error in bank liabilities' fair values.

Of course, not all earnings volatility arising from the application of fair value accounting is the result of measurement error. Barth (2004) makes the observation that there are three primary sources of 'extra' volatility associated with fair value-based accounting amounts relative to those determined under historical cost. The first is true underlying economic volatility that is reflected by changes in the fair value of assets and liabilities. The second is volatility induced by measurement error in estimates of those fair value changes. The third, induced volatility arising from using a mixed-attribute model, would be less of a concern if all instruments are recognised at fair value, or if a firm elects the fair value option that is permitted under IAS 39.

Before leaving the discussion of measurement error, it is important to note that although fair value estimates of assets and liabilities likely contain measurement error relative to true economic values, so do historical cost-based book value estimates.[26] The key question for policy makers and academic researchers alike is whether fair value-based financial statements improve information investors receive relative to information provided by historical cost-based financial statements. The overall conclusion from the research I review is that investors do indeed benefit from having access to fair value information.

5. Concluding remarks

This paper reviews the extant capital market literature that examines the usefulness of fair value accounting information to investors. In doing so, I highlight findings that are of interest not just to academic researchers, but also to practitioners and standard-setters as they assess how current fair value standards require modification, and issues future standards need to address. Taken together, the research findings suggest that disclosed and recognised fair values are informative to investors, but that the level of informativeness is affected by the amount of measurement error and source of the estimates – management or external appraisers. I also provide a discussion of implementation issues of determining asset and liability fair values.

Fortunately for academic accounting researchers, the IASB and FASB continue to issue standards relating to fair value measurement, disclosure, and recognition, providing ample opportunity for future research. Findings from extant studies of firms in the US, UK, and Australian capital markets suggest that investors are provided with information that is somewhat reliable and relevant. Whether relevance and reliability of asset and liability fair values improves with the new measurement and disclosure standards and with fair value recognition extended to a broader set of assets and liabilities than has been the case to date remains to be seen. In addition, because standards issued by the IASB either are or will be required to be adopted by firms in a great number of countries around the world, researchers will have an opportunity to examine how the relevance and reliability of disclosed and recognised fair value amounts vary across the many countries, where depth of markets for assets and liabilities and other institutional features that can affect fair value estimates are likely to differ.

[26] As noted above (footnote 23), historical cost-based estimates are also subject to managerial discretion.

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Raoudha Dhouibi (Tunisia), Chokri Mamoghli (Tunisia)

Accounting and capital market measures of banks' risk: evidence from an emerging market

Abstract

Depending on the purpose, both accounting and market information can be used as appropriate measures to assess bank's risk. According to Bliss and Flannery (2001), the market is likely to provide supervisors with signals that can be used to improve control quality through bank supervision. In this context, the prudential supervision reforms proposed by Basel Committee (BIS 2003) are based on three pillars including one calling for greater use of market discipline. However, market discipline can lead to a safe and efficient bank only when the market is sufficiently developed and its participants are competent and motivated to monitor banks.

Several authors have focused on the banking systems of developed countries and found that there are significant relations between accounting and market risk measures. Nevertheless, given the significant role of banking systems in emerging countries and the need to promote their stability, these countries are also preparing the adoption of prudential regulation. Therefore, it seems very interesting to examine the market ability to reflect the risk taking by banks in an emerging country. By applying a panel data analysis on 10 listed Tunisian commercial banks during the period of 1998-2007, the results show that neither the capital measure of total risk nor the systematic risk are linked to the accounting measures of total risk, leverage risk and credit risk of banks. Therefore, we can conclude that capital market is not able to reflect accounting information; therefore, prudential Tunisian authorities have to focus on accounting measures to assess the risk-taking by banks.

Keywords: risk accounting measures, risk capital market, total return risk, systematic risk, specific risk.
JEL Classification: G21, G30, G32, M41.

Introduction

According to the objective, in order to choose a suitable measurement to evaluate the banks' risk taking, one can use accounting information as well as capital market measures of risk. If a banking regulator seeks to evaluate the financial health of a bank, a CAMEL rating, made up of accounting variables would be preferred. However, according to Bliss and Flannery (2001), the market is likely to provide to the prudential authorities signals which they can exploit to improve control quality and the banking supervision. In this context, the prudential reforms proposed by the Basel Committee (BIS 2003) rest on three pillars including one recommending the improvement of market discipline. Nevertheless, there are many conditions that encourage the success of market discipline. First of all, the market has to be competitive and to function satisfactorily. If the capital market is not sufficiently active and the investors are not informed properly, nor sufficiently qualified and reasonably encouraged to control the banks, the information existing on the market can never reflect the risk undertaken by the banks and the signals can not be exploited by the regulator. So, it is of major interest to evaluate the aptitude of the market to reflect the risk taking by banks and their quality of the credit.

Since the work of Pettway (1976), several other authors[1] were interested in establishing the relation between risk accounting measures and those apprehended on the stock markets. These various studies made exclusively on the data of the developed countries' banks found that there are significant relations between the accounting and market measures of risk. Given the importance of the banking industries role within the emerging countries and the need for promoting their stability, the Official Authorities of these countries prepare, in their turn, the adoption of the Basel II prudential reforms.

For the reason of the recent reforms to stimulate and promote the market discipline and to improve the control quality of the Tunisian banks, we estimate that it is interesting to examine the aptitude of the Tunisian capital market to reflect the risk taking by the banks. In order to achieve this goal we will use the panel data analysis of the 10 listed commercial banks over the period of 1998-2007.

1. Relations between accounting and capital market measures of banks' risk: literature review

In a context of instability, such is the case of these last years, risk accounting measures can be differentially affected by economic environment and their relative importance can change over time (Agusman et al., 2008), so it becomes very important to use capital market measures. However, the data of the market can be exploited only if the

[1] Jahankhani & Lynge (1980), Lee & Brewer (1985), Brewer & Lee (1986), Mansur et al. (1993), Elysiani & Mansur (2005).

investors are properly informed and sufficiently qualified and incited to control the firms.

Several previous researches concerned with the problem of the relationship between the two various risk measures, namely accounting and capital market measures of risk. Treating this problem on the data of the American banks, Jahankhani and Lynge (1980), Lee and Brewer (1985), and Mansur et al. (1993) found significant relations between these two kinds of measures. Elyasiani and Mansur (2005) examined the Japanese banks using a GARCH model and also found a significant relation between accounting and capital market measures of risk.

In fact, the interest to this topic goes up for more than three decades. The pioneer was Pettway (1976) who explored the relation between these two kinds of risk measures. He studied the impact of the bank's capital level and other accounting variables on market beta and on the price to earning ratio. He noted that the amount of bank equity had an effect on market beta in 1974 and on the price to earning ratio in 1972 and 1974. Pettway and Sinkey (1980) developed an early warning system using, at the same time, the accounting and market information. Thereafter, Jahankhani and Lynge (1980) examined a sample of 95 commercial banks in the United States during the period of 1972-1976. They considered the market beta as a dependent variable, and noted that there were several factors which acted on the systematic risk such as the dividends yields and the coefficient of variation of the deposits. In the same way, they noted that accounting measures of risk explained 26% of systematic risk variability. Moreover, when the total risk is considered as a dependent variable, all the variables except for the ratio of loans/deposits prove statistically significant relations, and 43% of variability in the dependent variable are explained.

Also, Rosenberg and Perry (1981) examined 124 American banks between March 1969 and June 1977. The systematic and specific risks are used as dependent variables and a certain number of accounting ratios are used as independent variables. They noted that the most important predictive factors of beta are the size of the bank, the *dividend yield*, equity capitalization, and the asset to long-term liability ratio. In addition, the income variability, the leverage ratio and the accounting measure of beta are the most important predictive factors of the specific risk

In the same way, Karels et al. (1989) examined the relationship between the total risk, the systematic risk, and the specific risk and an accounting measure of risk, namely, the capital ratio. They examined these relations using a sample of 24 American banks for the period exceeding 30 quarters between 1977 and 1984. They noted that, as predicted, the coefficients of correlation between the capital ratio and the systematic risk were negative in each of the thirty quarters. They also explained that higher capital adequacy ratios provided a greater buffer against default and, therefore, implied less risk.

Mansur et al. (1993), using also a sample of American banks, examined the data of 59 institutions, chosen randomly, during the period of 1986-1990. Using the market beta as a dependent variable, they announced that only the loan loss reserve to total loans ratio and the coefficient of variation of deposits were statistically significant. They found that the independent variables explained 35% of the variability of the systematic risk. Moreover, using the total risk as a dependent variable, only the liquidity ratio was found statistically significant, and it explained 24% of the variability of this risk. In a general way, these studies indicate that accounting measures and the capital market measures of risk are interdependent in the case of the American banks.

Finally, in their recent work, Agusman et al. (2008) were interested in this topic and concentrated particularly on the banks' data of certain emerging countries, especially the banks of the Asian countries. The sample consisted of 46 institutions observed over the period 1998-2003. By applying the panel data analysis, their results show that the standard deviation of the return on assets (ROA) and loan-loss-reserves-to-gross-loans are significantly related to total risk. Also, gross loans to total assets and loan loss reserves to gross loans are significantly related to specific risk. Agusman et al. (2008) specified, consequently, that in these countries the specific risk of the banking firms is more important than the systematic risk.

The question which arises in this case, is such a result can be generalized to the other emerging countries, where the banking environment is instable and where the insolvency risk is omnipresent, such as for Tunisia? The answer to this question is of a major interest, because these countries are preparing to adopt the fundamental principles of the Basel II agreement which rests primarily on the market discipline.

2. Data and empirical methodology

The aim of this section is to examine the aptitude of the capital market to reflect the risk undertaken by Tunisian listed commercial banks. This topic was the subject of several previous researches that often use the prices of the subordinate obligations (Adrian Pop, 2005). Alternatively, there were few studies which treated this topic using the stock prices. The interest to use the stock prices rises from the weak liquidity of the other compartments of the financial markets or even from the inexistence of a market for the subordinate debts, such as the case of Tunisia. Among the studies which used the stock prices to evaluate the aptitude of market data to reflect the risk undertaken by banks is the study by Distinguin, Rous and Tarazi (2005) which relates to a sample of European banks for the period going from 1995 to 2002. The methodology used by these authors is in forecasting the deteriorations of the financial situation of banks which are identified using the rating deteriorations published by the three principal rating agencies (Fitch, Standard & Poors and Moody's). Gropp, Vesala and Vulpes (2005) also used the public information carried out by the agencies charged to evaluate the financial health of the borrowers. These authors justified the use of this kind of information by the insufficient number, in the case of Europe, of the officially declared banking bankruptcies, which does not make it possible to form a representative sample and also, by the difficulty of access to the internal notation systems of the banking supervision authorities used by the American studies (e.g., Curry, Elmer and Fissel, 2003; and Gunther, Levonian and Moore, 2001).

However, for the case of Tunisia, not all the listed commercial banks have a solicited notation, and if there are some banks which have it, this notation is available only for the few recent last years; therefore, it will not enable us to build a representative sample. So, to achieve our purpose, we are limited to check if there is a relation between the risk accounting measures and the capital market risk measures. Thus, we have chosen to use the stock prices to apprehend the total risk, the systematic risk and the specific risk of each bank. We will use these measures as dependent variables and we will examine the relation which can exist between these measures of risk and accounting measures of risk, namely, the total risk, the leverage risk, the credit risk and the liquidity risk.

2.1. Data and sample. In order to calculate the total risk, the systematic risk and the specific risk of the various banks, we obtained the data from the Web site of "La Bourse des Valeurs Mobilières de Tunis"[1]. The accounting data are collected from the financial statements and the annual reports for each bank. Data concerning the nonperforming loans and the loans loss reserves, which we will use as indicators of credit risk, are obtained from the services of the central bank of Tunisia. These data are rarely disclosed in the banks' annual reports. The collected data enabled us to have a sample composed by the ten listed commercial Tunisian banks over the period of 1998-2007. Because of the adoption of the new Tunisian accounting system in 1997 we could not take into account one longer period.

2.2. Specification of the empirical model. This study tests empirically the relations between capital market risk measures and accounting ratios using the following general model:

CMR= f (Total Risk, Leverage Risk, Credit Risk, Liquidity Risk, Control Variables) + error, (1)

where, *CMR* represents the capital market risk measures including the total risk, the systematic risk and the specific risk.

The Capital market Total risk (σ_i) is the annualized standard deviation of the banks' daily stock returns.

The systematic and specific (idiosyncratic) risk measures are calculated using the following market model. This model is estimated for each year for each bank:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}, \quad (2)$$

where i and t denote bank and time, respectively; R is the bank's equity return; Rm is the return on TUNINDEX market index; α is the intercept term; ε is the residuals. β_i is the systematic risk of bank i. Finally, the specific risk is calculated as the standard deviation of residuals of Eq (2) for each year and for each bank.

The three dependent variables, presented above, are regressed to several accounting measures of risk used to reflect the total risk (SDROA and Z-score), the leverage risk (EQTA and DEPEQ), the liquidity risk (LIQATA) and the credit risk (LLPGL, LLRGL and NPLGL).

The total risk accounting measure (SDROA) is the standard deviation of return on assets calculated estimated in a three-year moving window of annual observations. This variable is used by Brewer and Lee (1986), Shiers (1994) and Agusman et al. (2008). Moreover, we introduce in the regression function a second measure of bank's total risk, namely the Z-score[2]. This measurement was not used by the previous researches which seek to

[1] www.bvmt.com.tn

[2] The Z-score appreciates the total insolvency risk of a bank. This measure was proposed by Par Roy (1952), Blair and Heggestad (1978), Boyd and Graham (1986) and used by Goyeau and Tarazi (1992). Z-score = (ROA+K/A)/ SDROA, where ROA is the return on assets, SDROA is the standard deviation of ROA, and K/A is the capital on total assets ratio.

examine the relation between the risk calculated by the accounting ratios and capital market risk measures. The Z-score was introduced in the regression function as an inverse form, i.e. 1/Z, so as to make the interpretation of the signs of coefficients comparable. Otherwise, a high Z-score means less insolvency risk whereas a high total risk, the systematic risk or the specific risk indicate more risk. We also introduced the inverse form of Z-score to alleviate the muticollinearity problem with the indicator of credit risk (EQTA).

We expect to have a positive sign between these accounting measures (SDROA, Z-score) of total risk and the capital market measures of risk.

The leverage risk measure (EQTA) is the ratio of book value equity to total assets, which is the proxy for the Cooke ratio. This measure was used by Pettway (1976), Jahankhani and Lynge (1980), Brewer and Lee (1986) and Karels et al. (1989). We expect to have a negative sign between this accounting measure of leverage risk and the capital market risk measures. The second measure (DEPEQ) that we propose to introduce in the regression function to appreciate the leverage risk is the total deposits held by the bank to the book to value equity. This measurement was not used by the previous studies but we estimate that it is relevant to explain the leverage risk of the banks because the deposits are ensured by the organization of deposits insurance. Thus, the amount of the deposits is high; the incentive with moral hazard of the bank is high, contrary to the other uninsured loans. Consequently, a higher ratio of deposits on book value equity corresponds to a more important leverage risk. We expect that the correlation between this ratio and the capital risk measures is positive.

The liquidity risk (LIQTA) is apprehended by the ratio of liquid assets to gross loans. This measure was used by Jahankhani and Lynge (1980) and by Mansur et al. (1993). We expect to have a negative sign between this ratio and the capital market measures of risk of the market.

The accounting measure of credit risk (LLPGL) is the ratio of loan loss provisions to gross loans. This variable was used by Mansur et al. (1993) and by Hassan (1993). We expect to have a positive sign between this accounting measure of credit risk and the capital market risk measures. As alternative measures of credit risk we use the ratio of loan loss reserves to gross loans (LLRGL), used previously by Agusman et al. (2008) and the ratio of nonperforming loans to gross loans (NPLGL). This last ratio has not been already used in this context, but it represents a relevant measure of credit risk largely used as an indicator of the asset quality of the banking firm.

In order to better determine the impact of accounting measures of risk on those of the capital market, we controlled for the effects of banks' size, of banks' ownership (private or public) and of the quantity of information disseminated by the banks on their risk profile in their annual reports.

In fact, it is very important to control for the effect bank size because the banking regulation exerts a discipline on the behavior of the risk taking by the banks. But this discipline is imperfect for the case of big banks. Indeed, the bankruptcy of a big bank could result in very important costs, and consequently, these establishments generally anticipate a non intervention of the regulator. Their anticipations of the non interventionism of the regulator rise from the problem of *"too big to fail"*. Indeed, this behavior can generate incentives for the banks to engage in too risky activities. To apprehend the bank size we used the natural logarithm of total assets.

Moreover, the ownership of the bank can have a considerable effect on its level of the risk. In fact, the economic literature stipulates that the raison d'être of the public banks is due to the existence of insufficiencies on the financial and credit markets (Stiglitz and Weiss, 1981; Greenwald and Stiglitz, 1986). Indeed, the private banks which search, generally, to maximize their profits do not take into account the social returns in their projects financing decisions. Consequently, the aim of public banks is to enhance the economic development and to improve the social well-being (Stiglitz, 1993). According to this theory, the object of the public banks must be to direct the financial resources towards projects which are socially advantageous or to firms which do not have an access to other sources of financing, but have high risks. To take into account the bank ownership in the regression function we have created a dummy variable which equals 1 if the bank is private and 0 if the bank is public.

Finally, the interest to control the effect of the information quantity disseminated to the investors in the annual reports, is that the banks which reveal more information choose a lower level of risk (Cordella and Yeyati, 1998; Boot and Schmeits, 2000). The choice of a low level of risk by these banks is due to the fact that those are exposed to the market discipline, thus, they would be penalized by the investors if they choose a high level of risk. This effect is weak if the information given to the investors is limited and it is absent if the investors do not know the risk profile of the banks. To take into account the impact of information quantity on capital market measures of risk we introduce in the regression function an index drawn on a previous study of Nier and Baumann (2006). It synthesizes disclosure based on annual reports information. In Table 3 of the Appendix we present a summary of 17 categories used to construct the composite disclosure index (named Index). It is defined as: $Index = \frac{1}{17}\sum_{i+1}^{17} S_i$, where each sub-index S_i can be related to one or more sources of risk. For all subindices, we assign 0 if there is no information about the corresponding categories and 1 if there is at least one informed category. Then, the composite index will range between 0 and 1.

Finally, the general model (Eq1*)* presented above is detailed as follows:

$CMR = \alpha_0 + \alpha_1(SDROA) + \alpha_2(z\text{-}score) + \alpha_3(EQTA) + \alpha_4(DEPEQ) + \alpha_5(LIQTA) + \alpha_6(LLRGL) + \alpha_7(NPLGL) + \alpha_8(LLPGL) + \alpha_9(Index) + \alpha_{10}(Size) + \alpha_{10}(PRIV) + error.$

3. Empirical results

3.1. Descriptive analyses. Table 1 presents descriptive statistics of the various dependent and independent variables, and it shows that the data contain negative values. This table shows that the standard deviation is very high for the majority of the variables. Thus, we can conclude that the data are not homogeneous and they require additional tests so being able to choose the suitable estimator.

Table 1. Descriptive statistics of dependent and independent variables

Variables	Obs	Mean	Std. dev.	Min	Max
Total risk	100	1.453849	1.0603	.15194	10.66866
Systematic risk	100	63.79256	48.92614	-15.5772	208.7067
Specific risk	100	1.284687	1.039715	.14195	10.40687
SDROA	100	.5313885	1.355668	0	7.819807
Z-score	100	.0787105	.1742123	-.8003099	.8164958
EQTA	100	9.940542	6.18544	-39.22517	21.45947
DEPEQ	100	8.853683	2.587632	4.398857	16.15669
LIQTA	100	102.4385	20.61492	54.18894	146.8738
LLRGL	100	13.0655	9.250582	4.071816	86.15167
NPLGL	100	.2050848	.1278024	.0132722	.6644325
LLPGL	100	1.469797	1.529695	.1236853	11.77671
Index	100	.5622727	.2687695	0	1
Size	100	14.51537	.4965182	13.53922	15.44515
PRIV	100	.58	.496045	0	1

3.2. Regressions results. Baltagi (2001) and Hsiao (1986) indicate panel data methodology controls for individual heterogeneity, reduces problems associated with multicollinearity and estimation bias, and specifies the time-varying relation between dependent and independent variables. This study uses a panel data methodology and an F-test is used to determine whether the fixed-effects model outperforms the pooled OLS. The appropriateness of the random-effects model relative to the pooled OLS model is examined with the Breusche and Pagan Lagrange multiplier (LM) test. These tests indicate that there are no specific effects and the Ordinary Least Squares (OLS) estimator is more suitable. However, the post regression analysis shows that the residuals are not independent and not identically distributed because of the presence of serial correlation, the contemporaneous (spatial) correlation and the panel-level heteroscedasticity.

We used the Feasible Generalized Least Squares estimator to overcome these problems and to provide consistent standard deviations.

Thus, the results of the regressions by Feasible Generalized Least Squares estimator are presented in Table 2.

Table 2. Estimated coefficients from regressing capital market risk measures on accounting risk measures (cross-sectional time-series FGLS regression)

Variables	Expected sign	Total risk	Systematic risk	Specific risk
SDROA	+	.0195	-.8702043	-.0072598
		(.0408679)	(4.276143)	(.0062323)
Z-score	+	-.3638866	-44.1514	-.0219587
		(.7282982)	(30.35564)	(.0641338)
EQTA	-	.001374	.9230197	-.0065388 **
		(.0164714)	(.7432319)	(.0033232)

Table 2 (cont). Estimated coefficients from regressing capital market risk measures on accounting risk measures(cross-sectional time-series FGLS regression)

Variables	Expected sign	Total risk	Systematic risk	Specific risk
DEPEQ	+	-.0159849	-2.42582	.0072943*
		(.0442512)	(1.610937)	(.0044024)
LIQTA	-	.0717036*	.0995611	-.0037532 ***
		(.0403473)	(.8176405)	(.000799)
LLRGL	+	-.0039946	.3946529	-.010381
		(.0058594)	(.5581496)	(.0231479)
NPLGL	+	-.0015885	.3188865	.0068833
		(.0074729)	(.3332159)	(.0919526)
LLPGL	+	-.0370227	-6.692531 **	-.003761
		(.088948)	(3.328934)	(.0092066)
Index	-	-.2908101	-70.36999 ***	-.2116866 ***
		(.5809237)	(27.34359)	(.0485822)
Size	+	.0252495	16.38068	.0856132
		(.2938481)	(15.83256)	(.0526936)
PRIV	-	-.0249681	-9.43554	-.0284768
		(.2146052)	(13.68288)	(.0320141)
_cons		.5069472	-116.0044	.462072
		(4.181979)	(224.8792)	(.7271301)
Wald chi2 (11) = *Prob >chi2 =*		551.10* (0.0945)	258.48*** (0.0000)	405.39*** (0.0000)
Wooldridge test for autocorrelation in panel data *F (1, 9) =* *Prob > F =*		5.421** (0.0449)	1.778 (0.2152)	7.204 (0.0250)
Breusch-Pagan LM test of independence: chi2 (45) = *Pr =*		53.642 (0.1768)	112.669 *** (0.0000)	59.453* (0.0730)
Modified Wald test for groupwise heteroskedasticity *chi2 (10) =* *Prob> chi2 =*		9860.33 *** (0.0000)	15.93 (0.1018)	4365.26 *** (0.0000)
Observations *Number of banks*		100 10	100 10	100 10

Notes: *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. Robust standard errors (to account for both heteroskedasticity and autocorrelation) are in parentheses.

Total return risk is the annualized standard deviation of the banks' daily stock returns. Systematic risk is the beta of the banks' stock returns. Specific risk is the annualized standard deviation of residual errors from the market model. SDROA is the standard deviation of return before taxes on assets estimated in a three-year moving window of annual observations. Z-score is the total insolvency risk. EQTA is the book value equity to total assets ratio. DEPEQ is the total deposits to the book to value equity ratio. LIQAT is the liquid assets to total assets ratio. GLTA is the gross loans to total assets ratio. LLRGL is the loan loss reserves to gross loans ratio. NPLGL is the non performing loans to gross loans ratio. LLPGL is the loan loss provisions to gross loans ratio. Index = $\frac{1}{17}\sum_{i+1}^{17} S_i$ as in Nier and Baumann (2006) and detailed in Table 3 in the appendix. Size is the natural logarithm of total assets. PRIV = 1 if the bank is private and 0 if the bank is public.

The results from the Feasible Generalized Least Squares specification indicate that when total return risk is used as the dependent variable, only LIQTA is significant but it has a negative relation with the total return risk, not as expected. When systematic risk is used as the dependent variable, only the LLPGL variable is significant but the sign is negative.

Finally, when the specific risk is used as the dependent variable, EQTA, DEPEQ and LIQTA show significant relations with the expected signs.

These results show that firm specific risk is more important in Tunisia than is systematic risk, like as for the listed Asian banks studied by Agusman et al. (2008).

However, the capital market neither reflects SDROA nor Z-score, witch are the measures of both total and insolvency risks that are so high for Tunisian banks. In addition, in spite of the importance of Tunisian banks' credit risk, with a high level of nonperforming loans that are not sufficiently provisioned, the relations between LLPGL, LLRGL and NPLGL and the capital market risk measures are not significant and do not have the expected signs. So, we can conclude that the market is not able to reflect the most important source of risk of Tunisian banks. We can explain this result by the fact that the investors on Tunisian capital market have no information about asset quality of Tunisian banks because the latter, generally, do not disclose the information about their nonperforming loans.

Consequently, prudential Tunisian authorities have to focus on accounting measures to assess the risk-taking by banks until the information disclosed to investors will be of better quality. As we can observe in Table 2, the *Index* variable made up to apprehend the quantity of information disclosed to investors is significant and negatively related to systematic and specific capital market risks. So, prudential authorities have to encourage banks to be more transparent in the aim to reduce risk taking and to ameliorate the functioning of the market.

Conclusion

The relations between accounting and capital market measures of risk are examined for a sample of 10 listed Tunisian banks for the period of 1998-2007. Using panel data analysis, the Feasible Generalized Least Squares model indicates that the capital market risk measures do not reflect accurately the risk taken by banks. In fact, almost all the coefficients are insignificant for the total and systematic risks. And for the systematic risk, only EQTA, DEPEQ and LIQTA are significant and have the expected signs; but the variables that apprehend the total risk and the credit risk are not significant and they don't have the expected signs. The results indicate that the bank specific risk is more important than the bank systematic risk and indicate also that the market is not able to reflect accurately the risk taken by banks. So, the prudential Tunisian authorities have to focus on accounting measures to better assess risk-taking of commercial banks.

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Appendix

Table 3. Sub-indices used to make up a disclosure index based on annual reports information

Items	Sub-index	Categories
		Assets
Loans	S1: Loans by maturity	Loans and advances 〈3 months, loans and advances 3-12 months, Loans and advances〉 1 year
	S2: Loans by counterparty	Loans to group companies, loans to other corporate, loans to banks
	S3: Problem loans	Total problem banks
	S4: Problem loans by type S5: risk weighted assets	Overdue/ restructured/ Other non-performing loans, total of risk weighted assets
Other earning assets	S6: Securities by type	Treasury bills, other bills, bonds, CDs, equity investments, other investments
	S7: Securities by holding purpose	Investment, trading
Liabilities		
Deposits	S8: Deposits by maturity	Demand, savings, sub 3 months, 3-6 months, 6 months-1 year, 1-5 years, + 1 year
	S9: Deposits by type of customer	Banks/customers/ municipal, government
Other funding	S10: Money market funding	Total money market funding
	S11: Long-term funding	Convertible bonds, mortgage bonds, other bonds, subordinated debt, hybrid capital
		Income statement
	S12: Non-interest income	Net commission income, net fee income, net trading income
	S13: Loan loss provisions	Total loan loss provisions
		Memo lines
	S14: Reserves	Loan loss reserves (memo)
	S15: Capital	Total capital ratio, Tier 1 ratio, total capital
	S16: Off-balance sheet (OBS) items S17: Liquid assets	OBS items, total liquid assets

The usefulness of accounting information; evidence from the Egyptian market

Omaima Hassan
Department of Economic and Finance, School of Social Sciences, Brunel University, London, UK, and
David M. Power
School of Accounting & Finance, University of Dundee, Dundee, UK

Abstract

Purpose – The purpose of this paper is to ascertain financial analysts' views regarding the usefulness of a number of items of accounting information via a postal survey. This usefulness is explored in the context of the Egyptian capital market. In addition the usefulness of different types of information is researched, namely: historical vs forward-looking information; mandatory vs voluntary information; and quantitative vs non-quantitative information.

Design/methodology/approach – This paper uses descriptive analysis to investigate the views of a sample of 23 financial analysts regarding a number of items of accounting information. Analysts' ratings are obtained via a postal questionnaire, most of which are collected by hand. Fifteen out of 23 responses are collected in person, which offer the opportunity to ask follow-up questions about the information which the analysts see as valuable.

Findings – The findings indicate that different items of information are valued differently. In the context of the Egyptian market, financial analysts tend to value: mandatory disclosure more than voluntary disclosure; quantitative information more than non-quantitative information; and historic information more than forward-looking information. This type of preference reflects the information environment in Egypt, where mandatory disclosure is comprehensive and detailed based on International Accounting Standards but where compliance is an issue. Voluntary disclosure is limited and other sources of information are less common. Since mandatory information in Egypt tends to be historic and quantitative in nature, this may explain the preference for these types of disclosures.

Research limitations/implications – The findings suggest that the importance of different types of information may be affected by the degree of maturity of the market and how rich the information environment is.

Practical implications – The results should be useful in informing companies and market regulators about the types of information that financial analysts find useful for investment decision making and the areas of disclosure where financial analysts suggest that improvement is needed.

Originality/value – This paper contributes to the literature by investigating the views of a sample of financial analysts regarding the usefulness of accounting information and different types of disclosure in the context of an emerging capital market where a dearth of studies exist.

Keywords Accounting information, Capital markets, Financial analysis, Egypt

Paper type Research paper

1. Introduction

This study contributes to the current literature by investigating financial analysts' ratings of accounting information and different types of disclosure in the context of an emerging capital market. The importance of this study arises from the key role played by the Egyptian market. The Egyptian equity market capitalization was $26.1 billion

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in 2002. It was the second largest market in the Middle East and North African region in terms of absolute size after the Saudi Arabia market (Report on the Observance of Standards and Codes (ROSC), 2004).

Egypt is an emerging capital market which applies International Accounting Standards (IAS), but where divergence from full compliance with mandatory disclosure is the norm and voluntary disclosure is limited (Hassan *et al.*, 2006). Potential explanations for this non-compliance are: unfamiliarity with IAS and language barriers (Abd-Elsalam and Weetman, 2003); the deep-rooted tendency towards secrecy in the Egyptian culture (Dahawy *et al.*, 2002); and the lack of an effective enforcement policy for non-compliant companies (ROSC, 2002). Dahawy and Conover (2007) argue that although mandatory disclosure requirements in the Egyptian market are comprehensive and detailed, they are based on IAS rather than the users' information needs. This might also explain the divergence from full compliance with mandatory disclosure in the Egyptian context. In addition, Ragab and Omran (2006) find that accounting information is value-relevant in the Egyptian market compared to more mature markets, which (in their opinion) might indicate that other sources of information are less common in the Egyptian context; such as earnings forecasts, firm research by financial analysts, and management conference calls.

The purpose of the current study is to investigate whether financial analysts in Egypt view accounting information (whether disclosed or not) in corporate annual reports as valuable for investment decision-making, and whether they value different types of information differently. Although this issue is examined via a questionnaire instrument, the analysis employs mainly descriptive statistics to form an impression of how the respondents rated different items of information; a detailed quantitative analysis of the responses was not conducted because the sample size did not permit such an examination and because the authors were more interested in a qualitative investigation of an issue which has not been studied within the Egyptian context previously. The findings suggest that the perceived importance of different types of information is subject to market development in terms of how rich the information environment is and how effective any disclosure policies are.

The remainder of this paper is organised as follows. A review of prior studies from both developed and emerging markets is provided in Section 2. The research method which involves a questionnaire is outlined in Section 3. Section 4 provides a discussion of the results from the questionnaire. Finally, the research conclusions and suggestions for future work are presented in Section 5.

2. Literature review

The current study examines financial analysts' preference for information in the context of an emerging capital market. Financial analysts' views and usage of information are of particular interest perhaps because other user groups such as individual investors and fund managers depend either directly or indirectly on their advice for investment decision making (Dhaliwal, 1980; Dimson and March, 1984). Traditionally, financial analysts have tended to attach a great level of importance to historical accounting data (Benjamin and Stanga, 1977; Buzby, 1974, 1975; Chandra, 1974; Firth, 1979; Chang and Most, 1985). Non-financial information on the other hand has typically only received limited attention from the financial analyst community (Previts *et al.*, 1994; Rogers and Grant, 1997). Over time, the use of non-financial information has increased (Nielsen, 2005; García-Meca and Martínez, 2007) in response to several changes in the business environment such as rapid developments in information technology, globalisation and the emergence of new businesses with a sizeable proportion of intangible assets.

Although conventional accounting information implicitly includes some forecasts about the future, for example, estimating the expected economic life of non-current assets when accounting for depreciation, research suggests that more explicit forecasts about firms' prospects are needed. Reports from the Association for Investment Management and Research (AIMR, 1993) and the American Institute of Certified Public Accountants (AICPA, 1994) have suggested that users need more information of a strategic, forward-looking and non-financial nature to aid their evaluations of company performance. In addition, prior studies conducted mainly in developed markets, where lots of information is published and disclosure policies are effective, emphasize the importance of strategic and forward-looking information (both financial and non-financial) for decision making (Beattie and Pratt, 2002; Hussainey *et al.*, 2003; Orens and Lybaert, 2007). They highlight limitations of information included in the financial statements; a lack of timeliness, (some) inaccuracy, and a limited ability to convey details about the prospects and risks facing the firm (García-Meca and Martínez, 2007). Forward-looking data as such does not replace the historical financial information provided in corporate annual reports but tends to be seen as complimentary when analysts attempt to predict share prices as it gives more insights about future corporate performance.

Whether or not financial analysts really use forward-looking strategic information in company valuations is an issue that has been investigated in the substantive literature. For example, García-Meca's (2005) and Orens and Lybaert (2007) studied corporate disclosure of voluntary non-financial information and financial analysts' use of this information. Results suggest that financial analysts use less non-financial information in their reports than that published by companies. In addition, whether or not forward-looking information is value relevant is still an issue. For example, Orens and Lybaert's (2007) examined the association between:

- financial analysts' forecast accuracy; and
- financial analysts' use of forward-looking information. Financial analysts' use of forward-looking information was measured via a content analysis of their reports and via a questionnaire.

The results showed a positive association between financial analysts' forecast accuracy and financial analysts' use of forward-looking information obtained from the survey. By contrast, the content analysis of analyst reports showed no significant relationship with analysts' forecast accuracy. In addition, prior studies (Botosan, 1997; Richardson and Welker, 2001) indicate that analysts tend to give more weight to quantitative information compared to non-quantitative information, because it is generally seen as more precise and more useful (Botosan, 1997).

For the purpose of the current study, accounting information (both provided and not currently included) in the corporate annual reports of Egyptian companies is examined to see if it is a useful input for investment decision making. This usage could be particularly important within the context of a developing capital market where secrecy is the norm (Dahawy *et al.*, 2002). For example, in Egypt, companies tend to view information as a private asset owned by the firm; hence, the voluntary disclosure of information is rare and compliance with mandatory disclosure is often problematic. In this context, market participants might value the mandatory information available; they might focus on historical quantitative financial information.

Prior studies on financial analysts' need for and use of information can be classified into two strands based on the research methodology employed. The first strand of research uses interviews and questionnaires (Bartlett and Chandler, 1997; Chang and Most, 1985; Chandra, 1974; Lee and Tweedie, 1975). The second strand of research performs a content analysis on the reports produced by analysts (Previts *et al.*, 1994; Rogers and Grant, 1997; Breton and Taffler, 2001; Garcıá-Meca, 2005) to uncover the frequency with which certain items of information are mentioned.

It is the first of these two strands that is relevant for the current study. Within this strand, studies employ interviews or questionnaires in order to investigate different issues: such as the views of a user group (or user groups) in relation to a set of information (Coleman and Eccles, 1997; Beattie and Pratt, 2002); the appraisal methods employed by financial analysts in valuing ordinary equities (Arnold and Moizer, 1984; Barker, 1998; Carsberg and Dey, 1984; Lee and Tweedie, 1975; Pike *et al.*, 1993) and corporate disclosure practice (Buzby, 1975; Firth, 1979; Choi, 1973; Chow and Wong-Boren, 1987; Naser and Nuseibeh, 2003). Studies examining the appraisal methods employed in share valuations have investigated how investors use financial statement information in developed markets such as the UK (Arnold and Moizer, 1984; Barker, 1998; Carsberg and Dey, 1984; Lee and Tweedie, 1975; Pike *et al.*, 1993) and the USA (Arnold *et al.*, 1984; Belkaoui *et al.*, 1977). One of the main conclusions of these studies is that financial analysts pay a great deal of attention to the income statement and balance sheet figures when valuing ordinary shares with priority given to income statement figures. This finding is not unique to developed capital markets, since studies on emerging capital markets in Saudi Arabia (Al-Abdulqadar *et al.*, 2007), China (Wang *et al.*, 2007), Nigeria (Tijjani *et al.*, 2009) and Central and Eastern Europe (Middleton *et al.*, 2007) have reached similar conclusions.

One of the survey studies which is relevant to the current research was conducted by Coleman and Eccles (1997). They investigated the views of a sample of 209 financial analysts and investors regarding the value of 21 different financial and non-financial performance measures. They conducted face-to face interviews with 102 investors and telephone interviews with 107 financial analysts. Participants' perceptions about whether British companies disclosed performance measures were also ascertained. The results indicated that financial analysts had a greater need for information than their investor counterparts. However, financial analysts and investors found some financial measures (e.g. earnings and cash flow) to be especially valuable when arriving at decisions. Both financial analysts and investors had little interest in certain non-financial measures such as employee satisfaction information and employee turnover rates. The results also highlighted some differences between financial analysts and investors in the perceived importance of various measures of corporate performance especially non-financial measures. Within the investor group, non-financial performance measures were not regarded as particularly useful.

Recently, Beattie and Pratt (2002) investigated the views of 538 different user groups in the UK; expert users, private shareholders, finance directors and audit partners were surveyed in relation to a set of 130 items of information categorised into eleven groups. The results showed similar views across the four user groups in terms of the ranking of items of information according to their usefulness for investment decision making. Their results also indicated that financial information was ranked first followed by objective and strategic management information. Employee value drivers and environmental, social, and community items were ranked very low.

Content analysis studies (Previts *et al.*, 1994; Rogers and Grant, 1997; Breton and Taffler, 2001; Garcıá-Meca, 2005) that investigate financial analysts' use of information generally argue that this approach compliments the findings of investigations that employ the interview/questionnaire method because it investigates financial analysts actual usage of information (Dhaliwal, 1980). However, the extent to which financial analysts use information in their reports could be driven by other factors. For example, Garcıá-Meca and Martínez (2007) found that financial analysts provided more information in their reports on profitable firms and firms with high growth opportunities. In addition, using the content analysis technique does not allow researchers to uncover details about the value or the sort of information that financial analysts use but do not report on. For example, Orens and Lybaert (2007) compared financial analysts' views about a set of voluntary non-financial information obtained via a survey with their actual use of the same set of information via a content analysis of their reports. Their findings indicated that financial analysts did employ some of this information, even though they did not discuss it in their report. Also a content analysis of financial analysts' reports does not allow us to find out about the sort of information that analysts need but which is not available (Previts *et al.*, 1994). Using an interview/questionnaire approach might provide us with more detailed views about the importance of different items of information for shares valuation process. For this reason, the questionnaire approach is adopted in the current study.

3. Methods

In order to investigate financial analysts' perceptions regarding accounting information, a list of items of information was constructed. This list of items of information was drawn from the Guidelines Manuals published in 2002 by the Capital Market Authority (CMA) in Egypt on its web site[1], it constitutes the mandatory disclosure that is required in Egypt. The reason for including mandatory disclosure in our list is to check whether financial analysts find the current information requirements useful, since these items are based on IAS rather than users' views. In addition, a careful review of the disclosure literature was undertaken to select items of information (not included in the checklist of the CMA) that Egyptian companies might disclose voluntarily. The checklist used by the Center for International Financial Analysis and Research (CIFAR, 1995) to evaluate corporate disclosure levels for leading non-financial companies in a number of emerging and developed countries was thought to be a reasonable starting point for the voluntary list. It included not only some fundamental information that sometimes overlapped with that mandated by the CMA but also other voluntary disclosure items.

This process led to the inclusion of 115 items of information in the initial list: 71 items from the CMA checklist and 44 items from the CIFAR checklist. This list of items was grouped under seven categories[2]: general information; income statement information; balance sheet information; cash flow statement information; details about accounting policies; shareholders' information and supplementary information.

The list of items was sent out to a sample of Egyptian analysts in order to ascertain their views regarding the usefulness of these items of information. Specially, they were asked to indicate their views about the usefulness of these items of information when making an investment in ordinary shares. An unbalanced five-point scale[3] was employed for this purpose, ranging from one (not useful) to five (very useful). In addition, the respondents were asked to order seven different categories of information[4] according to their relative importance; thus respondents had to rank these categories from one (the most important) to seven (the least important) allowing the relative usefulness of these items to be determined.

A postal questionnaire was used as the research instrument, despite of its limitations (e.g. its low response rate), because it was thought to be efficient in terms of time and cost when contacting a large number of professional investors in Egypt. The sample consisted of 200 brokers and investment analysts in banks and insurance companies within Egypt. This sample was drawn from the brokers' directory obtained from the CMA, the insurance sector directory and the banks directory.

The questionnaire contained three sections[5]. The first section included a covering note and a set of instructions. The second section dealt with the usefulness of financial statement information. The final section sought additional details about the user: the nature of their employment, their level of education and their years of experience. Closed-end questions were mainly employed because they were considered to be easier to answer, code and analyze, thereby saving time for both the researcher and the respondents (Gillham, 2000; Frazer and Lawley, 2000; Bourque and Fielder, 1995). Moreover, closed-end questions were thought to be more efficient and reliable than their open-ended counterparts when questionnaires are mailed to the respondents (Fink, 1995; Bourque and Fielder, 1995). However, as 15 of the questionnaires were collected by one of the authors in person, she was able to conduct follow-up interviews. Specially, she asked for any additional information that a financial analyst might find useful but which was not included in the questionnaire. The answer to the question was normally no. The only feedback regarding the items of information included in the questionnaire from one of the respondents was that the cash flow statement information was incomprehensible; hence he did not use it for stock valuation purposes.

The questionnaire was pilot tested on thirteen people and feedback was used to revise and improve the research instrument before it was posted. Reminders were sent after 21 days to those who did not return the original copy of the questionnaire. A second request together with another copy of the questionnaire was sent after a further 21 days in order to maximise the response rate.

4. Analysis and results

A total of 23 responses out of 200 were received (Table I), giving a response rate of 11.5 percent. This low response rate was disappointing but not atypical of questionnaires in the finance area (Collier and Wallace, 1992). The replies were tested for non-response bias to see if the results obtained from the questionnaire were representative of the whole sample. The results[6] indicate the absence of a material non-response bias; hence, chance alone was a reasonable explanation for any difference in the scoring of items of information between early and late responders.

The 23 responses were classified according to the respondent's level of education and experience in order to explore whether either of these characteristics affected their

Respondent	Employment business	Education	Experience (years)
Res1	Broker	University	NA
Res2	Broker	University	NA
Res3	Broker	University	3
Res4	Broker	University	3
Res5	Broker	Diploma	3
Res6	Broker	University	4
Res7	Broker	University	7
Res8	Broker	University	8
Res9	Broker	University	7
Res10	Broker	Diploma	5
Res11	Broker	PhD	10
Res12	Broker	University	5
Res13	Broker	University	2
Res14	Broker	University	8
Res15	Broker	University	5
Res16	Broker	University	3
Res17	Broker	University	11
Res18	Broker	PhD	7
Res19	Bank	Master’s degree	6
Res20	Broker	Master’s degree	5
Res21	Insurance company	University	15
Res22	Insurance company	Diploma	5
Res23	Bank	University	10

Notes: This table provides background information about the respondents. Specifically, it shows the type of employment business, respondents’ level of education and experience

Table I.
Descriptive information about the respondents

rating of the relative usefulness of the items of information included in the questionnaire. According to the data obtained from the questionnaire, respondents were classified into two main groups: those with a University level (15 respondents) or a postgraduate level of education (seven respondents). The range of experience among respondents differed from 0 to 15 years. The respondents were therefore classified into two groups according to the median years of experience (5.5 years): less than or equal to 5.5 years of experience (13 respondents), and more than 5.5 years of experience (10 respondents). We then examined whether respondents attached different ratings to different items of information according to their level of education or experience. We found that there was no significant difference in the usefulness of items of information among respondents according to their level of education. In addition, we discovered that there was no significant difference in the rating attached to different items of information among respondents according to their level of experience. Therefore, we excluded these two variables as reasonable explanations of the differences between the groups’ scores.

The descriptive analysis of the data collected from the questionnaire shows that 46 out of 115 items of information included in the questionnaire were found to be useful or very useful (they were awarded a mean rating of at least four out of five). Table II shows items of information that have been awarded a mean of more than four sorted in a descending order. Table III shows items of information that have been awarded a mean of less than 3.5 sorted in an ascending order.

Items of information	M/V	Q/N	Mean	STD
Operating income	V	Q	4.87	0.34
Dividends per share	V	Q	4.74	0.54
Net income	M	Q	4.65	0.78
Comparative financial statements	M	Q	4.64	0.79
Purpose of the company's activity	M	NQ	4.61	0.50
Earnings per share	V	Q	4.61	0.99
Total dividends	V	Q	4.61	0.66
Sales/total revenue	M	Q	4.57	0.95
Number of issued shares and par value per share	M	Q	4.50	0.67
Earnings distribution statement	V	Q	4.50	0.74
Stock split/dividend/right issues	V	Q	4.48	0.79
Company legal status (private sector or privatisation companies)	M	NQ	4.39	0.72
The period covered by financial statement	M	NQ	4.35	0.71
Future plans	V	Q	4.30	0.70
Interest expense	M	Q	4.30	0.82
The un-paid amount of capital	M	Q	4.30	1.11
Stock price	V	Q	4.30	1.02
Qualitative and quantitative forecasts of revenues, expenses, profits, and cash flows	V	Q	4.30	0.93
Auditor's report	M	NQ	4.30	0.82
Non-operating gains or losses	M	Q	4.27	1.03
Appropriation of retained earnings	M	Q	4.27	0.98
Credit interest	M	Q	4.26	1.10
Depreciation and amortization expenses	M	Q	4.23	0.75
The currency used for the preparation of financial statements	M	NQ	4.18	1.26
Financial ratios disclosed	V	Q	4.18	1.14
Company name	M	NQ	4.17	1.15
Owners' equity separated from liabilities	V	NQ	4.17	1.03
Accounts receivables	M	Q	4.17	1.11
Changes in equity accounts during the year	M	Q	4.17	0.98
Trading volume	V	Q	4.17	1.03
Selling, general and administrative expenses	V	Q	4.14	1.04
Non-operating expenses	M	Q	4.14	1.08
Cash and cash equivalents	M	Q	4.14	0.94
Foreign exchange gains/losses	V	Q	4.09	1.04
Classification of assets into current assets and fixed assets (long-term assets)	V	NQ	4.09	1.00
Other investments and their market values if different from book value	M	Q	4.09	1.04
Priorities to preferred shares as to dividends	M	NQ	4.09	1.20
Assumptions underlying forecasts	V	NQ	4.09	1.00
Non-operating revenues	M	Q	4.04	1.02
Cost of goods sold	M	Q	4.04	1.30
Classification of liabilities to long-term liabilities and short-term liabilities	V	NQ	4.04	0.98
Accumulated preferred dividends due	M	Q	4.04	1.07

Notes: M/V: M is mandatory information and V is voluntary information; Q/NQ: Q is quantitative information and NQ is non-quantitative information

Table II.
Items of information that were found to be most useful with a minimum average rating of more than 4.00

Items of information	M/V	Q/NQ	Mean	STD
Pension costs	V	NQ	2.52	1.27
Outside manager of pension funds	V	NQ	2.65	1.37
Reasons for extraordinary items	V	NQ	2.86	1.32
Contingent liabilities	V	NQ	2.87	1.25
Geographic segment	V	Q	2.95	1.16
Acquisition method	V	NQ	2.96	1.43
Remuneration of directors and officers	V	Q	3.09	1.08
Number of employees	V	Q	3.10	1.37
Cash flow representing increase in operating capacity disclosed separately from that representing maintenance of current operating capacity	M	Q	3.13	0.92
Treatment of intangible assets	M	NQ	3.13	1.25
Minority interest	V	NQ	3.13	1.25
Address/telephone/fax	V	NQ	3.14	1.32
List of board members and their affiliations	V	NQ	3.18	1.53
Total assets can be derived	V	Q	3.22	1.24
Inventory physical count and valuation	M	Q	3.22	1.38
Long-term contracts, long-term leases, capital leases, sales on instalments and related interest	M	NQ	3.22	1.24
The policy used for determination of cash and cash equivalents	M	NQ	3.22	1.35
Cash outflow for taxes	M	Q	3.26	1.18
Deferred taxes	M	NQ	3.35	1.27
Treatment of investments	M	NQ	3.39	1.31
Events after the balance sheet date	M	NQ	3.39	1.37
Research and development costs	M	NQ	3.41	1.01
The value of each item of fixed assets and its accumulated depreciation	M	Q	3.43	1.20
Classification of short-term liabilities	M	NQ	3.48	1.27
Disclosing the necessary reconciliation if the balances appearing in the cash flow statement are different from the corresponding balances appearing in the balance sheet	M	Q	3.48	1.27

Notes: M/V: M is mandatory information and V is voluntary information; Q/NQ: Q is quantitative information and NQ is non-quantitative information

Table III. Items of information that were found to be least useful with a maximum average rating of less than 3.50

From Tables II and III we can extract the top and bottom ten items of information in terms of mean scores awarded for their usefulness in investment decision-making. The top ten items (extracted from Table II) in terms of the highest mean awarded (4.5 or higher) for their usefulness are: operating income, dividends per share, net income, comparative financial statements, purpose of the company's activity, earnings per share, total dividends, sales revenue, number of issued shares and par value per share, and statement of earnings distribution, respectively. These results indicate that financial analysts rated historical financial statement information relating to earnings and dividends as the most useful items. This result is consistent with Coleman and Eccles' (1997) findings where they discovered that earnings data were of most interest to investors. This result is also consistent with a finding cited in Abd-Elsalam (1999, p. 37) where:

> [. . .] in one of the very few empirical studies on Egyptian investors, it was suggested that they (respondents) are more interested in the profit figure than any of the other ratios.

In addition, our results support Ragab and Omran's (2006) findings that earnings information in particular is value-relevant in the Egyptian market.

The ten least important items of information in terms of the lowest means (3.13 or lower) were: pension costs, outside manager of pension funds, reasons for extraordinary items, contingent liabilities, geographical segment data, acquisition method used, remuneration of directors and officers, number of employees, and cash flow representing increase in operating capacity disclosed separately from that representing maintenance of current operating capacity[7]. These results highlight the low levels of interest among the financial analyst community in information about pension details perhaps because this item was not disclosed in Egypt at the time of the survey. However, the low interest shown for other items which are currently included in the Egyptian financial statements might indicate that financial analysts are not interested in details such as geographical segment data and minority interest information. Alternatively, such information may have been available to financial analysts on an informal basis via contacts with the company, so that the analysts might have been less interested in seeing details about these items disclosed in the annual report.

By contrast, the lowest standard deviation values were awarded to the following items: operating income, purpose of the company's activity, and dividends per share, respectively, which might reflect consistency among financial analysts' perceptions regarding the usefulness of these items of information. These results suggest that investors in Egypt paid a great deal of attention to income and dividend figures when making investment decisions. This finding is supported by an analysis of the ranking of the categories of information according to their relative importance in decision-making (Table IV).

The income statement was ranked first (the lowest mean) followed by the balance sheet and the cash flow statement. These findings are consistent with results obtained in Arnold *et al.* (1984) where the income statement and balance sheet were found to be the most important sources of information for UK and USA analysts when valuing shares based on company fundamentals. The last four categories of information (in terms of highest mean) were: supplementary information, general information, accounting policies, and shareholders information, respectively.

The highest standard deviation reported for individual items of information (about 1.5) was for the list of board members. This result reflects inconsistency among

Groups of information	Mean	STD	Rank
Income statement	1.87	0.968	1.00
Balance sheet	1.96	1.261	2.00
Cash flow statement	3.70	1.460	3.00
Shareholders' information	4.35	1.799	4.00
Accounting policies	4.65	1.071	5.00
General information	4.87	1.890	6.00
Supplementary information	6.04	1.107	7.00

Table IV.
Descriptive analysis for categories of information

financial analysts regarding the importance of such information in Egypt. Further, inconsistency among financial analysts regarding the importance of another eight items of information was reported where the standard deviation was about 1.4; acquisition method; earnings per share numerator; a physical count and valuation of inventory; number of employees; business segment; outside manager of pension funds; events after the balance sheet date; the policy used for determination of cash and cash equivalents.

We also looked at the results in terms of the importance of different types of information: mandatory vs voluntary information; historical vs forward-looking information, and quantitative vs non-quantitative information. An analysis for the mean score awarded to each type of information and standard deviation information is reported in Table V. An inspection of this table reveals that financial analysts tended to value mandatory disclosure slightly more than voluntary disclosure in terms of mean score awarded to mandatory information. This could be due to the fact that voluntary disclosure in the Egyptian context is limited (Hassan *et al.*, 2006). Financial analysts also tended to value historical information slightly more than forward-looking information; the mean score for the former category was 3.84 while the average score for the latter category was 3.71. This small difference could be explained by the dearth of forward-looking information in Egypt. This result is consistent with prior studies; for example Firth (1979, p. 275) found that historical accounting information tended to receive fairly high scores when users were asked to rank information according to the importance that they attached to it. Firth (1979) also discovered that forecasts of the future (forward-looking information) received moderate to important scores, suggesting that financial analysts were in some doubt about the accuracy of such forecasts. In addition, consistent with prior studies (Botosan, 1997; Richardson and Welker, 2001) financial analysts in Egypt tended to give more weight to quantitative information (mean score 3.94) compared to non-quantitative information (average score 3.66), presumably because it is seen as less ambiguous.

The results were then analyzed in terms of the most and least useful items of information according to each type of disclosure individually. When the results are analyzed in terms of the most and least useful items of historical information, they show that information such as operating income, dividend per share and net income appeared to be important for analysts in the Egyptian context. By contrast, information about pensions, extraordinary items, and geographic segment detail seems to be viewed as less important perhaps because this information was not disclosed

Type of information	Mean	STD
Mandatory-voluntary split		
Mandatory information	3.85	0.39
Voluntary information	3.79	0.58
Historical – forward-looking split		
Historical information	3.84	0.47
Forward-looking information	3.71	0.47
Quantitative – non-quantitative split		
Quantitative information	3.94	0.43
Non-quantitative information	3.66	0.49

Table V. Descriptive analysis for average analysts' rating for different types of information by listed companies; they are not mandatory disclosure and might explain why financial analysts rated their usefulness as law for valuation purposes.

Table VI focuses on future orientated information. It shows that financial analysts in Egypt were also interested in forward-looking information as indicated by the high mean score awarded to items such as: future plans, qualitative, and quantitative forecasts of revenues, expenses, profits, and cash flows and assumptions underlying forecasts; these items were awarded an average score of 4.00 or more. Consistent with Meeks' (1998) views, Egyptian financial analysts attached a great deal of importance not only to forecasts but also to the underlying assumptions on which these forecasts were based. Other future oriented information was found to be less useful in a share valuation setting; such as contingent liabilities, long-term contracts, long-term leases, capital leases, sales on installments, and related interest. Although information about contingent liabilities is voluntary in Egypt, information about long-term contracts, long-term leases, capital leases, sales on installments, and related interest is mandatory. Given that full compliance with mandatory disclosure is an issue in the Egyptian market, the availability of this type of information might be responsible for the lower ratings awarded to it by financial analysts.

When the results are analyzed according to the usefulness of mandatory items of information a number of findings emerged. Information about net income, comparative financial statements, the nature of company activities, sales revenue, the number of shares issued, and their par value, were considered to be essential for stock valuation purposes with ratings of 4.5 or above out of five. Other mandatory information was found to be less useful for stock valuation purposes such as remuneration paid to directors and officers and cash flow details about operating capacity. Financial analysts in Egypt were found to be less concerned in general about the cash flow statement, given that all items of information included in this part of the annual report were awarded a rating of less than four out of five.

An inspection of the average scores awarded to voluntary information reveals that the analysts emphasized the importance of earnings and dividend information for stock valuation, i.e. operating income; dividends per share; earnings per share; total dividends; earnings distribution statement. This type of voluntary information was

	Mean	STD
Future plans	4.30	0.70
Qualitative and quantitative forecasts of revenues, expenses, profits, and cash flows	4.30	0.93
Assumptions underlying forecasts	4.09	1.00
Chairman's or chief executive officer's statement	4.00	0.95
Disclosure of subsequent events	3.78	1.00
Schedule of interest and principal due on long-term debt in future years	3.65	0.93
Amount of facilities available for the company but not used yet	3.52	1.08
Events after the balance sheet date	3.39	1.37
Long-term contracts, long-term leases, capital leases, sales on instalments, and related interest	3.22	1.24
Contingent liabilities	2.87	1.25

Table VI.
Descriptive analysis for forward-looking information

seen as essential for investment decision making since it was awarded a rating of 4.5 or more. This result could be of interest to market regulators who are seeking more transparency in the Egyptian market. They might regulate this type of information if it is seen as essential from market participants' points of views. It could be also of interest to companies who want to discover the voluntary information which is found most useful; it may guide them when they are contemplating the disclosure of detailed information for analysts.

When the results are analyzed in terms of the quantitative vs non-quantitative items of information, the importance of quantitative information about the profitability of the business is apparent: operating profits, net income, earnings per share, earnings distribution statement, dividends, sales revenue, information about past performance (comparative financial statements) and the number of shares in issue along with their and par value. This quantitative information seems essential for investment decision making in Egypt. However, some quantitative information seems to be less relevant for stock valuation such as geographic segmental data, remuneration details of directors and officers, the number of employees, cash flow information about the operating capacity disclosed separately from that representing maintenance of current operating capacity.

The analysis also revealed that non-quantitative information that seemed useful for investment decision making relates to general information about the business (e.g. purpose of company activities, its legal status, the period covered by the financial statements, its name, the currency used for the preparation of financial) and the auditors' report. The auditors' report seems to be useful (mean score is 4.30) but not essential (awarded score is less than 4.50) for stock valuation in the Egyptian context. The least useful non-quantitative information is related to information about pensions, reasons for extraordinary items, contingent liabilities acquisition method. All these non-quantitative items of information are voluntary; some of them have never been actually disclosed in Egyptian financial statements (e.g. pension's funds). The current lack of such information in the Egyptian market might lead financial analysts to underestimate their importance for stock valuation.

5. Concluding remarks

This study contributes to the current literature on the usefulness of accounting information in the context of emerging markets. It has investigated the views of a small sample of financial analysts in the Egyptian market with regard to the usefulness of a number of items of information for investment decision making. In addition, a comparison of the level of importance of different types of disclosure has been carried out; namely: historical vs forward-looking information; mandatory vs voluntary information; and quantitative vs non-quantitative information.

The results show the relative importance awarded to different items of information, with the highest scores being given to net income and dividends figures consistent with prior studies (Coleman and Eccles,1997; Ragab and Omran, 2006). In addition, the results highlight that investors in Egypt pay more attention to mandatory, historical, and quantitative information, with priority being given to the income statement data consistent with results from prior studies on the appraisal methods used by financial analysts in valuing ordinary shares. These perceptions reflect the type of information available to financial analysts in the context of the Egyptian market. However, the findings do also indicate that financial analysts view forward-looking information such as future corporate plans, qualitative and quantitative forecasts of revenues, expenses, profits, and cash flows and assumptions underpinning these forecasts as useful inputs for investment decision making. This result suggests that companies might provide more forward-looking information voluntarily.

Moreover, our analysis reveals the most and least useful items of information under each disclosure category, which should inform market regulators and companies in Egypt about useful information for stock valuation from a user perspective. Our findings could be of useful in informing companies and market regulators about the types of information that financial analysts find useful for investment decision making and the areas of disclosure where financial analysts suggest that improvement is needed. Moreover, the results show that there are no differences among the professional users in Egypt in evaluating this list of items of information with respect to their level of education or experience.

Although we have tested for non-response bias, the low response rate to this survey calls for more future research in order to be able to conduct a quantitative analysis and generalise the results. In addition, future research could increase the sample size by investigating the views of other users groups such as private shareholders, finance directors and auditors. Future research could also compare the importance of different types of disclosure such as historical and forward-looking information in different emerging markets with varying levels of maturity in order to draw a firm conclusion. Nonetheless, the current study provides a useful starting point for future investigators in this area.

Notes

1. It informs companies issuing financial securities and their auditors of the procedures followed by the CMA when ensuring that companies have complied with disclosure and transparency requirements according to Egyptian Accounting Standards (IAS).
2. This categorising is derived from the CIFAR with one exception where we replaced the funds statements by the cash flow statements.
3. Both words and numbers were used in this five-point scale to avoid the weakness of using one rather than the other of these approaches (Gillham, 2000). We decided to put the negative end (not useful) of the scale first for the content question in this questionnaire, although deciding which end of the scale should be placed first is considered to be less important for a postal questionnaire than for face-to-face interviews (Fink, 1995).
4. The seven categories of information are: general information, income statement, balance sheet, funds flow statement, accounting policies, shareholders' information, and supplementary information.
5. A copy of the questionnaire is available from the authors upon request.
6. Full results of this non-response bias test are available from the authors upon request.
7. It is worth noting that minority interest and the treatment of intangible assets have been awarded a mean of 3.13 as well.

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Corresponding author
Omaima Hassan can be contacted at: Omaima.Hassan@brunel.ac.uk

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Does corporate disclosure policy change financial analysts' behaviour? Evidence from France

Faten Lakhal
IRG, Université Paris Est, Paris, France and
ISG, Université de Sousse, Sousse, Tunisia

Abstract

Purpose – The purpose of this paper is to examine whether financial analysts are sensitive to voluntary earning disclosures.

Design/methodology/approach – The paper is based on a literature review of the relationship between analysts' behaviour and corporate disclosures. It is assumed first that analyst coverage both influences and is influenced by voluntary earning disclosures, and that second, French managers are expected to make voluntary disclosures in order to reduce market uncertainty. To test these hypotheses, a simultaneous equation model and an ordinary least square regression framework were estimated on a sample of 154 French-listed firms between 1998 and 2001.

Findings – The results show that voluntary earning disclosures positively influence analyst coverage decision. They also show that voluntary disclosures improve the accuracy of analyst forecasts and reduce market uncertainty.

Research limitations/implications – The paper does not cover all forms of corporate voluntary disclosures.

Practical implications – The findings suggest that corporate disclosure policy is likely to change financial analysts' behaviour. The results are useful to both managers, wishing to meet market expectations and, to investors wishing to invest in richer informational environment firms.

Originality/value – This paper provides original results about the role of analysts in France as information intermediaries. These analysts pay little attention to French firms with a poor information environment in which minority shareholders are less inclined to ask for costly analyst coverage.

Keywords Financial forecasting, Dispersions, Disclosure, Financial analysis, France

Paper type Research paper

1. Introduction

Most research over the last few years has focused on the determinants and consequences of voluntary disclosure practices (Ajinkya *et al.*, 2005; Leuz and Verrecchia, 2000). This study examines the relationship between financial analysts' behaviour and voluntary earning disclosures. Analysts provide valuable earnings forecasts and stock recommendations to market participants (Lys and Sohn, 1990; Womack, 1996; Roulstone, 2003). They play a major role as financial intermediaries and as information providers for stock recommendations (Schipper, 1991). Voluntary

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disclosures help analysts to make their earnings forecasts. These disclosures may also reduce the extent of information gathering by analysts. Thus, we can expect a relationship among voluntary disclosures, analyst coverage and the characteristics of analysts' forecasts. Lang and Lundholm (1996) on the US market and Hope (2003a, b), on a multi-country sample, examines the relationship between analyst behaviour and corporate-provided information. They show that analysts provide coverage to firms with liberal disclosure policies for which they issue accurate analyst earnings forecasts.

This paper provides evidence on the relationship between voluntary earning disclosures and analyst behaviour in France. The case of French-listed firms is of particular interest since they show a concentrated ownership structure with an agency problem between large shareholders and minority shareholders, rather than between managers and shareholders as in highly diffused ownership structures. Moreover, minority investor rights are not adequately protected in civil law countries as is the case in France (La Porta *et al.*, 1998). Because of weak legal protection for investors, large shareholders or families are able to retain information or to provide optimistic and unreliable forecasts to minority shareholders. The costs of following firms with large shareholders are high as these firms have a poor informational environment. Minority shareholders are then less likely to turn to analysts as primary information providers, because their services are too costly.

Management forecasts and quarterly earnings disclosures were selected to test the relationship between analyst behaviour and voluntary earning disclosure. This choice is advantageous for two main reasons. First, unlike other more regulated forms of disclosure, management has considerable discretion as to whether or not to make a forecast or a quarterly announcement. Second, even though existing research examines voluntary disclosures extensively, the relationship between analyst behaviour and these voluntary disclosure modes has not so far been fully examined.

The purpose of this study is to show that analysts are likely to follow those firms with highly informative earnings disclosures which can provide more accurate earnings forecasts. Voluntary earnings disclosures may allow analysts to revise their earnings forecasts and reduce the dispersion between analysts' forecasts. The second objective is to assess whether managers use voluntary earning disclosures to reduce information asymmetry between market participants.

The results show that financial analysts are attracted by a firm's disclosure reputation. There is a positive association between analyst coverage and voluntary earnings disclosures. Both, the decision to provide voluntary information and to follow a firm have been tested as two decisions that can be simultaneously determined. The results show that voluntary earning disclosures influence analyst coverage decisions, where analyst coverage does not affect these voluntary disclosure modes. The findings also show that voluntary earning disclosures improve forecast accuracy and reduce dispersion between analysts' forecasts. It should be noted that few studies have considered information asymmetry between market participants as a major reason why managers issue voluntary disclosures. Furthermore, this study differs from existing ones because it examines the effect of a specific component of voluntary disclosures, i.e. earnings disclosures (management forecasts and quarterly earnings announcements[1]). Such disclosures are extensively used by financial analysts and investors to assess firm value (Gajewski and Quéré, 2001).

The remainder of this paper is organized as follows. Section 2 presents a review of the literature that highlights the relationships between voluntary disclosures, analyst coverage and their forecast characteristics. Section 3 describes the sample, data collection and methodology. The empirical findings and discussions are presented in Section 4. The last section concludes the paper.

2. The relationship between voluntary earning disclosures and financial analyst behaviour

2.1 Analyst coverage and voluntary earning disclosures

Bhushan's (1989) model predicts that analyst coverage is determined by a firm's various characteristics including corporate disclosures. Jensen and Meckling (1976) suggest that analyst activity mitigates agency costs arising from conflicts of interests between managers and shareholders. Analysts act as a monitoring device for insiders because they are likely to enhance the corporate information environment. The authors also argue that voluntary disclosures are one means to control managers and to reduce information asymmetry between market participants. As two distinct control mechanisms, voluntary disclosures and analyst coverage could either complement or be substitutes for one another.

The existing literature shows that analyst coverage and corporate disclosures are complementary. The link between them was tested initially by Lang and Lundholm (1996) in the US market. The authors found that firms with poor disclosure policies are less likely to be followed by analysts. Analysts mainly follow firms with extensive disclosure practices, because the cost of information collection is relatively low for richer information environment firms. Bushman *et al.* (2004) show a positive relationship among analyst coverage, disclosure quality and minority shareholder protection. In a study of 20 countries, Hope (2003a) shows that voluntary disclosures help analysts issue their forecasts and make buy and sell recommendations.

In concentrated ownership structures, conflicts of interests arise between large and small shareholders. Information asymmetry is likely to be high, because large shareholders may retain information and expropriate private benefits of control (Dyck and Zingales, 2004). This poor information environment coupled with poor legal protection increases the costs of analyst coverage which can act as a monitoring device. Minority shareholders would then ask for more analyst services to bridge the information asymmetry gap caused by the poor quality of publically available information (Boubaker and Labegorre, 2006). Accordingly, the informational environment would be richer in response to a greater demand for analyst services from minority shareholders.

The relationship between analyst coverage and corporate disclosures is ambiguous, because it depends on the supply and the demand for analyst services. Bhushan (1989) finds that the equilibrium number of analysts following a particular firm is determined by the aggregate demand and supply curves for analyst services. High-disclosure levels increase both the supply of and the demand for analyst services (Lang and Lundholm, 1996). However, Lang and Lundholm (1996) describe how analysts are reticent to follow firms with a poor informational environment as these analysts have to then pay high fees to collect private information. This information is offered to shareholders at a high price given that analysts in this case are primary information providers. The above discussion leads to the following hypothesis:

H1. There is a relationship between voluntary earning disclosures and analyst coverage.

2.2 The characteristics of analyst forecasts and voluntary earning disclosures

The models of Milgrom (1981) and Grossman (1981) suggest that managers choose to disclose corporate information to reduce information asymmetry, and subsequent empirical studies have tested these predictions. Ajinkya and Gift (1984) suggest that management forecasts are provided to narrow the expectation gap between market and managers (the expectation hypothesis). Voluntary disclosures aim at reducing information asymmetry in the market (Verrecchia, 2001) and therefore, at reducing investor's uncertainty (Ajinkya and Gift, 1984 and Ruland *et al.*, 1990). Empirical studies such as Christie (1987), Atiase and Bamber (1994) and Soffer *et al.* (1999), show that analyst forecast characteristics, including forecast error and forecast dispersion, are used as proxies for investor expectations.

In the USA, Lang and Lundholm (1996) find ratings of annual report disclosures (a subset of the overall AIMR ratings) to be negatively associated with forecast dispersion, but not significantly related to forecast accuracy. The authors show that analyst forecasts differ less as firms increase their disclosures. Piotroski (1999) finds that discretionary expansion of segment reporting is also, on balance, associated with an increase in analyst forecast accuracy and a decrease in forecast dispersion. Similarly, Bushman *et al.* (2004) show that financial analysts provide accurate earnings forecasts for firms disclosing high-quality information. The relationship between earnings forecasts and voluntary disclosures was also tested and confirmed by Hope (2003b). However, for Swedish firms, Adrem (1999) finds no significant relationships between information disclosure strategy and forecast accuracy.

The effect of additional information on forecast dispersion is measured by differences in forecasts issued by each analyst. These forecasts may differ as a result of various assessments of the same set of information, or to different sets of acquired private information Lang and Lundholm (1996) show that high levels of forecast dispersion are associated with high-market uncertainty. Ang and Ciccone (2001) examine international differences of analyst forecast dispersion. They show that forecast dispersion greater when the informational environment of the firm is poor. Swaminathan (1991) finds a decrease in dispersion among analyst forecasts for multiple segment firms after the implementation of the Securities Exchange Commission's (SEC) business disclosure requirements. Lastly, using an international sample, Chang *et al.* (2000) find a positive and significant relationship between dispersion and corporate disclosures in 47 countries. In light of these arguments, these two hypotheses were tested:

H2. There is a negative relationship between forecast error and voluntary earning disclosures.

H3. There is a negative relationship between forecast dispersion and voluntary earning disclosures.

2.3 Analyst coverage and analyst forecast characteristics determinants

Analyst coverage and analyst forecast characteristics are not influenced solely by corporate disclosure policy. We rely on prior research to consider control variables for the extent of analyst coverage and their forecast characteristics. These control variables include: firm size, earnings variability, the proportion of institutional investors in total capital, US listing, the book-to-market ratio and a dummy variable for negative earnings.

Firm size. Firm size is an important determinant of analyst coverage. Previous studies, of analysts' forecast characteristics and coverage, including that of Bushan (1989) have shown that analysts follow small firms less than large ones. Furthermore, Doukas *et al.* (2005) show that the acquisition of information is relatively more costly for small firms. Lang *et al.* (2003) find a positive and significant relationship between firm size and analyst coverage. They suggest as Ackert and Athanassakos (2003) that large firms are more transparent to investors. Firm size is also regarded as a major factor for analyst forecast error and dispersion. According to Lang and Lundholm (1996), large firms have a richer informational environment. This is likely to help analysts provide accurate and less dispersed forecasts. The empirical study of Rajan and Servaes (1997) also shows that earning per share of large firms is more predictable than that of small firms. Subsequently, we expect a positive relationship between firm size, analyst coverage and the characteristics of analyst forecasts.

Earning surprise. On the one hand, analysts are more likely to follow firms with highly predictable earnings because the cost of private information gathering is low. Several studies including O'Brien and Bhushan (1990), Lang and Lundholm (1996), Marston (1997) and Lang *et al.* (2003, 2004) show that analysts prefer following firms with less variable earnings. On the other hand, earning surprise is shown to be positively related to analyst forecast characteristics. According to Hope (2003b), earning surprise increases market uncertainty due to high-analyst forecasts dispersion and error. We measure earning surprise as the absolute value of the difference between the current earning per share and the lagged earning per share scaled by the firm's stock price at the beginning of the fiscal year. Earning surprise is expected to be negatively associated with analyst coverage and positively associated with forecast error and dispersion.

US listing. Firms listed on the US market are more followed than others, because they are likely to generate high fees for financial analysts. Lang *et al.* (2003, 2004) find that foreign firms listed on the US market are more heavily followed by analysts. Financial analysts are attracted by US listing firms as the disclosure quality is enhanced. Firms listed on the US market are likely to have more accurate analyst predictions, because the rich informational environment of such firms enhances the ability of analysts to predict earnings (Lang and Lundholm, 1996; Marston, 1997). We expect then a positive relationship between US listing and analyst coverage, and a negative relationship between US listing and forecast error and forecast dispersion.

Market-to-book ratio. Empirical studies find that analyst coverage is associated with the market-to-book ratio. According to Krische and Lee (2000), high market-to-book firms receive more recommendations from analysts, because these firms earn higher returns than low book-to-market firms (Fama and French, 1992). McNichols and O'Brien (1997) find similar results. They show that analysts follow stocks for which seem more likely to yield good returns. We introduce the value of market-to-book to control for analyst-coverage decisions and we expect a positive relationship between this ratio and analyst coverage.

The proportion of institutional investor ownership. Bhushan (1989) shows that analyst coverage is associated with the increasing institutional investor's ownership. For a sample of 1,409 American firms, he finds a positive relationship between the proportion of institutional investors and analyst coverage. Similarly, Ackert and Athanassakos (2003) show that institutional investors ask for more analyst services to cover the firm. Within this study, the proportion of foreign institutional investors was used to control for analyst-coverage decision. These investors offer a high guarantee for minority shareholder protection and can influence managers to enhance their corporate disclosure policies (Lakhal, 2005). We would therefore expect a positive relationship between the proportion of foreign institutional investors and analyst coverage.

Negative earnings. Most analysts are reluctant to estimate earnings for loss firms. Hope's (2003b) study highlights the positive relationship between negative earnings and forecast accuracy and that negative earnings positively influence analyst forecast dispersion. Hope suggests that loss firms have a greater earning variability than profitable firms. This may increase the forecast error and dispersion between analysts. This variable is a dummy that equals to 1 for negative earnings and to 0 otherwise, and we assume that there is a positive relationship between negative earnings and analyst forecast error and dispersion.

3. Sample, data selection and methodology

3.1 Sample and data selection

Our sample includes both manufacturing and commercial companies listed on the SBF 250 index. Financial and insurance firms were excluded, because they are subject to specific disclosure requirements. The sample period is 1998-2001. Our final sample includes 154 companies. Data related to analyst forecasts were extracted from the Institutional Brokers Estimate System database. Stock prices were collected from the ABC-bourse database. Accounting information was extracted from the Worldscope database and data related to ownership structure and institutional investors were hand-gathered from annual reports.

Non-mandatory earning disclosures were examined. French-listed firms are required to release their annual reports in the BALO (*Bulletin des Annonces Légales et Officielles*). They must also issue their earnings reports half-yearly (according to the law 24 July 1966 and the decree 23 March 1967). The AMF (*Autorité des marchés financiers*) requires the quarterly announcements only to include revenue. The SEC requirements in the USA are more stringent, where companies are required to release formal annual reports and quarterly ones with a homogenous form. The analysis of earnings disclosures practices in the French market shows that there are two forms of non-mandatory earnings disclosures: quarterly earnings announcements, and management forecasts. These voluntary disclosures were hand-gathered from the daily financial press.

Our variables were computed for the fiscal years 1998-2001[2]. Analyst forecast characteristics include: the forecast dispersion and forecast error. The former is measured each fiscal year for each sample firm, using annual forecasts. The dispersion is calculated as the standard deviation of all individual forecasts available to a firm in the last fiscal month of the related fiscal year scaled by share price at the beginning of the year. The standard deviation is the absolute value of the simple average of forecasts in the last fiscal month of the fiscal year. The forecast error is computed as the difference between actual earnings and the average of individual earnings forecasts issued in the last fiscal month of the related fiscal year. This number is scaled by the share price of the beginning of the year. Finally, financial analyst coverage is measured by the Log of the number of financial analysts (Table I).

3.2 Methodology

Prior to studying the relationship between voluntary disclosures and analyst coverage, we tested for the existence of the endogeneity problem. The Durbin-Wu-Haussman test

Variable	Definition	Measure
Dependent variables		
NAF	Analyst coverage	The mean number of analysts following the firm each month
MFE	Mean of error forecasts	The absolute value of the difference between actual EPS and mean forecasts, scaled by the share price at the beginning of the year
DISP	Forecast dispersion	The standard deviation of annual analysts forecasts divided by the share price at the beginning of the year
DISC	Voluntary disclosure's decision	A dummy variable that equals to 1 if the firm discloses voluntarily its earnings and 0 otherwise
Independent variables		
SURPRISE	Earning surprise	The difference between actual EPS and the EPS of previous year, scaled by the EPS of previous year
NEGATIVE	Negative earnings	A dummy variable coded as 1 if the annual earning per share is negative and 0 otherwise
NREV	The number of analysts' revisions	The mean number of analysts' recommendations
FLOAT	Ownership structure	The percentage of shares dispersed in public
CONTROL[a]	Controlled shareholder	A dummy variable equals to 1 if there is a controlling shareholder and to 0 otherwise
FORII	Foreign institutional investors	The percentage of shares held by foreign institutional investors
LOGTA	Firm size	The log of total assets
USQUOT	US listing	A dummy equals to 1 if the firm is listed on the US market and to 0 otherwise
LEVERAGE	Leverage	The total long-term debts by the total assets
MTB	Market-to-book	The market value divided by the book value

Notes: [a]According to the French legislation, a two-thirds majority is required to overtake any decision at the special shareholders general meeting. Shareholders that own one-third of the shares can block these decisions. The controlling shareholder holds then at least a third of the shares, when no other shareholder holds a third of the shares

Table I.
Definition and variable measures

of Davidson and Mackinnon (1993) was used. This test was run to check whether our two variables are endogenously determined. The results do indeed show the existence of the endogeneity problem. Therefore, in order to estimate these effects correctly, a simultaneous equations model was estimated. The dependent variable of the first equation in our model is analyst coverage. The voluntary disclosure decision is the dependent variable of the second equation. Analysts are attracted by the firm's disclosure reputation. At the same time, French firms could decide to disclose their earnings voluntarily, because of the increasing need for information by analysts. The simultaneous equation model is estimated as follows:

$$\begin{aligned}\mathrm{LOG}(1+\mathrm{NAF}) = {} & \beta_1\mathrm{DISC}+\beta_2\mathrm{SURPRISE}+\beta_3\mathrm{LOGTA}+\beta_4\mathrm{USQUOT}\\ & +\beta_5\mathrm{FORII}+\beta_6\mathrm{MTB}+u_2\end{aligned} \tag{1}$$

$$\begin{aligned}\mathrm{DISC} = {} & \alpha_1\mathrm{LOG}(1+\mathrm{NAF})+\alpha_2\mathrm{FLOAT}+\alpha_3\mathrm{LOGTA}+\alpha_4\mathrm{LEV}\\ & +\alpha_5\mathrm{USQUOT}+\alpha_6\mathrm{HIGHTECH}+u_1\end{aligned} \tag{2}$$

With, DISC, voluntary disclosure decision; Log(1 + NAF), analyst coverage; DISP, dispersion; FLOAT, float; LOGTA, firm size; MTB, market-to-book; LEV, leverage; USQUOT, US listing; HIGHTECH, high-tech industry; and SURPRISE, earning surprise.

A large number of empirical studies have found that voluntary disclosures are not only associated with analyst coverage; but that firm characteristics are also likely to influence the disclosure policy. These include firm size, float, industry type, US-listing and leverage:

- *Firm size*. Firm size and voluntary disclosures have been found in several studies to be positively associated. Large firms report regular financial information since they face lower costs than small firms (Lev and Penman, 1990; Lang and Lundholm, 1993; Xiao *et al.*, 2004).
- *Free float*. Voluntary disclosure policy is influenced greatly by the form of ownership and management structure. Firms with highly diffused capital disclose regular information in order to decrease the conflicts of interests between managers and shareholders (Jensen and Meckling, 1976; Chau and Gray, 2002; Ho and Wong, 2001).
- *Industry type*. Industry type also affects disclosure choices, particularly in the high-tech industry. High-tech firms voluntarily disclose information, because they are subject to high-earnings fluctuations (Haven *et al.*, 2002; Lakhal, 2005).
- *US-listing*. The disclosure requirements of US markets are greater than those of the French Stock Exchange. US-listed firms have to abide by the USA. Generally accepted principles leading to a higher level and quality of disclosures than those listed on the French market (Raffournier, 1995; Joos, 2000; Xiao *et al.*, 2004).
- *Leverage*. There is a negative relationship between voluntary disclosures and debt level. Firms with high debts are more likely to provide debt-holders with more private information; there is then less need for additional public disclosures (Wallace *et al.*, 1994; Eng and Mak, 2003).

The models of analyst forecasts error and analyst forecasts dispersion were estimated by using a one-equation regression and the ordinary least square (OLS) method as follows:

$$\mathrm{MEF} = \mu_0 + \mu_1\mathrm{DISC} + \mu_2\mathrm{SURPRISE} + \mu_3\mathrm{NEGATIVE} + \mu_4\mathrm{LOGTA} + \mu_5 NREV + u_3$$

$$\mathrm{DISP} = \lambda_0 + \lambda_1\mathrm{DISC} + \lambda_2\mathrm{SURPRISE} + \lambda_3\mathrm{NEGATIVE} + \lambda_4\mathrm{LOGTA} + \lambda_5\mathrm{NREV} + u_3$$

With, DISC, voluntary disclosure decision; MEF, mean forecast error; DISP, forecast dispersion; LOGTA, firm size; NEGATIVE, loss firms; NREV, analyst estimation revisions; USQUOT, US listing; and SURPRISE, earning surprise.

4. Analysis and discussion

4.1 Descriptive analysis

Our sample includes 57.1 per cent companies that disclosed at least one earning forecast or quarterly earning announcement during the period of the study (1998-2001). Table II shows that about 13 per cent of the sample firms are listed on the US market. This dummy variable controls for the existence of listed companies in the US market

	Variable	Frequency	Percentage	Total
DISC	Disclosure	88	57.1	154
	No disclosure	66	42.9	
USQUOT	US listed	20	13	154
	Not US listed	134	87	
CONTROL	Controlled	125	81.8	154
	Not controlled	29	18.2	
HIGHTECH	High-tech industry	28	18.2	154
	Other industries	126	81.8	
NEGATIVE	Negative earnings	14	9.09	154
	Positive earnings	140	90.91	

Notes: This table reports descriptive statistics on categorical variables. DISC is equal to 1 for firms disclosing voluntarily their earnings and to 0 otherwise. USQUOT is equal to 1 for firms listed on the US market and to 0 otherwise. CONTROL takes the value of 1 if the firm is controlled by a large shareholder or a family holding at least the third of shares and 0 otherwise. HIGHTECH takes the value of 1 for firms belonging to the high-tech industry and 0 otherwise. NEGATIVE is equal to 1 if the annual EPS is negative and 0 otherwise

Table II.
Descriptive statistics of nominal variables

that already disclose mandatory quarterly earnings disclosures. French firms are mostly controlled by families or institutional investors. The percentage of firms with concentrated ownership structures is 81.8 per cent. Among industry dummies, only firms belonging to the high-tech industry are retained. Firms belonging to this sector provide regular disclosures because their earnings are subject to high-earnings fluctuations. Lastly, loss firms present a low percentage of 9.09 per cent of the total sample.

Table III reports descriptive statistics for the entire sample. Panel A includes statistics for our dependent variables and Panel B shows statistics for the independent variables. The mean number of analysts following a firm's stock is 18.2 analysts. For a sample of 20 countries, Hope (2003a) shows that France has the seventh position. According to Hope (2003a), the mean number of analyst coverage in France is 22.4. The Netherlands occupies the first position with 29.5 analysts, followed by Germany with 28.8. Switzerland comes after that with 24.8, followed by Singapore, Spain and Hong Kong with 23.4, 23.2, and 23.1, respectively. The mean (median) value of error forecasts is 0.07 (0.03) of the share price. The mean dispersion of forecasts between analysts is about 0.54 of the share price.

Table IV reports the Pearson correlation matrix which was used to check for multi-collinearity. Table IV indicates that voluntary disclosure decision is positively correlated to financial analyst coverage. Furthermore, there is a negative relationship between voluntary disclosures and analyst forecasts dispersion. These preliminary results confirm our hypotheses. The correlation coefficients are, however, low (0.21 and 0.17, respectively). With the exception of firm size, which is correlated with most of our independent variables, the correlations among explanatory variables are relatively low. A serious problem of multicolinearity exists according to Gujarati (1988) if the correlations between the independent variables exceed 0.80. All correlations between independent variables are less than this threshold. The VIF values were computed to check for the existence of this problem and are all far below the critical value of ten (Neter *et al.*, 1989).

	Mean	Median	SD	Minimum	Maximum	Quartile 25%	Quartile 75%
Panel A: dependent variables							
NAF	18.2	15	13.539	1	57	6.75	27
MFE	0.0732	0.03179	0.2002	0.0011	1.910	0.0172	0.0553
DISP	0.5486	0.0719	1.5136	0	14.00	0.0168	0.3264
Panel B: control variables							
SURPRISE	0.8456	0.2036	9.4773	−11.6145	116.142	−0.0538	0.500
NREV	0.0918	0.040	0.152	0.00	1.39	0.020	0.0925
FLOAT	0.2730	0.2360	0.1750	0.00	0.869	0.1587	0.3540
MTB	0.6816	0.5144	0.6819	−2.1129	3.9339	0.3297	0.8261
FORII	0.1589	0.1076	0.1666	0.00	0.688	0.0401	0.2089
LOGTA	7.2368	6.8604	1.8525	3.8916	11.8289	5.8770	8.5982
LEVERAGE	173.73	14.02	499.45	0	4,657	3.49	90.96

Notes: This table indicates descriptive statistics of continuous variables used in the current study. NAF is the mean number of financial analysts following the firm each month. MEF is the mean error forecast that equals to the absolute value of the difference between actual EPS and mean forecasts, scaled by the share price at the beginning of the year mean error forecasts. DISP is forecasts' dispersion calculated as the standard deviation of annual analysts forecasts divided by the share price at the beginning of the year. SURPRISE is earning surprise that equals to the difference between actual EPS and the EPS of previous year, scaled by the EPS of previous year. NREV is the mean number of analysts' recommendations. FLOAT is the proportion of shares available for purchase. MTB is the market value scaled by the book value. FORII is the percentage of shares held by foreign institutional investors. LOGTA is firm size and LEVERAGE is total long-term debts per total assets

Table III. Descriptive statistics of quantitative variables

4.2 Multivariate analysis and discussion

4.2.1 Analyst coverage and voluntary disclosures. We use the method of least squares to test the effect of the voluntary disclosure decision on analyst coverage. The results in Table V shows that voluntary disclosures are positively and significantly associated with analyst coverage. A simultaneous equation model for both decisions (following a firm and disclosing information) was then estimated. The method of three-least squares indicates a positive and significant relationship between analyst coverage and the decision to issue voluntary earning disclosures. Financial analysts are attracted by transparent firms. The costs of collecting information are low when firms disclose regular and additional information. This finding is consistent with the one found by Hope (2003a) on a multi-country sample. This author concludes that analysts follow firms with better accounting disclosure policies. Furthermore, according to Healy *et al.* (1999), disclosure policies attract financial analysts. Our *H1* is thus corroborated. Accordingly, there is a positive relationship between analyst coverage and voluntary disclosure decisions.

The simultaneous equation model also reveals that the number of analysts following the firm does not influence the disclosure decision. This result is in line with Hope (2003a) and Lang and Lundholm (1996) studies. They show that there is no simultaneous effect of analyst coverage and the disclosing decision. We therefore conclude that there are no causal relationships between these two variables. Consequently, the disclosure decision influences, but is not influenced by, the number of analysts following a firm. The positive relationship between analyst coverage and voluntary disclosures is consistent with the claim raised by Lang and Lundholm (1996) suggesting that voluntary disclosures and analyst coverage are complementary in the USA. In a concentrated ownership structure, analyst coverage does not substitute for

Table IV.
Correlation matrix

	MEF	DISP	DISC	NREV	SURPRISE	NEGATIVE	LOGTA	USQUOT	LEVERAGE	MTB	FLOAT	FORII
NAF	0.032	−0.045	0.392***	0.264***	−0.068	0.045	0.665***	0.282***	0.440***	−0.047	0.130	0.202**
MEF	1	0.086	−0.171**	−0.112	−0.048	0.172**	−0.053	−0.065	−0.065	0.087	0.003	−0.090
DISP		1	−0.21***	−0.118	−0.002	−0.026	0.072	0.013	0.019	0.081	−0.022	−0.059
DISC			1	0.234***	−0.079	−0.137	0.317***	0.296***	0.111	−0.010	0.196**	0.388***
NREV				1	−0.028	0.042	0.229***	0.027	0.109	0.027	−0.022	0.017
SURPRISE					1	−0.057	−0.077	−0.023	−0.024	0.001	−0.044	−0.059
NEGATIVE						1	−0.003	−0.055	−0.038	−0.033	0.111	0.016
LOGTA							1	0.394***	0.594***	−0.027	0.064	0.235***
USQUOT								1	0.416***	0.230***	0.030	0.261***
LEVERAGE									1	0.034	0.061	0.086
MTB										1	−0.042	0.081
FLOAT											1	0.060

Notes: The correlation is significant at *10, **5, and ***1 per cent levels, respectively. This table displays the Pearson correlation matrix. NAF is the mean number of analysts following the firm each month. MEF is the mean error forecast that equals to the absolute value of the difference between actual EPS and mean forecasts, scaled by the share price at the beginning of the year mean error forecasts. DISP is forecasts' dispersion calculated as the standard deviation of annual analysts forecasts divided by the share price at the beginning of the year. DISC is equal to 1 for the disclosing firms and 0 otherwise. NREV is the mean number of analysts' recommendations. SURPRISE is earning surprise that equals to the difference between actual EPS and the EPS of previous year, scaled by the EPS of previous year. NEGATIVE is equal to 1 when the annual EPS is negative and 0 otherwise. LOGTA is firm size. FLOAT is the proportion of shares available for purchase. USQUOT is coded as 1 for firms listed on the US market and 0 otherwise. LEVERAGE is total long-term debts per total assets. MTB is the market value scaled by the book value and FORII is the percentage of shares held by foreign institutional investors

	OLS		3SLS			
	Log(1 + NAF)		Log(1 + NAF)		DISC	
Constant	0.793	3.62***	0.744	3.12***		
DISC	0.399	3.12***	0.631	2.8***		
SURPRISE	−0.002	−1.74*	−0.001	−0.32		
MTB	−0.098	−1.23	−0.095	−1.20		
LOGTA	0.236	7.86***	0.226	6.59***	0.089	0.64
USQUOT	−0.110	−0.66	−0.159	−0.83	0.238	2.07**
FORII	0.007	0.20			0.787	3.19***
Log (1 + NAF)					0.02	0.05
FLOAT					0.364	1.98**
HIGHTECH					0.275	3.17***
LEVERAGE					−0.001	−1.73*
R^2	0.390		0.393		0.362	
χ^2	37.57		96.94		83.94	
p-value	0.000		0.000		0.000	

Notes: The coefficient is significant at *10, **5 and ***1 per cent levels, respectively. This table provides multivariate statistics using 3SLS and OLS regressions. DISC is equal to 1 for the disclosing firms and 0 otherwise. Log(1 + NAF) is the Log value plus one of the mean number of analysts following the firm each month. SURPRISE is earning surprise that equals to the difference between actual EPS and the EPS of previous year, scaled by the EPS of previous year. MTB is the market value scaled by the book value. LOGTA is firm size. USQUOT is coded as 1 for firms listed on the US market and 0 otherwise. FORII is the percentage of shares held by foreign institutional investors. FLOAT is the proportion of shares available for purchase. HIGHTECH stands for companies that belong to the high-tech industry and LEVERAGE is total long-term debts per total assets

Table V. Simultaneous equation model

voluntary disclosures as well. Analysts do not supply their services to firms with a poor environmental record and minority shareholders do not request costly analyst services.

Moreover, our results show that the number of analysts following a firm increases as the firm size increases. The coefficient of firm size is positive and significant at the 1 per cent level. This finding shows that firm size is an important determinant of analyst coverage. It is similar to prior findings in different contexts. Studies carried out by Lang and Lundholm (1996) and Lang *et al.* (2003) in the USA, Hope (2003a) in an international context, and Marston (1997) in the UK, show that analysts are more likely to follow large firms, because these firms offer better disclosure policies than small firms. Our results also indicate that there is a negative relationship between analyst coverage and earning surprise. It seems that analysts are attracted by firms with low-earning variability. Financial analysts are also likely to follow firms with predictable earnings. Lang *et al.* (2003, 2004) confirm this finding. They suggest that analysts differ in their earnings estimations when there is uncertainty about firm performance. We notice, however, that the effects of the market-to-book ratio and US listing on analyst coverage are not significant.

Table V reports the effects of firm characteristics on the voluntary disclosure decision. The free-float, measured by the proportion of shares available for purchase, is positively and statistically associated with the probability of issuing voluntary earning disclosures. This result backs up the theory that large shareholders are less reliant on minority shareholders interests and are able to obtain private information internally.

Our result is in line with the assumption that ownership structure affects corporate financial reporting. Chau and Gray (2002) and Ho and Wong (2001) find similar results. The proportion of foreign institutional investors is statistically significant with the expected sign. This result shows that as major actors in corporate governance structures, these investors are likely to influence managers to disclose their earnings voluntarily. The findings also show that large firms and those listed on the US market are likely to make voluntary disclosures. French firms listed on the US market comply more closely with International Accounting Standards. The relationship between leverage and voluntary earnings disclosures is negative. The agency costs of free cash flow are indeed controlled by debt, which plays a substitutive role to control managers. Our finding is consistent with Eng and Mak (2003), who argue that leverage lessens incentives for voluntary disclosures, because it helps control the free cash flow problem in Singapore. Finally, the high-tech industry is positively associated with the voluntary disclosure decision. Such firms belong to a sensitive sector and are inclined to have large price fluctuations, which lead them to inform the market regularly about their earnings.

4.2.2 Analysts forecast characteristics and voluntary disclosures. Table VI reports the results on whether a disclosure policy influences analyst forecast dispersion and error and reduces then market uncertainty. The estimated coefficients on accounting policy disclosures are negative and significant in both OLS regressions. Voluntary earning disclosures are negatively associated with both: forecast error and analyst forecast dispersion. This finding shows that voluntary earning disclosures influence the variations in analyst estimations. These outcomes further support the hypothesis that voluntary earnings disclosures reduce analyst uncertainty about firms' future prospects. Lang and Lundholm (1996) and Hope (2003b) find similar results.

	Mean error forecast OLS		Forecast dispersion OLS	
Constant	0.049	1.39	0.107	0.40
DISC	−0.047	−2.42***	−0.784	−2.67***
SURPRISE	0.004	5.10***	−0.002	−1.11
LOGTA	0.001	0.22	0.135	2.65***
USQUOT	−0.002	−0.10	0.105	0.48
NEGATIVE	0.061	2.00**	−0.298	−0.89
NREV	−0.037	−0.71	−0.817	−1.98**
R^2	0.220		0.071	
χ^2	59.07		6.14	
p-value	0.000		0.000	

Notes: The coefficient is significant at *10, **5, and ***1 per cent levels, respectively. This table reports multivariate statistics using OLS regressions. MEF is the mean error forecast that equals to the absolute value of the difference between actual EPS and mean forecasts, scaled by the share price at the beginning of the year mean error forecasts. DISP is forecasts dispersion calculated as the standard deviation of annual analysts forecasts divided by the share price at the beginning of the year. DISC is equal to 1 for the disclosing firms and 0 otherwise. SURPRISE is earning surprise that equals to the difference between actual EPS and the EPS of previous year, scaled by the EPS of previous year. LOGTA is firm size. USQUOT is equal to 1 for firms listed on the US market and 0 otherwise. NEGATIVE is coded as 1 when the annual EPS is negative and 0 otherwise and NREV is the number of revisions made by analysts

Table VI.
Linear regression of mean error forecast and forecast dispersion

They show that additional information is helpful for financial analysts, given that it allows them to correct their earnings estimations and therefore reduces information asymmetry. The more analysts have access to regular information about firm performance, the less-frequent dispersion and error occur in their earnings forecasts. We conclude that even though voluntary earnings disclosures are a small proportion of the total information provided to the market, they are likely to influence analyst forecasts characteristics.

We find a positive relationship between forecast error and earning surprise. The more earnings vary from one year to another, the more analysts are likely to provide different earnings estimations. The variability of earnings was found by Huberts and Fuller (1995) to influence forecast accuracy. These authors suggest that analysts provide the market with optimistic earning per share for firms with high-earnings fluctuations. Finally, there is a negative relationship between negative earnings and error forecasts. The accuracy of earnings forecasts is affected by negative earnings, given that analysts find it difficult to estimate future earnings for loss firms.

Forecast dispersion is positively associated with firm size which is a major determinant of analyst coverage. It is obvious then that the increase in the latter would bring about high dispersion in analyst earning forecasts. As the number of analysts increases, the probability of diverse opinions increases, because analysts are able to acquire various private information or to use differing estimation models. The number of revisions by financial analysts was introduced as a control variable. This variable captures for the information asymmetry effects on the market. The number of revisions is a new indicator. It could be used in subsequent studies as a proxy for the degree of transparency of firm disclosures. The results presented in Table VI show that the number of analyst revisions is negatively and significantly associated with analyst forecast dispersion. This finding suggests that the more analysts revise their estimation about firm value, the more informational uncertainty is reduced.

5. Conclusion

The relationships among voluntary earning disclosures, analyst coverage and the characteristics of analysts' forecasts have attracted little attention in literature. To the best of our knowledge, no studies have been carried out in France to test whether analysts are sensitive to firm disclosure policies or not. Existing literature shows that corporate disclosures enhance analyst coverage as well as the accuracy of their earnings forecasts and mitigate the dispersion between analyst forecasts.

Our findings show that financial analysts choose to follow firms with high-disclosure policies. Earning information is used by analysts to estimate earnings more accurately. This result suggests that financial analysts increase the supply of their services in response to a rich informational environment. However, analysts' services become costly for poor informational environment firms which decrease the supply and demand services. Moreover, we find that earning forecast characteristics are influenced by the disclosure decision. Voluntary earnings disclosures are positively associated with forecast accuracy and negatively associated with forecast dispersion. These disclosures help decrease market uncertainty by enhancing the accuracy of shared information. The results generally suggest that managers are more likely to disclose their earnings voluntarily, in order to reduce information asymmetry and to avoid earning surprises for investors.

One of the limitations of this study is that we did not control for other forms of voluntary disclosures. Besides, voluntary disclosure determinants examined in the present study do not include corporate governance mechanisms such as the characteristics of the board (Karamanou and Vafeas, 2005; Ajinkya *et al.*, 2005; Eng and Mak, 2003).

To sum up, voluntary earnings disclosures are a major determinant of analyst coverage decision, forecast accuracy and forecast dispersion. Although prior research has examined, the relationship between firms' overall disclosure levels and the characteristics of analyst forecasts, there is no prior empirical evidence on the importance of disclosing additional earnings in concentrated ownership structures. A lack of disclosure increases information asymmetry and reduces the level of analyst coverage. As a consequence, investors would be less interested in such firms, and this would probably mitigate market liquidity.

Notes

1. Quarterly earning announcements are not mandatory in France. According to the French legislation, French-listed firms are only required to disclose their annual and semi-annual reports.
2. Cross-sectional data were used and three dummy variables were introduced to control for year effects. The results show that these variables are not significant at usual levels. They were dropped from analysis.

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Corresponding author

Faten Lakhal can be contacted at: lakhal@univ-paris12.fr

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CAPITAL MARKET RESEARCH IN ACCOUNTING: EVIDENCE FROM THE TEHRAN STOCK EXCHANGE

Mohammad Namazi[1*] and Amin Nazemi[2]

[1] *Department of Accounting, College of Economics, Management and Social Sciences, Eram Sq., Eram Paradise, Shiraz University.*
[2]*Department of Accounting, School of Management, University of Tehran Nasr Bridge.*

[*]Corresponding author: mnamazi@rose.shirazu.ac.ir

ABSTRACT

The major purpose of this study is to classify and analyse capital market research conducted in the Tehran Stock Exchange Market (TSEM). Similar to Namazi and Nazemi's (2005) review of Finance Studies on the TSEM in 1991–2003, we review, classify and analyse the significant Accounting Studies related to the TSEM. Consequently, by both employing content analysis and archival methodology and considering academic accounting courses and programs established by the Ministry of Science, Research and Technology (MSRT), the studies are classified into four main topics: financial accounting, auditing, managerial accounting and other subjects. The significant results reported in each of the above groups of studies are presented. It is concluded that, in recent years, the amount of research conducted and the research techniques utilised concerning TSEM-related accounting issues have rapidly improved in various significant aspects of the capital market; yet, much more in-depth research must be carried out.

Keywords: Capital market research, Tehran Stock Exchange Market, financial accounting, auditing, and managerial accounting

INTRODUCTION

A review of historical capital markets studies in accounting can provide a relevant classification system for accounting research findings and their implications. It also discloses the important roles that accounting techniques play in capital markets. Furthermore, it provides an excellent reference by which researchers and financial professionals can review their perceptions and become interested in new topics. Therefore, we collect and review major studies that have been performed on the Tehran Stock Exchange Market (TSEM). Namazi and

Nazemi (2005) concentrated on TSEM *finance* studies, but we concentrate on major *accounting* research, including financial accounting, auditing, managerial accounting and other accounting topics, and summarise the major conclusions that can be drawn from these studies.

REVIEW OF THE LITERATURE

Numerous reviews of market research have been conducted. For example, Lev and Ohlson reviewed accounting market research in the US during the period 1960–1980. They categorised relevant studies into four groups: (i) the information content of accounting information, (ii) the effects of differences in information disclosure and changes in accounting methods on decision making processes, (iii) the effects of making accounting rules on capital markets, and (iv) the impacts of accounting market research on other fields. They found that accounting data have useful and timely content for investors. Although the results are consistent with the hypothesis that accounting numbers are useful, the informational content of accounting information other than values reported in financial statements is uncertain. They also found that functional fixation of investors is unavoidable. They also showed that, for extreme cases (such as oil and gas industries, replacement costs and segmental reporting), regulation carries clear consequences. Consequently, they had suggested that finance theories such as the Capital Asset Pricing Model (CAPM) and Efficient Market Hypothesis (EMH) to be revised.

Kothari (2001) also reviewed capital market research in accounting based on an economic framework (i.e., supply and demand for information). He investigated the relationship between financial statements and the role of capital markets during the 1985–2000 period. His major finding was that the main objectives of capital market research in accounting are valuation, fundamental analysis, EMH testing, and the role of accounting numbers in contracting and regulating. Fundamental analysis, efficient market and value relevance were found to be the topics most frequently investigated by accounting researchers.

Holthausen and Watts (2001) reviewed the value relevance of information and its effects on standard setting. Based on accounting theories, the value relevance of accounting variables and equity valuation has limited implications for the standard setters. They reviewed results in three categories: (i) the incremental association of accounting variables and stock returns, (ii) marginal information content, and (iii) the relationship between accounting variables and equity valuation parameters.

Barth et al. (2001) criticised Holthausen and Watts (2001) and argued that value relevance studies offer informational content for the standard setters. They argued that Holthausen and Watts' (2001) work is not a comprehensive review of value relevance studies in accounting.

Shackelford and Shevlin (2001) reviewed the empirical tax accounting studies in the US and found that three categories of studies were being performed in this domain: (i) coordinating tax and non-tax issues, (ii) the effect of tax on asset prices, and (iii) international and interstate taxation.

Healy and Palepu (2001) investigated discretionary information disclosure by managers. They argued that the demand for financial reporting and disclosure is the result of information asymmetry and agency conflicts between managers and investors. They also showed that earnings, book values and other required information possess informational content. Financial analysts also have provided new valuable information for predictions. Other results were as follows:

i. Auditing reports are perceived to increase the validity of the financial reports, but empirical results are rare;
ii. Accounting decision making can be influenced by compensation and lending contracts, and political costs are also important in this process;
iii. The discretionary information provided by management is considered valid information by investors.

Fields et al. (2001) investigated factors affecting accounting choices. They argued that agency costs, information asymmetry and outside information are important. They showed that only 10% of the articles in the top three accounting journals were related to accounting choices. In addition, the designated empirical research contained some problems that have caused researchers to replicate prior studies instead of developing new ideas. Therefore, the progress of this line of research has been very slow.

RESEARCH METHODOLOGY

This study employs content analysis and an archival methodology (Smith, 2003). We chose the methodology used by Kothari (2001) and modified it based on our national classification of accounting areas. This framework was selected because it is matched with the national and international accounting classifications (Noravesh, 2004).

The time period of 1991–2003 was investigated to obtain enough information related to our topic. Multiple data sources were employed. First, we gathered 205 empirical theses from the Iranian Information and Documentation Center (Irandoc), which maintains a large collection of dissertations. Second, we augmented our information base by reviewing the databases of the accounting research centre of the Audit Organisation of Iran and major Iranian accounting journals and magazines (including *Accounting and Auditing Review*, *Accountant Magazine*, *Auditor Magazine, The Journal of Financial Research, Bourse Magazine, Economic News, Today Message, Planning and Budgeting Magazine, Journal of Humanities and Social Science of Shiraz University, Economy and Management*, and some other academic journals published by Iranian universities). Because we found no comprehensive database of accounting research classification, we chose different databases and compared them to ensure that we obtained the most relevant studies. In addition, we have also used the database of the Shiraz Library of Regional and Science and Technology, which is a comprehensive international database. Finally, after controlling for overlaps between the studies cited in different databases, we found 405 studies for classification and analysis. Table 1 provides general information about these databases and journal articles.

Table 1
Classification of articles and theses.

Number	Resource	Frequency of Articles and Theses	Percentage
1	Iranian Center (Irandoc)	205	50.6
2	Audit Organization Research Center	49	12.1
3	Accounting Journals	68	16.8
4	Shiraz Regional Library of Science and Technology	83	20.5
Total		405	100.0

We collected studies from the 1991–2003 period because TSEM was reactivated in 1991 and accounting studies increased significantly in number thereafter. Furthermore, it was during this period that the number of entities listed in the TSEM increased through the establishment of local stock exchanges, which improved the availability of financial information.

To classify and investigate the main conclusions of these 405 studies, we chose a content analysis and a substantive analysis framework (Smith, 2003). Thus, we attempted to classify these studies based on their areas of focus and their major contributions. This classification, however, is relative and may be changed based on individual judgments.

CLASSIFICATION OF THE STUDIES

Following Namazi and Nazemi (2005), we chose a descriptive framework for the content analysis that encompasses a description of the contents of the articles and classification based upon the topics studied, not on its classification in an ideal situation. Table 2 shows the frequency of accounting and finance studies on the TSEM. Four major topics of study were identified:

i. Financial Accounting;
ii. Auditing;
iii. Managerial Accounting; and
iv. Other Accounting Topics.

Table 2
Frequency of the major topics considered in TSEM.

Number	Topics	Frequency of Articles and Theses	Percent
1	Finance	231	57.04
2	Financial Accounting	58	14.32
3	Auditing	22	5.43
4	Managerial Accounting	17	4.20
5	Other Subjects	77	19.01
Total		405	100.00

The preceding classification system was selected because it is based on the Ministry of Science, Research and Technology (MSRT) academic programs in accounting, and it is expected that the majority of the studies conducted on the TSEM are carried out by the accounting programs of Iranian universities and research centres (Noravesh, 2004).

These findings are briefly presented as follows:

Financial Accounting

Based on our classification, approximately 15% of all TSEM studies during the selected time period were related to financial accounting and specifically investigated balance sheet and income statement items. We further divided these studies into two sub-groups based on their frequency and content. In the first section, we present the "decision making and financial reporting" topics. We then will review "other subjects" in the second section. Table 3 presents a summary of the classifications of studies in this group.

Table 3
Subjects and classification of capital market research in TSEM (1991–2003).

Financial Accounting	Auditing	Managerial Accounting	Other Subjects
Decision Makings and Financial Reporting	Audit reports (64%)	Cost accounting (29%)	Other subjects (58%)
Information System (18%) *	Audit attitudes (14%)	Other subjects (29%)	Impact of economic indicators (18%)
Information Production (12%)	Operating auditing (5%)	Productivity (18%)	Privatisation (17%)
Decision Makers (6%)	Legal inspectors (5%)	Management accounting Obstacles (18%)	Stock Exchange rules (7%)
Other Subjects	Market for auditors (4%)	Management information technology (6%)	
Inflation reporting (14%)	Managerial letter (4%)		
Declaration of dividend (12%)	Audit risk (4%)		
Taxation (9%)			
Consolidated financial statements (7%)			
Liquidity (7%)			
Accounting standards (4%)			
Development reserves (4%)			
Inventory valuation (3%)			
Intangible assets (2%)			
Advertisement costs (2%)			
Total 100%	100%	100%	100%

***** Frequency of studies

Part 1: Decision making and financial reporting

According to the Iranian Accounting Standards, the major objective of financial statements is to present summarised and classified information about the financial position, financial performance and financial flexibility of an entity that is provided to many users to help them make better economic decisions (Accounting Standards, 2007). Therefore, the usefulness of a particular piece of information for decision making is a significant criterion for its presentation. In effect, given the results of a content analysis, it became necessary to classify relevant studies into three categories: information systems, information providers and decision makers.

(a) Information systems

Sahrapour (1993) and Ahmadi (1998) investigated the implications and difficulties of exploiting accounting information systems in the TSEM. Keshavarznejad (1996) studied provision of information to users for decision making purposes. She showed that external users of financial information demand timely information about the actual and expected results, and the lack of this demanded information, along with the inaccuracy and irregularity of information provided to users, are the major problems of Iranian entities' information systems. She suggests that recourse to different means of presenting the required information to external users is the key solution to these problems. Saffarian (2004) reviewed the policies and requirements for disclosures in the TSEM and compared these requirements with other selected stock exchanges' requirements. He maintains that a framework for disclosing information in the TSEM is necessary to harmonise the Iranian information disclosure policies with global international standards.

(b) Information production

A major characteristic of efficient markets is the assimilation of suitable and sufficient financial and non-financial information for decision making. The standard-setters and regulatory agencies, like the FASB and the SEC in the US, the Audit Organisation and Tehran Stock Exchange Committee in Iran and other organisations, attempt to promulgate rules and standards required for disclosure. For example, Iranian Accounting Standard No. 22, entitled *Interim Reporting*, requires selected entities to prepare interim financial statements. Some TSEM studies have focused on this issue.

Hemati (1996), Saghafi and Rahimian (1998) and Zandieh (1998) examined the requirement for providing interim reporting. Hemati (1996) showed that both interim reports exert a significant effect on stock price changes and that entities that publish their interim reports maintain relatively persistent price changes.

Yarmohammadi (2001) investigated major factors that affect timely interim reporting of the TSEM entities. She found that: (i) the firm size, profitability and complexity of activities based on the product type do not affect timely interim reporting; (ii) frequency of stock transactions is positively affected by timely reporting; and (iii) centralised capital structures and the existence of efficient cost accounting systems do not affect timely interim reporting.

The Information Disclosure Act requires listed Iranian companies to publish quarterly non-audited financial statements one month after the selected quarter period and quarterly audited financial statements two months after that period (Davani, 2004). TSEM regulators believe that the disclosure of such information would affect stock prices. Fakhari (1993) and Mokarrami (2000) have investigated this subject.

Mokarrami (2000) found that interim financial reporting contains informational content and affects stock prices at the publication date. Fakhari (1993) conducted a similar study. On the other hand, Zalghi (1996) examined the effect of the accountant's skills on preparation of quarterly financial reports. He did not find a significant relationship between accountants' qualifications and the quality of financial reporting.

(c) Decision makers

The major goal of information assimilation is to provide a basis for decision making. In effect, the primary qualitative characteristics of information will be dismissed if the disclosed information is not relevant.

Dolatshahi (1997), Farrokhnia (2001), and Khoshtinat (1999) investigated these issues. Dolatshahi showed that both investors and auditors employ accounting information such as tax income and extraordinary items, sales, net income, earnings per share, dividends per share and total assets for decision making.

Khoshtinat (1999) showed that financial accounting information can be extracted to decrease the observed bias in judgments and the required education to exploit financial statements. Such changes would not only provide more reliable information, but also cause users to rely more on the information provided in financial statements when making decisions.

Farrokhnia (2001) also investigated the role of financial information in decision making and revealed that investors do not employ any specific technical models in their decision making. He also argued that a lack of specialised knowledge, insufficient information concerning stock exchange databases, a low level of satisfaction with stocks' returns and the ability to earn more profits in other investments, such as bank deposits, bonds, automobiles and mobile phones, have had negative effects on stock market prices.

Saghafi and Malekian (1998) investigated the characteristics of the financial reports of listed Iranian companies and found a significant relationship between the size (total assets), debt to equity, net sales, income before taxes to net sales ratio and the full disclosures of the annual reports. However, they did not find a significant relationship between income before taxes to equity ratio and the comprehensiveness of the reports. Some other conclusions relating to this topic are as follows:

i. There is a need for a database that facilitates analysing the information provided in financial statements. For example, Zaiffard and Arabmazar (1994) investigated this subject and showed that only a few companies prepare and publish such databases; thus, there is a strong need for restructuring of existing accounting information databases;

ii. The harmonisation of information settings at an international level provides a suitable framework for accounting information disclosures. In this manner, investment at a global level is also enhanced;

iii. Interim reporting would affect stock prices of the TSEM; and

iv. Some financial statement items (total assets, debt to equity, net sales and income before taxes to net sales) are employed more than other items for the purpose of financial decision making.

Part 2: Other subjects of financial accounting

We describe other subjects of financial accounting that have been investigated in the context of the TSEM. These subjects, listed according to their frequency (shown in table 3), are as follows: inflation reporting, dividend policies, taxation, consolidated financial statements, liquidity, accounting standards, development reserves, inventory valuation, intangible assets and advertisement costs.

Table 4
Summary of Information System studies.

Title	Author(s)	Objectives	Findings
A) Information systems The investigation of the available methods to assess information used by major users	Keshavarznejad (1996)	The suitable conditions of information reporting to decision makers	Lack of knowledge about asymmetry of real and expected information, different needs of stock holders and lack of needed information, inaccuracy and irregularity in providing information to users, are the major problems.
Policies and required information disclosure in TSEM	Saffarian (2004)	Harmonization of disclosure policies with global standards	A disclosure framework is required.
B) Information production Interim financial statements	Saghafi and Rahimian (1998)	Requirements for preparing interim financial statements	Appropriate interim reports are not prepared in TSEM.
Requirements for preparing interim financial statements by TSEM's listed companies.	Hemati (1996)	The relationship between interim reports and price changes	Relative stability in preparing interim reports.
Factors affecting timely interim reports in TSEM's listed companies.	Yarmohammadi (2001)	The relationship between firms' characteristics and timely interim reports	There is no relationship between the firm's size, profitability, and complexity of products, ownership structure, timely reporting, and stock transaction recordings.
The impact of interim financial reporting on stock prices.	Mokarrami (2000)	The relationship between stock prices and interim reports	Information content of interim reports is shown.
Relationship between the financial reporting quality and the numbers of qualified accountants	Zalghi (1996)	Financial reporting quality	There is no significant relationship between the qualified accountants and the reporting quality.
The impact of accounting information on decision making process in TSEM	Dolatshahi (1997)	Decision making process	Sale items, net incomes, Earnings per share (EPS), DPS and total assets are used for external decision making.

(continued)

Table 4 *(continued)*

Title	Author(s)	Objectives	Findings
The comprehensiveness of annual reports and financial characteristics of the listed companies.	Saghafi and Malekian (1998)	Financial characteristics of the companies	There is a significant relationship between the firm's size, debt to equity ratios, net sales, incomes before taxes to net sales ratios, and full disclosures of the annual reports. There is not a significant relationship between incomes before taxes and stock holders' equity.
The effects of financial accounting presentations on investors' judgments for decision making.	Khoshtinat (1999)	Investors' judgments	Financial accounting information would cause decreasing biases, and the education of using financial statements, would enhance reliability.
The role of financial information in making decisions in TSEM.	Farrokhnia (2001)	Decision making process	Lack of special knowledge, insufficient databases, unsatisfied returns on investments and inconsistency between markets, would cause investors do not use specific models in buy/sale decisions.

(a) Inflation reporting

Financial statements are prepared based on the historical costing approach, but changes in prices and decreases in purchasing power caused by inflation have affected financial information and reduced the relevance of historical cost information. Thus, SFAS No. 33 in the US, for example, required enterprises to present supplementary adjusted financial statements based on general price levels. However, presentation of such information became discretionary because of pressure from lobbying groups. Thus, researchers have sought to find answers to such questions as whether presentation of the adjusted information (based on the price level changes) affects investors' decisions.

Mostophi (1993) attempted to determine whether adjusted income statements based on general price changes are more useful for predicting future earnings than historical cost information. He found that adjusted income statements indeed contain little information for predicting future earnings and therefore, the relevance of the qualitative characteristics of such information is in doubt.

In another study, Moradinia (1994) investigated the types of information employed in decision making. She showed that investors utilise more non-financial information and consider this type of information to be more reliable. In addition, she reported that nearly all users adjust the financial statements before decision making. These adjustments include: (i) fixed assets revaluation and consideration of foreign liabilities and their effects on net income, (ii) adjustments based on the qualified paragraphs in the audit reports, (iii) adjustments based on the inflation rate, (iv) adjustments based on the deferred taxes, and (v) adjustments based on the foreign exchange rates.

Asgharian (1994) tested the impacts of the general price index financial accounting items on price settings in the cement industry. He found that these adjustments cause increasing stock prices of the listed companies. However, he referred to the cost-benefit concept and concluded that historical information was suitable for price setting. Johari (1996) and Ghanavati (1996) also investigated this question in the textile industry.

In summary, there is no distinct evidence about the effects of general price level changes on financial statements and decision making. However, it seems that revaluation of assets that has been deemed legitimate by the national accounting standards setter (the Audit Organisation) somewhat decreases the inflation effects of the financial accounting statement items.

(b) Earnings declaration and dividends

As a general rule, entities distribute earnings between their stockholders through cash or stock dividends. Thus, Samadzadeh (1993) studied earnings distribution policies and their effects on the stock values for TSEM companies. He found that managers were not familiar with earnings distribution policies and did not follow the prescribed policies for presentation of the financial positions of the entities.

On the other hand, stockholders did not pay attention to cash dividends and their changes as an adjustment signal. In addition, he showed that earnings distribution did not affect stock returns because of the legitimacy of earnings distribution time lags (the National Business Act permits entities to delay cash dividend distribution for eight months after approval). Therefore, stockholders are not interested in earnings distribution. Abbasi (1991), Gholipour (1995), Abdollahpoor (1997) and Rohanipoor (1999) also conducted studies in this line of research and reported similar results.

One of the most common objectives of earnings distribution studies is to investigate the relationship of earnings distributions with stock prices and stock returns and, therefore, market efficiency. Namazi (2004) and Namazi and Shooshtarian (1996) investigated this subject and showed that:

i. The concept of efficiency and its different levels (weak, semi-strong and strong forms) is complex, and it depends on different contexts, such as competitive markets, efficient information systems, and correct understanding of financial information by its users; and

ii. Market-based research shows that the TSEM is not efficient in the weak form, but it is moving towards efficiency by increasing local stock markets' development and improving information systems - especially for accounting information. However, at present, the efficiency evidence is not statistically significant.

(c) Taxation

Despite the importance of tax incomes for the listed companies (at least for reporting to the government), studies in this area are scarce. Tax allowances of the listed companies and indirect use of tax information by investors in decision making are two major topics that have been addressed by this field of research. In addition, preemptive right taxes, investment taxes and tax laws have been studied by Iranian accounting researchers.

Golestani (1996) showed that tax assessments of nearly 87% of the listed companies are based on their journals and ledger books, and the remainder (13%) are based on tax officials' assessments. About 63 percent of the listed companies follow Generally Accepted Accounting Principles (GAAP). However, they are aware of the existence of conflicts between the GAAP-based and tax-based income numbers and the probable losses resulting from these discrepancies. About 63% of the listed companies have sufficient knowledge about acceptable expenses and depreciations and have some experience with declaring assessment notices, but they do not sufficiently record the required tax provision caused by the tax differences.

In addition, about 42% of the managers argued that tax rates are high and that there is a need to revise the tax rates. Importantly, 98% of the managers argued that tax problems are the main obstacle for asset revaluations. In addition, 48% of the listed companies do not employ tax exemptions for development reserves because they are not acceptable by the Ministry of Economics and Finance.

The revaluation obstacles and non-tax exemptions showed that revaluation of assets would not lead Iranian companies to revaluate and present their financial statements based on the current values. Therefore, historical costs are the prevalent method for preparing financial statements. Given the tax assessment legitimacy of the Iranian Certified Accountants, conducting more research on tax problems and their obstacles seems necessary. Consequently, creation and development of an efficient tax system that supports investment in financial assets also seems very desirable.

(d) Consolidated financial statements

In Iran, when an entity obtains control over another entity, consolidated financial statements are required. In recent years, the number of companies that are required to consolidate their financial statements has increased. Thus, Khoshyomn (1998) investigated the extent to which parent companies rely on their subsidiaries' financial information. He found that for 89% of the sampled companies, auditors reported a qualified opinion, and returns on the investments in investees' companies were less than 20%. He also discovered that approximately 35 to 42.5% of the financial statements of the investees were used by the investors for decision-making purposes.

Langari (1994) and Samarbakhsh (2001) also studied the role of the consolidated financial statements in decision making. Langari (1994) showed that although consolidated financial statement information is needed for decision making, it is not exploited appropriately. He argued for the following causes of this problem:

i. The public sector's management of business units;
ii. A lack of sufficient knowledge relating to consolidation;
iii. A lack of authoritative requirements;
iv. A failure to reflect the subject in the audit and legal inspectors' reports;
v. The existence of surrogate information;
vi. The existence of unsuitable and inefficient accounting systems;
vii. Inefficiency of personnel and accounting systems of the parent companies; and
viii. A failure to implement financial management ratio analysis.

Unfortunately, studies on this topic are scarce, and therefore we cannot assess its findings extensively. More research in this area is required.

(e) Liquidity

Mansoori (2003) and, recently, Namazi and Mansoori (2007) investigated cash flows and liquidity cycles of listed companies for the period of 1997–2001. They showed significant positive relationships between cash flow cycles and current ratios, accounts receivable and inventory turnover. They also found significant negative relationships between cash flow cycles and acid test ratios, accounts payable turnover, gross profit sales ratios, return of investment (ROI) and leverage ratios. However, there was no significant relationship between cash flow periods and return of assets (ROA) ratios.

(f) Accounting standards

The Audit Organisation is a government agency in Iran that is authorised to enforce accounting and auditing standards. Accounting standards have been prescribed since 2002, and so far, this organisation has published 29 standards and 3 other promulgations that are in due process (concerning EPS, impairment of assets, the disposal of noncurrent assets held for sale, and discontinued operations).

Alizadeh (1997) revealed that the disclosure standards were used in preparation and presentation of the balance sheet by 95% of the sample companies. Furthermore, these standards were exerted in preparing income statements by 90% of the companies and were used for cash flow statements by 75% of them. He concluded that the implementation rate of the disclosure standards in preparing and presenting financial reports by the listed companies was 80%.

(g) Development reserves

Mahooti (1996) investigated 23 listed companies during the period of 1992–1994 and found no significant correlations between raising capital resources and the development of physical assets. On the other hand, resources that were provided by capital increases were not implemented to develop and complete fixed assets. He also showed that there was no significant relationship between proposed dividends and dividends payable and distributed earnings for the listed companies.

(h) Inventory

Very limited research in this area was found. Evazi (2002) investigated factors affecting inventory accounting choices. He revealed that there were no significant relationships between accounting choices (such as the FIFO and average methods) and the firm size, debt to working capital ratio and industry type.

(i) Intangible assets

Boghaddareh (1995) studied accounting for intangible assets for the listed companies and showed that companies employed traditional accounting methods that were not based upon a uniform criterion for valuation and bookkeeping purposes; therefore, intangible assets were not presented properly.

(j) Advertisement costs

Ebrahimi (1995) investigated the application of the recognition method for advertisement costs (i.e., capitalising or expensing advertisement costs) and found that advertisement costs could be capitalised in some industries. He investigated four industry groups during the period of 1977 to 1993, including: (i) chemical, (ii) food and beverages, (iii) textile, and (iv) household appliances. Except for the chemical industry, in which advertisement costs had a significant influence on future revenue distributions and should be expensed in the current period, advertisement costs had no influence on revenue distributions.

Summary Check Points in Financial Accounting

We can briefly conclude that, except for reporting, there are only a few studies on financial accounting in the Iranian context. Therefore, Iranian researchers should consider other topics within financial accounting and concentrate more on investors' decision-making demands. The most important results of the financial accounting section can be summarised as follows:

i. Earnings distribution does not affect stock returns, and stockholders are not interested in the dividend policies because of multiple problems;
ii. Tax acts are the major obstacle to revaluation of assets;
iii. Despite the importance of the consolidated financial information, it is not properly utilised for decision making;
iv. Resources raised by equity holders are not employed for development and equipment costs;
v. There are no significant relationships between accounting choices and firm size, debt to working capital ratio and industry type;
vi. Intangible assets are not valued and presented properly in the financial statements of the listed companies;
vii. Advertisement costs can be capitalised in some industry groups.

Auditing

As table 3 shows, auditing reports are the second major topic considered by Iranian researchers. Alizadeh (1995) investigated auditors' attitudes towards major factors that would cause earnings changes that affect decision making processes. He concluded that a proper information presentation in financial statements, especially earnings changes caused by sales price variations, production and sales volume and changes in costs of goods sold items, were useful in the decision making processes of the financial statements' users.

Rahimi (1996) investigated the impact of the audit evidence on audit reports. Jamshidi (1993) and Tabibi (1993) also reviewed problems confronting the exploiting of audit reports for the listed companies and the reasons for adverse (or qualified) reports.

Rajabi (1997) analysed audit service markets in Iran and showed that the client, firm size and type of the firm significantly affected the audit fees. He argued that the Audit Organisation, which is a governmental organisation, provides major auditing services in the country, and therefore the audit market is not competitive. (This research, however, was conducted ten years ago, and currently a segment of the audit services have been transferred to private auditing firms).

Golnari (1997) selected 60 companies listed during 1991–1995. He reviewed their audit reports and found that, in recent years, most of the auditors and legal inspectors' reports were routine, and stockholders did not pay attention to these reports. Ebrahimi (1999) also showed that auditing and legal inspector reports were not considered by common stockholders; but Mousavi (1999) showed that lenders, stockholders and investors rely on the audited financial reports.

Noravesh and Fiali (1997) investigated the entropy of the balance sheet items and auditing correction notes and reported a significant relationship between the entropy of other assets, accounts payable and auditing correction notes.

Nick-khah and Mojtahedzadeh (1998) reviewed the responsibilities of the independent auditors and argued that the auditors’ most important responsibilities include audit assessment, evaluation of internal control structure, detection of misstatements (errors and fraud), evaluation of social responsibility and accountability of the clients.

Shabahang and Khatami (1999) tested the effects of the qualified opinions on stock prices and on stockbrokers' analysis of the annual financial statements. They found that audit paragraphs affected clients' stock prices, but stockbrokers did not consider audit paragraphs in their analysis. Thus, audit qualification paragraphs are only effective in changing institutional investors' behaviours.

Azgoli (2000) also investigated the impact of auditing reports on the stock prices of the TSEM listed companies and reported that the type of information reflected in auditing reports can change stock prices.

Kadkhodaee and Mohammadi (2001) studied the relationship between stock returns and the type of audit assessments for the listed companies. They concluded that:

i. A significant portion of the audit reports (approximately 68.5%) were issued by the Audit Organisation; and
ii. There was no significant relationship between audit assessments and stock returns.

They recommended that authoritative bodies support and develop suitable rules and regulations and train stakeholders to improve the efficiency and usefulness of the auditing reports.

Mirmotaharri (2001) studied 50 actively traded companies from 1998 to 2000. He revealed that, in nearly all selected samples, *qualified* audit reports were issued. In addition, the number of qualification paragraphs in manufacturing companies' reports was greater than in the investment companies' reports. Finally, he argued that tax qualified paragraphs (in the audit reports) were the most frequently appearing paragraph in audit reports of the sampled companies.

Summary Check Points of Auditing

The most frequent topic considered by auditing researchers in the TSEM context is the content of auditing reports. The existing findings do not support any hypothesis with certainty. Therefore, there is a need for in-depth studies to be conducted in the future. In these studies, the roles of the Audit Organization and the Iranian Certified Public Accountants (IACPA) should also be considered. Table 5 summarises the major findings of this line of research.

Table 5
Summary of the auditing research findings.

Title	Author(s)	Period (year)	Findings
An analytical study of the auditing attitudes towards the effect of disclosing significant factors in earnings changes.	Alizadeh	1995	Appropriate disclosures in financial statements (specifically earnings changes, sales price changes, sales volume changes and changes in the costs of goods sold items) are useful in decision makings.
Studying the relationship between the entropy of financial positions and auditing correction notes.	Noravesh and Fiali	1997	There is a significant relationship between some balance sheet items and audit correction notes.
The effectiveness of the auditor and legal inspectors' reports in common stockholders' decisions.	Golnari	1997 (1991-1995)	Most of the reports issued during recent 5 years, are repetitive and therefore, they are not used for decision makings.
Auditing markets in Iran	Rajabi	1997	Size of the firm is a significant factor affecting the audit fees.
Identifying auditing responsibilities based on the auditing users and auditors' views.	Nick-khah and Mojtahedzadeh	1998	Audit assessment, evaluation of the internal control structures, fraud detection, evaluation of the social responsibility and client accountability are the most important responsibilities
The effect of auditing reports on stock prices and annual financial statements analysis by stock brokers.	Shabahang and Khatami	1999	There is a significant relationship between the auditing qualification reports and stock prices.
Auditing reports in TSEM	Mirmotaharri	2001 (1998-2000)	Nearly all samples received a "qualified report". The most frequent qualified paragraph is relating to the "tax" paragraph. The number of the "qualified paragraphs" for manufacturing companies is more than the investment companies.
The effect of auditing assessments on stock prices.	Kadkhodaee and Mohammadi	2001	There is no significant relationship between audit assessments and stock prices.

Managerial Accounting

As table 3 shows, most managerial accounting studies of the TSEM have concentrated on cost accounting. Jalilpour (1995) investigated the application of a *master budget program* in the tire and plastic industry. He showed that implementing a master budget improves performance and increases efficiency. He also pointed out the role of the human aspect of the budgeting process and argued that managers' communication would improve their knowledge on the objectives and permit problems and constraints to be overcome.

Khajavi (1995) found that the managers of the manufacturing companies in the TSEM do not possess sufficient knowledge about different management accounting concepts and methods. He maintained that the most important restrictions against the development of management accounting concepts in manufacturing companies are as follows:

i. Lack of necessary information for predicting the required variables;
ii. Lack of cooperation and coordination between different manufacturing departments;
iii. Problems in training managers to understand what is being implemented in practice (i.e., practical management accounting methods); and
iv. Difficulties in separation of the fixed and variable costs that arise because of internal and external problems.

Ebrahimi (1997) argued that an Activity Based Costing (ABC) system could provide vital information for managers to enable them to concentrate on customers, identify opportunities and create improvements in the organisation. He studied the possibility of implementing ABC in a particular company (Gas-Butan Manufacturing Co.). He concluded that there were two prerequisites for implementing ABC in this company: (i) the existence of various management styles and accountability for employing the system and (ii) data availability and an appropriate environment for designing and establishing ABC. Managers of the selected company had sufficient knowledge to implement ABC. Furthermore, it was possible to identify activities and cost drivers in the company to compute the ABC costs.

Masoumian (1997) focused on other aspects of the management accounting methods. He studied the capital project evaluation methods in the TSEM. He reported that the selected managers mostly exerted two capital budgeting methods, the net present value (NPV) and the profitability index (PI), and they did not employ other analytical methods of evaluating the projects. In addition, managers argued that the PI index was the most important method and that NPV, internal rate of return, payback period, accounting rate of return and reverse payback period were the next most important methods that could be exercised by TSEM companies.

Gholipour (1997) reviewed the role of management cultures in improving human resource productivity among the listed companies. He argued that religious aspects of the culture affect productivity and that nearly all productivity problems result from management weaknesses. Hajikarimi (1992) gathered nine years of time series data to investigate the relationships between productivity, employee training, compensation and corporate culture. He reported a positive relationship between productivity, training and compensation, but he found no relationship between productivity and cooperation. Esmaeelpour (1994) also reviewed the role of effective communication in increasing productivity and investigated the contributions of the significant factors affecting productivity.

Summary Check Points in Managerial Accounting

Limited study of TSEM managerial accounting issues has been attempted. The studies conducted are mainly related to the extent of management knowledge about information technology, the role of cost accounting systems in management control, cost control processes in the automobile industry, and empirical research on total quality management (TQM) in the pharmacy industry. Table 6 provides a summary of the findings.

One can conclude that the major managerial accounting studies are related to cost accounting issues and problems and obstacles hindering the implementation of cost accounting systems. However, few studies exist in the field of management accounting. Therefore, it is imperative that researchers pay more attention to this field. Also, it seems that the TSEM listed companies face different problems in applying advanced managerial accounting techniques such as the ABC. These problems are mainly related to employee resistance to change and a lack of knowledge about the necessary techniques, productivity and information updating.

Table 6
Summary of management accounting research findings.

Title	Author(s)	Period (year)	Findings
Designation of a human resource productivity model in the industry.	Hajikarimi	1982–1991 (1992)	Productivity is related to training and non-fixed compensation fees directly, but it is not related to corporation's environment.
Budgeting process in the tire and plastic industry.	Jalilpour	1995	Master budget improves performance and increases efficiency.
The investigation of management accounting obstacles in TSEM' listed companies.	Khajavi	1996	Managers do not have sufficient knowledge about management accounting concepts and methods. Lack of necessary information, Lack of managers' understanding of practical methods, Lack of separation of fixed and variable costs are essential problems.
The relationship between strategic decision making models and productivity in the mineral industry.	Gholipour	1997	Management weaknesses would cause less productivity.
Long-term investment evaluation methods (capital projects) in TSEM.	Masoumian	1998	Companies mainly use only two methods for capital investment evaluation; NPV and PI.
Required conditions for implementing ABC in the house appliance industry.	Ebrahimi	1997	Managers had sufficient knowledge about ABC. In addition, it was possible to identify activity cost drivers in selected companies.

Other Subjects

In this section, we review other important topics: macroeconomic variables, privatisation and other related subjects (see Table 3). These studies are listed in table 7.

Table 7
Summary of other economic subjects in TSEM.

Subjects	Author(s)
Comparison of the TSEM with other stock exchange markets	Dorodi (1995), Arman and Salehi tabar (1999), Ekbatani (2001)
The need for other exchange markets (agricultural and metal products)	Rasoolof (2002), Eskandari (2003)
Stock insurance	Valibeigi (2002), Ghazizadeh (2003), Talebi (1997)
Stock exchange based on the religion and law views	Mirnasiri (2003), Karimi (1996), Emamgholi (1997)
Stock exchange and automobile industry	Arman (1997)
Women participation in the stock exchange	Shahrokni (1999)

The effect of macroeconomic variables

Economic factors affect society as a whole. In Iran, oil revenues are the major income source of the government. Therefore, changes in oil prices affect economic welfare nationwide. In addition, gold prices, foreign currency prices, inflation, real estate conditions and fuel prices are the most important economic variables and thus, they have been investigated in the context of the TSEM.

Lotfi (1997), Badkobehi (1995) and Yahyazadehfard (1999) studied the effects of inflation and prices. Taghavi (2001), Khodaei (1999), Jalali and Ghalibaf (2002), Noormohammadi (1995) and Allahbakhshi (1996) investigated the effects of foreign currencies on stock prices and returns.

Javadpour (1996) found that forward index changes and stock price variations are not correlated. On the other hand, except for the two indices that did match the signs of stock price changes, other index changes were not significant; the first index was the number of building permissions for the private sector and the second was the number of licenses for new industries.

Lotfi (1997) studied stock return time series trends. He found that the rate of return growth was greater than the inflation rate. Also, the stock price index growth far exceeded the inflation rate and the net income growth rate and the dividend growth rate was indeed greater than the inflation rate. He also concluded that the stock price growth rate was abnormal in selected samples. Badkobehi (1995) and Yahyazadehfard (1999) also considered this subject and reported similar results.

The preceding findings suggest both that economic factors affect financial parameters and stock market variables and that stockholders should utilise hedging policies to minimise economic effects. However, more in-depth research is required to identify the effects of other economic factors, such as inflation, oil prices and foreign currency prices.

Privatisation

In recent years, the Iranian government has tried to increase its efficiency and effectiveness by transferring governmental holdings to private sectors. An important question, however, is how to privatise. Generally, stock markets are integrated and organised markets that are structured by many investors. These markets can be extracted for privatisation. Therefore, the government has attempted to privatise governmental entities through the TSEM. The government has also attempted to monitor governmental entities that become private companies to assure an increase in their efficiency and effectiveness. Aminimehr (1994) investigated the efficiency of privatisation and revealed that privatisation through the TSEM has not been truly efficient.

Miri (1995) investigated privatisation trends in manufacturing entities and concentrated on their efficiency and effectiveness. He discovered that the profitability and production ratios increased after privatisation.

Talebi (1997) compared market values based on the initial public offering (IPO) prices of private companies and discounted cash flows. He showed that stock price changes were not related to predicted rate of returns. Therefore, it was not possible to determine stock prices based on financial and economic variables. He argued that accounting and economic valuation techniques would create significant problems for price detection.

Arabi (1996) showed that privatising manufacturing companies would improve their performance. He studied this subject in the chemical, food and beverage, tile, mineral and packaging industries and found that except for the chemical industry, performance increased following privatisation.

On the other hand, Almasi (2001) considered the effect of privatisation policies based on the Economic and Social Development Plans and extracted three criteria (EPS, ROA and return of equity (ROE)); he reported that the selected companies' performances did not improve after privatisation.

Table 8 shows a summary of the findings for this section.

Table 8
Major results of privatisation in TSEM.

Title	Author(s)	Period (year)	Findings
Comparison of privatisation methods and trend reviews.	Aminimehr	1995 (two period)	Privatisation methods are not appropriate in spite of the acceptance of provisions in TSEM.
The effects of privatisation on the efficiency of manufacturing companies.	Miri	1995	Profitability and production ratios have been increased after privatisation.
IPO (Initial Public Offering) pricing problems and suggestions for an appropriate method.	Talebi	1997	Comparison on the first price and present value of discounted cash flows shows that financial and economic information are not sufficient for price detection.
The effects of industry type on performance after privatisation.	Arabi	1997	Privatisation concepts for pharmacy industry would improve performance.
The effects of privatisation on financial performance in TSEM.	Almasi	2001	After privatisation, financial performances (ROE, EPS, and ROA) have not been improved.

Based on these results, one can conclude that the efficiency of privatisation has not been significant because of the lack of appropriate monitoring mechanisms, the use of an inappropriate privatisation framework, errors in pricing and mistakes in firm selection. These factors should be seriously considered by the government because if public reliance on privatisation decreases, it would be difficult to restore it and the advantages of privatisation would be diminished.

SUMMARY AND CONCLUDING REMARKS

The TSEM has an important role in merging small investments and it provides an efficient capital allocation mechanism. Various researchers have studied different accounting-based variables pertinent to the TSEM companies. In this study, we have cited and categorised these subjects and findings published during the 1991–2003 period based on content analysis and archival evidence. We believe this classification will be useful and effective for future research by categorising the major studies and their findings.

The major objectives of this study were to compile a relevant database of studies conducted on the TSEM and to report the significant findings of these studies and their implications for the capital market. In approaching these objectives, after reviewing different databases and published articles, following Namazi and Nazemi (2005), we based our classification system on the content and frequency of the articles and we classified the relevant studies into four groups: financial accounting (14.3% of studies), auditing (5.4%), management accounting (4.2%) and other subjects (19.0%). Finance studies (57.1%), which comprise the majority of TSEM studies, were not considered because Namazi and Nazemi (2005) presented these results.

The finance studies, however, make up the majority of the reviewed literature. According to Namazi and Nazemi (2005), information content studies (16%) were the most frequent studies in this section. Stock prices and stock returns predictions (9%) and market efficiency (8%) were the next most frequent topics considered by the researchers (Namazi and Nazemi, 2005).

Financial accounting is the second most popular area of study. Financial reporting, information disclosure and decision making (totalling nearly 40%) were the major topics studied based on the number of published studies. Financial reporting studies are divided into three groups: information provider, information users and information systems. Accounting standards, taxation and consolidated financial statements are also included in this section.

Auditing studies of the TSEM are concentrated on auditing reports. Auditing reports provide a summary of auditors' findings. The reliability of audit reports is increased if they are assessed by independent auditors because they must be independent and qualified to provide an accurate assessment. However, in the future, more research must be conducted in this venue because the auditing profession involves other aspects worthy of study.

Cost and management accounting were introduced as the third most frequent topic studied in the TSEM context. Budgeting methods, the ABC system, decision making techniques, and human aspects are the major topics in this section. It seems that researchers have not extensively studied managerial accounting topics because of the difficulty or impossibility of collecting the required information from the TSEM companies.

Finally, we presented research on other topics, such as economic factors and privatisation. Based on the results, we can conclude that privatisation mechanisms are inefficient because of the lack of an appropriate monitoring framework, the use of inappropriate privatisation mechanisms, errors in pricing, and mistakes in firm selection. These findings could help the government to improve the efficiency and effectiveness of the economic resources involved in the privatisation process.

We should note that these findings are relevant to a specific period (1991–2003) and are not comprehensive. We only attempted to explain the major studies and results. We also encountered many restrictions when attempting to access databases. These databases, in some cases, were not complete, and therefore it is probable that some relevant studies are not included in this review. Furthermore, access to the results of past studies was not easy to obtain. Unfortunately, even the most complete academic database (i.e., irandoc.ir) contains a substantial amount of missing data. Therefore, we could not obtain complete information about some studies. Finally, we found that some researchers' names were repeated two or three times because their topics were not new and/or their studies were published in different sources.

In summary, in recent years, the number of studies relating to different aspects of the TSEM has increased significantly, and the research techniques and approaches used in these studies have also improved greatly. They have provided useful knowledge about the capital market and the functions of accounting areas. However, much more research is necessary. We suggest the following areas for future investigations:

i. Creation of a more comprehensive database of TSEM studies;
ii. An in-depth analysis of each area of the studies identified in this article;
iii. Studies of different accounting standards and values relating to the TSEM and its efficiency;
iv. Research on the implications of the auditing standards, managerial accounting data and systems, tax laws, etc. for the efficiency and effectiveness of the TSEM; and
v. Creation of EMH mechanisms in the TSEM.

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Evidence on the Dark Side of Internal Capital Markets

Oguzhan Ozbas
University of Southern California

David S. Scharfstein
Harvard Business School and NBER

This article documents differences between the Q-sensitivity of investment of stand-alone firms and unrelated segments of conglomerate firms. Unrelated segments exhibit lower Q-sensitivity of investment than stand-alone firms. This fact is driven by unrelated segments of conglomerate firms that tend to invest less than stand-alone firms in high-Q industries. This finding is robust to matching on industry, year, size, age, and profitability. The differences are more pronounced in conglomerates in which top management has small ownership stakes, suggesting that agency problems explain the investment behavior of conglomerates. (*JEL* D21, D23, G31)

There is wide variation in the way firms are organized. For example, in 2005, Anadarko, Murphy Oil, and Kerr-McGee were all engaged in oil and gas exploration and production (E&P). However, while E&P was Anadarko's only line of business, Murphy Oil was integrated downstream into oil refining and marketing, and Kerr-McGee had unrelated operations in titanium dioxide. This variation in organizational form suggests some important questions: Did Anadarko, Murphy Oil, and Kerr-McGee manage their E&P businesses differently because they were parts of different types of organizations? Did their performances differ as a result?

Answering these types of questions is a central goal of organizational economics. It is also central to corporate finance: mergers and acquisitions, divestitures, spin-offs, and management buyouts all change organizational structure in ways that are designed in part to affect firm behavior and performance. Indeed,

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in 2006 Kerr-McGee spun off its titanium dioxide business to become focused on E&P and was then sold to Anadarko. Was this because Kerr-McGee's diversified structure was inefficient?

This article analyzes the relationship between organizational form and efficiency by comparing the investment behavior of stand-alone businesses to the investment behavior of businesses that function as part of a diversified conglomerate. Williamson (1975) suggests that the internal capital market of diversified firms might allocate capital more efficiently than the external capital market because top management of a diversified firm is better informed about investment opportunities than external investors. Along these lines, Gertner, Scharfstein, and Stein (1994) and Stein (1997) present models that identify circumstances under which internal capital markets lead to more efficient investment decisions. In particular, Stein (1997) argues that managers of stand-alone firms will be reluctant to cut investment when they have no good investment opportunities. An internal capital market comprised of multiple business lines allows managers to redeploy capital from divisions with poor investment opportunities to those with good investment opportunities without compromising the overall capital budget.

There is also a theoretical literature that suggests just the opposite—that internal capital markets function less efficiently than the external capital market. Scharfstein and Stein (2000) argue that when firms are composed of divisions with good and bad investment opportunities, rent-seeking behavior on the part of divisional managers will lead top management to overinvest in the weak division and underinvest in the strong division. Meyer, Milgrom, and Roberts (1992) and Rajan, Servaes, and Zingales (2000) make similar predictions.

Given the competing theories, the answer is ultimately an empirical one. Thus, we compare the investment behavior of stand-alone businesses (such as Anadarko) with comparable business segments of diversified companies (such as Kerr-McGee's E&P business). We start by estimating the responsiveness of capital expenditures to industry investment opportunities, as measured by industry Q. Our basic finding is that the investment of stand-alone businesses is more responsive to industry Q than is the investment of "unrelated" segments of conglomerate firms. This finding is driven mainly by the fact that unrelated segments of conglomerate firms tend to invest less than stand-alone firms in high-Q industries. This fact is robust to careful matching of unrelated segments to stand-alone firms based on size, profitability, and age.

The lower investment of unrelated segments relative to stand-alone firms in high-Q industries could be a symptom of underinvestment by unrelated segments or overinvestment by stand-alone firms. To distinguish between these two interpretations, we examine whether this finding is more pronounced in diversified firms with low management ownership. If it is the unrelated segments that are investing inefficiently, and not the stand-alone firms, we should find more pronounced differences in diversified firms with low management ownership. This is indeed what we find. The finding is in line with the prediction of

Scharfstein and Stein (2000), who argue that one must have agency problems both at headquarters and at divisions to give rise to the inefficient allocation of capital.

A number of other papers have presented evidence of inefficient internal capital markets. Lamont (1997) shows that when oil prices are high, the non-oil divisions of diversified oil producers seem to invest more than their industry peers. Shin and Stulz (1998) find similar evidence in a broader sample: small divisions of conglomerates invest more when other divisions have high cash flows, but the extent of their investment does not depend on Q. Rajan, Servaes, and Zingales (2000) find that when divisions are in low-Q industries relative to other divisions in a firm, they tend to invest more than their stand-alone counterparts, and they tend to invest less when they are in high-Q industries relative to others in the firm. Billett and Mauer (2003) find that firms that they deem to have more efficient internal capital markets are more highly valued. The results are also related to those of Gertner, Powers, and Scharfstein (2002), who show that when divisions of diversified conglomerates are spun off, their investment becomes more sensitive to industry Q.

We see three main contributions of our article relative to the existing literature: the measurement of relatedness, our matching procedure, and the identification of the role of management incentives. With respect to relatedness, we are careful to identify segments of diversified firms that are truly unrelated to other segments by using information in the Input-Output Benchmark Surveys of the Bureau of Economic Analysis. The surveys provide data on the flow of goods and services among industries and allow us to identify significant vertical and horizontal industry relationships (Matsusaka 1993; Fan and Lang 2000).[1] As we argue, it is important to identify segments that are unrelated to others to ensure that there are no transfer pricing and co-investment decisions that introduce more measurement error into the accounting data of diversified segments than those of stand-alone firms.

Our matching procedure is also an improvement over the existing literature, which typically just adds linear industry and profitability controls. Instead, we use matching estimators (as described by Abadie and Imbens 2007) to compare the investment behavior of diversified segments and stand-alone firms that are similar on the basis of size, age, and profitability. The advantage of this nonparametric approach is that unlike parametric approaches, it does not rely heavily on extrapolation—which is problematic when there is imperfect overlap in the covariate distributions of comparison groups, as there is with unrelated segments and stand-alone firms.

Finally, our article appears to be the first to show that there are differences in the functioning of internal capital markets based on management incentives. This finding provides support for the view that the results are not driven by

[1] We use six different surveys in total (1977, 1982, 1987, 1992, 1997, and 2002), each covering panel years starting the year of the survey and ending the year before the next survey. For panel years 1979–1981, we use the 1977 survey. For panel years 1982–1986, we use the 1982 survey, and so on.

spurious measurement issues but rather are tied to the workings of internal capital markets.

The rest of the article is organized as follows. In the next section, we describe our data sources and relatedness measure. In Section 2, we document the basic finding that stand-alone firms are more responsive to industry Q than are the unrelated segments of conglomerate firms. In Section 3, we show that this basic result is robust to industry, size, and age matching. In Section 4, we show that our findings are more pronounced for conglomerate firms in which management has only a small stake. Section 5 concludes the article.

1. Data

Our segment-level data come from Compustat segment files covering the period 1979–2006. For each segment, these files provide basic accounting information such as sales, assets, capital expenditures, operating profits, and depreciation along with a pair of Standard Industrial Classification (SIC) codes for the entire panel and a pair of North America Industry Classification System (NAICS) codes starting in 1990 and onward. As is standard practice, we cross-validate observations in the segment files with observations in the annual files and drop observations for which the sum of reported segment sales do not fall within 25% of total firm sales in the annual files. We further drop segments with (i) name "other," (ii) primary SIC code equal to zero, (iii) incomplete accounting data (sales, assets, capital expenditure, depreciation, operating profits), (iv) anomalous accounting data (zero depreciation, capital spending greater than sales or assets, capital spending less than zero), (v) sales less than \$20 million in 1982 dollars using the Bureau of Labor Statistics producer price index for finished goods (WPUSOP3000). We also exclude from the analysis segments that operate in regulated industries, specifically Transportation (SIC codes 4000-4799), Telecommunication Service (4800-4899), Utilities (4900-4999), Banking (6000-6199), and Insurance (6300-6499).

To assess the functioning of internal capital markets, we compare unrelated segments of conglomerate firms with stand-alone (single segment) firms. We focus on the unrelated segments of conglomerate firms instead of their related segments for two reasons. First, the theories discussed in the introduction suggest that resource allocation inefficiencies will be greater in diversified firms. Second, from a practical empirical measurement perspective, transfer pricing and asset allocation make it difficult to accurately assign profits and capital to a particular segment. For example, a vertically integrated chemical manufacturer might source inputs for its downstream unit from its upstream unit at below market transfer prices (Eccles 1985), thus inflating downstream profits and deflating upstream profits relative to stand-alone chemical firms. Or, the upstream unit might add production capacity to meet the specific input needs of the downstream unit, as shown by Mullainathan and Scharfstein (2001) in their study of the chemical industry.

For the empirical validity of our approach, we need a reliable indicator of whether segments are related. The standard methodology classifies segments as unrelated if they are in different two-digit industries. However, there are many two-digit industries that are clearly related, and there are some three- and four-digit industries within two-digit industries that are not related. For example, SIC 13, Oil and Gas Extraction, is certainly related to SIC 29, Petroleum Refining and Related Industries. And, although they are both in SIC 28, SIC 281, Industrial Inorganic Chemicals (such as chlorine), is arguably not related to SIC 283, Drugs.

We use an alternative method, which builds on the relatedness measure of Matsusaka (1993) and Fan and Lang (2000). We first identify vertically related industries using data from the Input-Output Benchmark Surveys of the Bureau of Economic Analysis. Specifically, we assume that two input–output (I-O) industries are vertically related if one of the industries buys more than 10% of its inputs from the other industry or sells more than 10% of its outputs to the other industry (the Appendix provides further details). We then consider each segment within a firm and determine whether it is related to another segment within the firm by way of operating either in vertically related I-O industries or, alternatively, in the same I-O industry. Our unrelated sample consists of segments that we cannot relate to any other segment within the firm after systematically enumerating every possible within-firm pairwise connection.

Table 1 provides descriptive statistics on sales, assets, cash flow, capital expenditures, capital expenditures divided by sales, cash flow divided by sales, and lagged industry Q (as a result, our sample effectively starts in 1980). We measure cash flow as operating profits plus depreciation. This measure of cash flow is standard in the literature and does not adjust cash flow for taxes, working capital investments, and other factors because those data are not available. We winsorize the ratio of cash flow to sales at the 1% level in both tails to deal with extreme values. We define industry Q as the median bounded Q of stand-alone firms within the same I-O industry. In calculating stand-alone Q's, we follow the data definition of Kaplan and Zingales (1997), but bound it above at 10 to reduce the effect of potential measurement error in the book value of assets. Specifically, we compute bounded stand-alone Q as $MVA/(0.9BVA + 0.1MVA)$, where the book value of assets equals Compustat item 6 and the market value of assets equals the book value of assets plus the market value of common equity (item 25 times item 199) less the book value of common equity (item 60) and balance sheet deferred taxes (item 74).[2] Note that this simple market-to-book ratio definition of Q differs from the standard measure of Q in that we do not estimate the replacement cost of fixed assets nor adjust for taxes. Previous studies have shown that these adjustments are not essential (see Perfect and Wiles 1994).

[2] Bounding Q in this way has the same basic effect as winsorising Q at the extremes as described in Baker, Stein, and Wurgler (2003). None of the results change if we winsorize at the 99th and 1st percentiles of Q.

Table 1
Descriptive statistics

Sample: All industries	Stand-alone		Unrelated	
Segment level	Mean	SD	Mean	SD
Segment sales	779	3,778	1,150***	6,117
Segment assets	773	4,530	932***	4,483
Segment capital expenditure	44	223	68***	413
Segment cash flow	99	486	154***	740
Segment capital expenditure/sales	0.072	0.116	0.061***	0.098
Segment cash flow/sales	0.121	0.158	0.139***	0.135
Lagged industry Q	1.42	0.40	1.31***	0.37
Obs	61,081		13,186	
Sample: Manufacturing industries	Stand-alone		Unrelated	
Segment level	Mean	SD	Mean	SD
Segment sales	720	3,299	1,271***	6,909
Segment assets	700	3,301	990***	4,989
Segment capital expenditure	46	263	72***	461
Segment cash flow	103	515	166***	815
Segment capital expenditure/sales	0.059	0.072	0.046***	0.048
Segment cash flow/sales	0.108	0.124	0.126***	0.097
Lagged industry Q	1.43	0.41	1.29***	0.35
Obs	30,645		9,978	

Observations are by segment and year (Compustat segment files, 1980–2006). Segment cash flow is defined as segment operating profits plus segment depreciation. Segment sales, assets, capital expenditure, and cash flow are in millions of dollars. Industry definitions follow the Input-Output Benchmark Surveys of the Bureau of Economic Analysis. Industry Q in a given year is the median bounded Q of stand-alone firms in the industry. A segment is defined to be unrelated if it is not related to any other segment of the firm. Two segments are related if they operate in vertically related industries or the same industry. Mean comparison tests between stand-alone firms and unrelated segments are performed without the assumption of equal variance. Asterisks indicate statistical difference at the 10% (*), 5% (**), and 1% (***) levels using a two-tailed test.

As shown in Table 1, stand-alone firms are smaller than unrelated conglomerate segments on the basis of both sales ($779 million vs. $1150 million) and assets ($773 million vs. $932 million). These differences are statistically significant at the 1% level. Stand-alone firms appear to be less profitable than unrelated segments as measured by the cash flow to sales ratio (12.1% vs. 13.9%). In addition, stand-alone firms appear to operate in industries with better investment opportunities than those of unrelated segments; the median industry Q of stand-alone firms is 1.42 as compared with 1.31 for unrelated segments. The difference is statistically significant at the 1% level. All of these differences exist within the subsample of segments in manufacturing industries (I-O industries 13–64 covering SIC codes 2000–3999).

2. Panel Analysis

Our main objective in this section is to determine whether there are systematic differences in the investment behavior of stand-alone firms and the unrelated segments of conglomerate firms. For this purpose, we use standard investment regressions and focus on the Q-sensitivity of investment. We estimate variants of the following panel regression:

$$cxs_{i(j)t} = a_j + b_t + c_0 * U_{it} + c_1 * Q_{j,t-1} + c_2 * Q_{j,t-1} * U_{it} + d_1 * cfs_{it} + d_2 * cfs_{it} * U_{it}. \tag{1}$$

The dependent variable $cxs_{i(j)t}$ is the sales-normalized capital spending of segment i (operating in industry j) in year t. a_j and b_t are industry and year fixed effects, respectively. We follow the industry definitions of the Input-Output Benchmark Surveys. In some specifications, we include segment fixed effects instead of industry fixed effects. The purpose of including industry or segment fixed effects is to address the possibility that time-invariant (perhaps technology-driven) differences in investment levels among industries or segments may explain our results. We include year fixed effects to deal with changing tax regimes and changing state of the business cycle during our sample period.

In addition, U_{it} is an indicator variable equal to one for unrelated segments. We include both the direct and interaction terms of U_{it}. Our key explanatory variable $Q_{j,t-1}$, the median bounded Tobin's Q of stand-alone firms in industry j in year $t-1$, proxies for investment opportunities. Because our sample provides us with a cross-section of segments facing similar investment opportunities in a given industry j and year t, we compute robust standard errors that allow for correlated error terms at the industry-year level. We also include cfs_{it}, sales-normalized cash flow of segment i in year t. We normalize by segment sales instead of segment assets because firms may have more discretion in allocating assets across their segments than they have in allocating sales. Nevertheless, we obtain qualitatively similar results when we normalize our variables using segment assets instead.

Table 2 presents the results of our panel analysis for the full sample (columns 1 and 3) and the restricted sample of manufacturing industries (columns 2 and 4). In column 1, unrelated segments exhibit lower Q-sensitivity of investment than stand-alone firms, as evidenced by a statistically significant negative value of c_2 (-0.017), the coefficient on $Q_{j,t-1} * U_{it}$. This result continues to hold (-0.016) for the manufacturing subset in column 2. Moreover, c_0 is positive and statistically significant (0.017 and 0.010 in columns 1 and 2, respectively), indicating that unrelated segments invest more (less) than their stand-alone counterparts in sufficiently low-Q (high-Q) industries.[3] All of these results are robust to the inclusion of segment fixed effects, which we report in columns 3 and 4.

[3] Our sample includes segment observations with $Q_{j,t-1}$ as low as 0.47 and as high as 4.66. At both extremes, the difference in investment levels between unrelated segments and their stand-alone counterparts (as implied by $c_0 * U_{it} + c_1 * Q_{j,t-1} + c_2 * Q_{j,t-1} * U_{it}$) is statistically different from zero at the 1% level. Moreover, the breakeven $Q_{j,t-1}$ (at which investment by unrelated segments and stand-alone firms equals each other; about 1.00 in column 1 and 0.63 in column 2) is generally lower than the median $Q_{j,t-1}$ (1.40). Thus, the coefficient estimates imply that for our sample of unrelated segments, the underinvestment effect in high-Q industries is more prevalent than the overinvestment effect in low-Q industries.

Table 2
***Q*-sensitivity of investment: Unrelated segments and stand-alone firms**

Sample	All (1)	Manufacturing (2)	All (3)	Manufacturing (4)
Lagged industry Q	0.025***	0.025***	0.026***	0.023***
	[0.003]	[0.002]	[0.003]	[0.003]
Lagged industry Q × Unrelated	−0.017***	−0.016***	−0.013***	−0.010***
	[0.003]	[0.003]	[0.003]	[0.003]
Cash flow/sales	0.115***	0.066***	0.007	−0.009
	[0.014]	[0.013]	[0.010]	[0.009]
Cash flow/sales × Unrelated	−0.028*	0.017	−0.037	−0.004
	[0.016]	[0.014]	[0.024]	[0.016]
Unrelated	0.017***	0.010***	0.017***	0.012**
	[0.005]	[0.003]	[0.005]	[0.005]
Industry F.E.	Yes	Yes	No	No
Segment F.E.	No	No	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
R^2	0.385	0.101	0.749	0.611
Obs	74,267	40,623	74,267	40,623

Unrelated segments and stand-alone firms are compared (Compustat segment files, 1980–2006). Dependent variable is capital spending over sales. Industry definitions follow the Input-Output Benchmark Surveys of the Bureau of Economic Analysis. Industry Q in a given year is the median bounded Q of stand-alone firms in the industry. Columns 2 and 4 restrict the sample to manufacturing industries. Heteroskedasticity-robust standard errors are in brackets. Standard errors are corrected for clustering at the industry-year level. Asterisks indicate significance at the 10% (*), 5% (**), and 1% (***) levels.

These effects are also economically significant. Based on the estimates in column 1, at the means of all of the explanatory variables including $Q_{j,t-1}$ at 1.40, unrelated segments are predicted to invest at a lower rate than stand-alone firms (0.062 vs. 0.072). More interestingly, this difference increases with $Q_{j,t-1}$. A one-standard-deviation (0.40) increase in $Q_{j,t-1}$ to 1.80 increases the investment rate of unrelated segments by 0.003 to 0.065, while it increases the investment of stand-alone firms by 0.010 to 0.082. At this higher level of $Q_{j,t-1}$ the difference in investment rates is 0.015, while the difference is 0.010 at the mean.

In column 2, which restricts the sample to manufacturing segments, the difference between stand-alone firms and unrelated segments in their Q-sensitivity is much larger in percentage terms. In particular, at the means of all the variables including $Q_{j,t-1}$ at 1.40, unrelated segments invest at the rate of 0.047, while stand-alone firms invest at the rate of 0.058. At higher levels of $Q_{j,t-1}$ the difference is even larger—a one-standard-deviation (0.40) increase in $Q_{j,t-1}$ to 1.80 increases an unrelated segment's investment to 0.050, a modest increase of 0.003, while a stand-alone firm's investment increases by 0.010 to 0.068. At this increased level of $Q_{j,t-1}$, the difference of 0.018 is 26% of stand-alone investment.

In the rest of the article, we build on these results to address two further issues. First, we investigate whether the results are robust to matching on observable characteristics such as industry, size, and age. Second, we test whether agency-based theories such as that of Scharfstein and Stein (2000) can explain the observed low Q-sensitivity of investment of conglomerate firms.

3. Matching Analysis

We know from Table 1 that the unrelated segments of conglomerate firms are on average larger than stand-alone firms. It is possible that larger segments exhibit lower Q-sensitivity of investment because they face larger technological adjustment costs for some reason. If this is the case, it would be a mistake to attribute differences in the Q-sensitivity of investment to a shortcoming of internal capital markets. Moreover, there may be differences in Q-sensitivities across industries (perhaps because of differences in adjustment costs or in the importance of physical capital). If unrelated segments are more prone to operate in industries with low Q-sensitivity of investment, it would be wrong to attribute our findings to the effects of internal capital markets. Similarly, there may be differences between young and old firms.

To address these problems, we form matched samples of unrelated segments and stand-alone firms based on observable characteristics such as industry, year, age, and size that are *a priori* important determinants of investment. These matched samples allow us to difference out a broad class of level and slope effects that might be driving our results.

To see the general form of confounding effects that our matching approach allows us to control, suppose that investments by unrelated segments and stand-alone firms are driven by the following two equations:

$$\begin{aligned} cxs_{U(j)t} &= a_U + b_{jt}(observable) \\ &\quad + [c_U + c_{jt}(observable)] * Q_{j,t-1} + d * cfs_{Ut}, \end{aligned} \tag{2}$$

$$\begin{aligned} cxs_{S(j)t} &= a_S + b_{jt}(observable) \\ &\quad + [c_S + c_{jt}(observable)] * Q_{j,t-1} + d * cfs_{St}. \end{aligned} \tag{3}$$

Taking the difference of matched pairs removes the potentially confounding effects of $b_{jt}(observable)$ and $c_{jt}(observable)$, whose functional forms are generally unknown and therefore difficult if not impossible to control directly. For example, if age and industry are the observable variables, the matching procedure will eliminate their effect on the intercept and slope terms, b_{jt} and c_{jt}:

$$\Delta cxs_{US(j)t} = \underbrace{[a_U - a_S]}_{a} + \underbrace{[c_U - c_S]}_{c} * Q_{j,t-1} + d * \Delta cfs_{US(j)t}. \tag{4}$$

In Table 3, we run this differenced specification for matched samples of unrelated segments and stand-alone firms formed on the basis of industry, year, size, and age. Matching is always exact for industry and year, and without replacement. When matching on the basis of size, we require that matched segments have sales within 10% of each other. When matching on the basis of age, we require that matched segments be in the same age category where the three broad age categories are 1–5 years, 6–10 years, and 10+ years. We

Table 3
Difference between pairs of unrelated segments and stand-alone firms: Industry, size, and age matched

	(1)	(2)	(3)
	Panel A: All industries		
Constant	0.021***	0.021***	0.014**
	[0.005]	[0.006]	[0.006]
Lagged industry Q	−0.022***	−0.019***	−0.012***
	[0.004]	[0.004]	[0.004]
Difference in cash flow/sales	0.117***	0.109***	0.138***
	[0.017]	[0.019]	[0.021]
R^2	0.029	0.024	0.036
Obs	9,176	6,001	4,282
	Panel B: Manufacturing industries		
Constant	0.013**	0.012***	0.017***
	[0.005]	[0.004]	[0.006]
Lagged industry Q	−0.017***	−0.015***	−0.018***
	[0.004]	[0.003]	[0.004]
Difference in cash flow/sales	0.091***	0.089***	0.075***
	[0.014]	[0.014]	[0.016]
R^2	0.029	0.031	0.030
Obs	6,904	4,130	2,789
	Panel C: All industries, alternative relatedness threshold (5%)		
Constant	0.035***	0.033***	0.031***
	[0.006]	[0.008]	[0.009]
Lagged industry Q	−0.030***	−0.027***	−0.026***
	[0.004]	[0.005]	[0.006]
Difference in cash flow/sales	0.060***	0.056**	0.087***
	[0.019]	[0.028]	[0.029]
R^2	0.016	0.013	0.023
Obs	4,995	3,046	2,098
	Panel D: Manufacturing industries, alternative relatedness threshold (5%)		
Constant	0.022***	0.021***	0.027***
	[0.007]	[0.005]	[0.007]
Lagged industry Q	−0.023***	−0.021***	−0.024***
	[0.005]	[0.004]	[0.006]
Difference in cash flow/sales	0.053***	0.071***	0.065***
	[0.014]	[0.016]	[0.021]
R^2	0.020	0.033	0.036
Obs	3,972	2,256	1,499

Unrelated segments are matched with stand-alone firms (Compustat segment files, 1980–2006). In column 1, unrelated segments are matched with stand-alone firms based on industry and year. In column 2, unrelated segments are matched with stand-alone firms based on industry, year, and sales. In column 3, unrelated segments are matched with stand-alone firms based on industry, year, age, and sales. Age categories are 1–5, 6–10, and 10+ years. Size matching threshold is ±10% of sales. Repeat matches are not allowed. Dependent variable is the difference in the capital spending over sales ratio of the matched pair, unrelated segment minus stand-alone firm. Industry Q in a given year is the median bounded Q of stand-alone firms in the industry. Panel B restricts the sample to manufacturing industries. Panels C and D repeat the analysis in Panels A and B, respectively, with a relatedness threshold of 5% instead of 10%. Heteroskedasticity-robust standard errors are in brackets. Standard errors are corrected for clustering at the industry-year level. Asterisks indicate significance at the 10% (*), 5% (**), and 1% (***) levels.

use three age categories due to sample size considerations. Using different size criteria to match segments (for example, assets rather than sales, matching threshold as small as 5% or as large as 20%) results in qualitatively similar results.

In column 1 of Panel A, where matching is performed on the basis of industry and year, we find a coefficient on $Q_{j,t-1}$ of −0.022, indicating that unrelated segments exhibit lower Q-sensitivity of investment than stand-alone firms. Also, the intercept is positive (0.021) and statistically significant, indicating as before that unrelated segments invest more (less) than their matched stand-alone counterparts in sufficiently low-Q (high-Q) industries. Column 2 reports results where we further match on the basis of size.[4] Both the coefficient on $Q_{j,t-1}$ (-0.019) and the intercept (0.021) are statistically significant. Finally, in column 3, we match on the basis of industry, year, age, and size. Both the coefficient on $Q_{j,t-1}$ (-0.012) and the intercept (0.014) are statistically significant. Restricting the sample to manufacturing industries in Panel B also yields similar results. Overall, the matching analysis confirms that our basic results are robust to heterogeneity in observable characteristics such as industry, size, or age.[5] In addition, we investigate the robustness of our relatedness methodology by lowering the 10% cutoff used to determine relatedness to 5%. This reduces the sample of unrelated segments by about three-fourths but yields similar results, which are reported in Panels C and D.

Recent work by Abadie and Imbens (2006), however, shows that commonly used matching procedures like ours may entail a bias term that converges at a rate slower than $N^{1/2}$. Abadie and Imbens (2007) propose a matching estimator to correct this bias, while taking account of inexact matching. We use this estimator to investigate the robustness of our results. In particular, we estimate average treatment effects, which in our context measure differences in capital spending between unrelated segments and observationally similar stand-alone firms.

Based on our prior results, we expect the average treatment effect to be positive in low-Q industries (where unrelated segments invest more than their stand-alone counterparts) and negative in high-Q industries (where unrelated segments invest less than their stand-alone counterparts). To accommodate this relation, we form two subsamples of segments with industry Q below and above the sample median industry Q in each year and estimate an average treatment effect for each subsample. We require matches to four other stand-alone firms in the sample because Abadie and Imbens (2007) find four matches to perform well in terms of mean-squared error in their simulations. We require an exact match on industry and year but allow for inexact matches on other attributes—namely, sales, age, and profitability (cash flow over sales ratio).[6]

[4] In the size-matched sample of column 2, unrelated segments have average sales of \$557.6 million (with a standard deviation of \$2401.3), compared with \$555.6 for stand-alone firms (with a standard deviation of \$2410.7). The difference in means is not statistically significant. We check and confirm that the matching procedure ensures that all of our matched samples have differences in means that are statistically indistinguishable from zero along the matched dimensions.

[5] Instead of taking the difference of matched pairs of unrelated segments and stand-alone firms, one could estimate pooled specifications similar to Equation (1) with matched pair fixed effects. Indeed, this alternative pooled approach is numerically equivalent to the differenced approach we report here.

[6] It is also possible, at least in principle, to match on lagged investment. The reason we do not match on lagged investment is that in our sample it is not common for segments to change their status from related to unrelated.

Table 4
Bias-corrected matching estimates

Match variables	Lagged industry Q Low	Lagged industry Q High	Difference H–L
	Panel A: All industries		
Sales, profitability	−0.0025*	−0.0086***	−0.0060***
	[0.0015]	[0.0016]	[0.0022]
Age, profitability	0.0024	−0.0034**	−0.0058***
	[0.0016]	[0.0016]	[0.0022]
Sales, age, profitability	0.0030*	−0.0031**	−0.0061***
	[0.0016]	[0.0016]	[0.0022]
	Panel B: Manufacturing industries		
Sales, profitability	−0.0034***	−0.0097***	−0.0063***
	[0.0012]	[0.0012]	[0.0017]
Age, profitability	−0.0007	−0.0058***	−0.0051***
	[0.0011]	[0.0012]	[0.0016]
Sales, age, profitability	−0.0004	−0.0054***	−0.0050***
	[0.0011]	[0.0012]	[0.0016]

Abadie and Imbens (2007) bias-corrected estimates for the average treatment effect for treated unrelated segments relative to control stand-alone firms (Compustat segment files, 1980–2006). Treatment outcome is capital spending over sales ratio. Matching is continuous with respect to sales, age, and profitability (cash flow over sales ratio) and exact with respect to industry and year. Number of matches is four. Low- and high-Q bins are based on the annual sample median of lagged industry Q. Panel B restricts the sample to manufacturing industries. Standard errors are in brackets. Comparisons between low- and high-Q bins assume independence of estimated average treatment effects. Asterisks indicate significance at the 10% (*), 5% (**), and 1% (***) levels.

The results in this analysis are reported in two panels of Table 4. Panel A reports results based on the whole sample, whereas Panel B restricts the sample to manufacturing industries. In both panels, as predicted, we consistently find that unrelated segments in high-Q industries invest less than matched stand-alone firms—the estimates range from −0.0097 to −0.0031 depending on which set of matching variables is used and are always significant at conventional levels. In low-Q industries, we find somewhat mixed and usually insignificant treatment effects. This is not surprising in light of the fact that unrelated segments invest more than stand-alone firms only in very low-Q industries, well below the median of roughly 1.40. Indeed, when we define low-Q industries as those in the bottom quartile, we find consistently positive treatment effects (results not in table). Regardless, the difference in average treatment effects between high-Q and low-Q industries is always negative (ranging from −0.0063 to −0.0050) and statistically significant, as shown in the third column of Table 4. This is consistent with our core finding that unrelated segments are more prone to invest less than stand-alone firms in high-Q than in low-Q industries.

4. Evidence of Agency

In this section, we explore whether agency problems could explain the differences in the investment behavior of conglomerates and stand-alone firms. Our tests are motivated by the multi-tier agency model of Scharfstein and Stein (2000), which predicts that conglomerate firms will invest less than stand-alone firms in high-Q industries and more than stand-alone firms in low-Q industries. In particular, we posit that when top management of conglomerates have large ownership stakes, their firms will exhibit a greater Q-sensitivity of investment.[7] We obtain management ownership data from the ExecuComp database.

Using our previously matched samples of unrelated segments and stand-alone firms, we estimate variants of the following specification:

$$\Delta cxs_{i(j)t} = a + b * Q_{j,t-1} + c * MO_{it} + d * Q_{j,t-1} * MO_{it} + e * \Delta cfs_{it}, \quad (5)$$

where $\Delta cxs_{i(j)t}$ is the difference between the sales-normalized capital spending of unrelated segment i (operating in industry j) in year t and that of its matched stand-alone counterpart, $Q_{j,t-1}$ is the median bounded Tobin's Q of stand-alone firms in industry j in year $t-1$, MO_{it} is management ownership by top officers of the conglomerate firm that owns unrelated segment i, and $\Delta cfs_{i(j)t}$ is the difference between the sales-normalized cash flow of unrelated segment i in year t and that of its matched stand-alone counterpart. As before, our differencing approach removes potentially confounding level and slope effects.

Columns 1–3 of Table 5 report results for the industry–year-, industry–year–size-, and industry–year–age–size-matched samples, respectively. Panel A uses the whole sample, whereas Panel B restricts the analysis to manufacturing industries. Overall, the results lend strong support to agency-based explanations for the observed investment behavior of conglomerate firms in their unrelated segments. Consistent with our earlier findings, the unrelated segments of conglomerate firms exhibit lower Q-sensitivity of investment than stand-alone firms, as evidenced by statistically significant negative coefficients on $Q_{j,t-1}$. The statistically significant positive intercept terms indicate that unrelated segments in sufficiently low-Q (high-Q) industries invest more (less) than stand-alone firms. More important, Table 5 demonstrates that, consistent with the agency view, unrelated segments of conglomerate firms with high management ownership appear to suffer less from this allocative inefficiency, as evidenced by statistically significant positive coefficients on the interaction term $Q_{j,t-1} * MO_{it}$ and negative coefficients on MO_{it}. The only exception is column 2 in Panel B, where the coefficients of interest have the predicted signs but lack statistical significance.

The coefficient estimates in Panel A, however, imply unrealistically high levels of management ownership at which a conglomerate firm would have the same Q-sensitivity of investment and roughly the same level of investment as a stand-alone firm. For example, in Panel A, column 3, management ownership as high as 16.5% (about the 85th percentile in the distribution of management ownership) would erase the negative coefficient on $Q_{j,t-1}$ (−0.040) given

[7] Note that several other theoretical models also predict inefficient allocation of capital in internal capital markets, but they build on agency problems lower down in the organization for which we have no data. For models that involve strategic interaction among multiple managers, see Rajan, Servaes, and Zingales (2000) and Ozbas (2005). For models that analyze a single manager in isolation, see Harris and Raviv (1996); Bernardo, Cai, and Luo (2001); and Marino and Matsusaka (2005).

Table 5
Evidence on agency: Difference between matched pairs of unrelated segments and stand-alone firms

	(1)	(2)	(3)
Panel A: All industries			
Constant	0.045***	0.070***	0.059***
	[0.010]	[0.018]	[0.020]
Lagged industry Q	−0.035***	−0.050***	−0.040***
	[0.006]	[0.011]	[0.011]
Management ownership	−0.220**	−0.296**	−0.349**
	[0.096]	[0.141]	[0.170]
Lagged industry Q × Management ownership	0.142**	0.197**	0.243**
	[0.059]	[0.091]	[0.108]
Difference in cash flow/sales	0.094***	0.128***	0.124**
	[0.031]	[0.044]	[0.054]
R^2	0.031	0.049	0.040
Obs	2,349	1,495	1,211
Panel B: Manufacturing industries			
Constant	0.020**	0.015	0.025**
	[0.008]	[0.010]	[0.012]
Lagged industry Q	−0.022***	−0.017**	−0.022***
	[0.005]	[0.007]	[0.008]
Management ownership	−0.163**	−0.163	−0.429*
	[0.079]	[0.165]	[0.237]
Lagged industry Q × Management ownership	0.109**	0.110	0.278*
	[0.051]	[0.109]	[0.160]
Difference in cash flow/sales	0.070***	0.149***	0.112***
	[0.027]	[0.027]	[0.033]
R^2	0.023	0.092	0.076
Obs	1,681	1,012	764

Unrelated segments are matched with stand-alone firms (Compustat segment files, 1980–2006). The matching procedure is described in Table 3. Dependent variable is the difference in the capital spending over sales ratio of the matched pair, unrelated segment minus stand-alone firm. (Using Standard & Poor's ExecuComp database) Management Ownership is defined as the sum of stocks and options held by top officers as a fraction of outstanding shares. Panel B restricts the sample to manufacturing industries. Heteroskedasticity-robust standard errors are in brackets. Standard errors are corrected for clustering at the industry-year level. Asterisks indicate significance at the 10% (*), 5% (**), and 1% (***) levels.

the positive coefficient on the interaction term $Q_{j,t-1} * MO_{it}$ (0.243) and at the same time almost offset the level effect in the intercept (0.059) given the negative coefficient on MO_{it} (−0.349). By comparison, the results in Panel B for manufacturing industries indicate that lower levels of management ownership (about 7.9% in column 3—about the 75th percentile in the distribution of management ownership) would achieve similar effects.

Finally, we check the robustness of our results about managerial ownership using the bias-corrected matching estimator of Abadie and Imbens (2007). The same rationale for estimating average treatment effects separately for low-Q and high-Q industries applies here as well. In addition, because our results suggest that the treatment effect is different depending on the level of managerial ownership, we estimate average treatment effects separately for low- and high-managerial ownership subsamples comprising observations with managerial ownership below and above the sample median in each year. As before, we require four exact matches on industry and year. In addition, we add managerial ownership to the set of continuously matched covariates—namely, sales, age,

Table 6
Evidence on agency: Bias-corrected matching estimates

Management ownership	Lagged industry Q Low	High	Difference H–L
	Panel A: All industries		
All	0.0146**	−0.0085**	−0.0231***
	[0.0061]	[0.0035]	[0.0070]
Low	0.0222***	−0.0130***	−0.0352***
	[0.0084]	[0.0038]	[0.0092]
High	0.0021	−0.0050	−0.0071
	[0.0100]	[0.0076]	[0.0126]
	Panel B: Manufacturing industries		
All	0.0050	−0.0159***	−0.0209***
	[0.0046]	[0.0057]	[0.0073]
Low	0.0090*	−0.0221***	−0.0311***
	[0.0049]	[0.0063]	[0.0079]
High	−0.0046	−0.0035	0.0011
	[0.0090]	[0.0115]	[0.0146]

Abadie and Imbens (2007) bias-corrected estimates for the average treatment effect for treated unrelated segments relative to control stand-alone firms (Compustat segment files, 1980–2006). Treatment outcome is capital spending over sales ratio. Matching is continuous with respect to sales, age, management ownership, and profitability (cash flow over sales ratio) and exact with respect to industry and year. Number of matches is four. Low- and high-Q bins are based on the annual sample median of lagged industry Q. Low- and high-management ownership bins are based on the annual sample median of management ownership. Panel B restricts the sample to manufacturing industries. Standard errors are in brackets. Comparisons between different bins assume independence of estimated average treatment effects. Asterisks indicate significance at the 10% (*), 5% (**), and 1% (***) levels.

and profitability (cash flow over sales ratio)—to address a potential concern that managerial ownership may proxy for unobserved firm characteristics that change the Q-sensitivity of investment (rather than treatment).

Table 6 presents our results in two panels. Panel A uses the whole sample, and Panel B restricts the sample to manufacturing industries. In both panels, we continue to find that unrelated segments in high-Q industries invest less (−0.0085 in Panel A and −0.0159 in Panel B) than matched stand-alone firms. This is similar to Table 4 except that managerial ownership is added to the set of continuously matched covariates. Consistent with the agency explanation, the effect appears to be strong especially when managerial ownership is low (−0.0130 in Panel A and −0.0221 in Panel B) and disappears when managerial ownership is high. We find some evidence that unrelated segments in low-Q industries invest more than matched stand-alone firms when not conditioning on managerial ownership (statistically significant in Panel A, but not in Panel B). Strikingly, the results strengthen when managerial ownership is low (0.0222 in Panel A and 0.0090 in Panel B, both significant at conventional levels) and disappear when managerial ownership is high. Also, the difference between high-Q and low-Q industries is always significantly negative when not conditioning on managerial ownership (−0.0231 in Panel A and −0.0209 in Panel B). The relation strengthens when managerial ownership is low (−0.0352 in Panel A and −0.0311 in Panel B) and disappears when managerial ownership is high, consistent with the agency explanation.

In interpreting these results, it is important to keep in mind that we do not have exogenous variation in managerial ownership. It is possible that managerial ownership proxies for another factor that affects investment. One concern is that an unrelated segment of a high-managerial ownership firm may be large relative to the overall firm. In this case, there would be less scope for cross-subsidization in an internal capital market. As a result, the investment of unrelated segments of high-managerial ownership firms would appear to be more similar to stand-alone firms. However, we find that unrelated segments of high-managerial ownership firms account for 38% of firm sales, while unrelated segments of low-managerial ownership firms account for 35% of firm sales. The difference is small and therefore unlikely to explain our findings. Of course, it is possible that managerial ownership proxies for other factors that are themselves related to the difference in the investment of unrelated segments and stand-alone firms (after matching on size, age, industry, and profitability), but it is not apparent to us what these factors might be.

5. Conclusion

This article presents evidence of inefficiencies in internal capital markets. The investment of stand-alone firms is more sensitive to industry Q than the investment of unrelated segments of conglomerate firms. In addition, the unrelated segments of conglomerate firms tend to invest less than stand-alone firms in high-Q industries, and more than stand-alone firms in low-Q industries. These findings are robust to industry, size, and age matching. In addition, these findings are more pronounced in conglomerate firms in which managers have small ownership stakes, suggesting that the inefficient investment behavior of conglomerate firms is, at least in part, due to agency problems at the top of conglomerates.

There are a number of directions in which one can take the research question of this article. First, our findings point to inefficiencies in corporate resource allocation, but they do not provide nearly the full account that one would like. For example, our findings are consistent with there being agency problems among top managers. But theoretically, this is not sufficient to generate inefficient resource allocation. A good example of this is Stein (1997). In his model, external capital markets ration resources to a CEO who is prone to overinvest. But because the CEO prefers managing a more profitable empire over a less profitable empire, resources flow from divisions with poor investment opportunities to divisions with good investment opportunities.

Stein's model is a useful benchmark in that it shows that agency problems lower down in the organization are necessary to generate inefficient resource allocation. Thus, one would like to know more about the nature of the agency problem lower down in the organization as well as the kinds of organizational processes and structure that firms use to mitigate agency problems within. Manager promotion and rotation policies across divisions may be one way to mitigate divisional incentives for overinvestment (Xuan 2006), as would more high-powered incentives for divisional managers (Palia and Ye 2003). The formal and informal rules companies use to make capital allocation decisions are also likely to have an important impact on investment behavior (Bower 1970; Ozbas 2005; Stein 2002).

Second, our focus here has been on analyzing the effect of internal capital markets on capital investment. Yet, there are many other types of investments that firms undertake, such as research and development, marketing, and certain pricing policies. Analyzing these decisions in the context of internal capital allocation is also an important avenue for future research.

Finally, papers such as Berger et al. (2005), Guedj and Scharfstein (2005), Khanna and Tice (2001), and Mullainathan and Scharfstein (2001) have shown the benefit of analyzing rich industry-specific data sets and also of having a specific industry context in which to interpret the results. More industry-focused work along these lines would be useful in identifying the costs and benefits of internal capital markets.

Appendix: Relatedness Measure

The standard two-digit SIC approach is somewhat limited when it comes to identifying vertical relationships because the SIC numbering system is organized horizontally. For example, drilling oil wells and other exploration services have the same two-digit SIC code, but the next vertical stage of petroleum refining does not. To establish vertical relationships that the two-digit SIC approach seems to miss, we use the Input-Output Benchmark Surveys conducted by the Bureau of Economic Analysis.

The Use Table of the Input-Output Benchmark Surveys is our main data source for identifying significant vertical relationships that are not captured by the two-digit SIC approach. Essentially, the Use Table is a matrix that contains the dollar value of commodity flows measured in producers' prices between what are called the Input-Output Accounts of the US economy. These I-O accounts are defined by the survey and represent industries that are significant enough to be classified as a separate account. While the number and definition of I-O accounts change from survey to survey, a table that lists I-O account numbers, titles, and associated SIC or NAICS codes is provided in each survey.

We identify significant vertical relationships first by looking at the Use Table from the perspective of a purchasing industry. We calculate use coefficients by dividing the purchases of an industry by its total purchases and keep the I-O pairs with use coefficients above 10%, which is the cutoff used by Matsusaka (1993). We then look at the Use Table from the perspective of a selling industry. Similar to use coefficients, we calculate make coefficients by dividing the sales of an industry by its total sales and keep the I-O pairs with make coefficients above 10%.

The Bureau of Economic Analysis publishes a new Input-Output Benchmark Survey roughly once every five years to coincide with the Economic Census conducted by the US Census Bureau, and we draw on six different surveys (2002, 1997, 1992, 1987, 1982, and 1977) on a rolling basis to identify vertical relationships. We adopt this approach primarily to improve measurement accuracy because each survey provides a historical snapshot and thus may be inadequate for describing the structure of the US economy for our entire sample period from 1979 to 2006. We use data from a given survey until a new snapshot is provided by the following survey. Specifically, we rely on 1977 data between 1977 and 1981, 1982 data between 1982 and 1986, and so on.

When calculating use and make coefficients, we exclude I-O accounts greater than 77 (1992, 1987, 1982, 1977) or labeled S (2002, 1997). These are mainly government accounts without an associated SIC or NAICS code. Also excluded are accounts that are related to inventory adjustments, employee compensation, and industry value-added. These accounts have nothing to do with the vertical relationships we are trying to identify. Including them would introduce an unnecessary source of measurement error.

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Key accounting value drivers that affect stock returns: evidence from Greece

Christie Florou and Constantinos Chalevas
Department of Accounting and Finance,
Athens University of Economics and Business, Athens, Greece

Abstract

Purpose – This paper seeks to investigate the accounting factors that affect the value of a firm.

Design/methodology/approach – Cross-sectional analysis is employed to investigate the association between critical accounting ratios and stock returns.

Findings – This study finds that the operating performance of a company, its growth opportunities and its capability to generate profits from its sales affect stock returns.

Practical implications – This study provides insights regarding the extent that policies concerning operating, investment and working capital management affect stock returns. The findings of this study can be helpful to managers for selecting and implementing the appropriate business policies. Besides, current shareholders and investors may find the results of this study useful in identifying the drivers of stock values.

Originality/value – The paper tests, empirically, the effect of the key value drivers on stock returns in a developing stock exchange.

Keywords Accounting, Stock returns, Capital markets, Greece

Paper type Research paper

1. Introduction

The present study investigates the factors that lead to an increase in the value of a firm and as a consequence contribute to an increase in the shareholders' wealth. In particular, this study focuses on the financial statements figures that influence firms' stock value. In addition, it is examined whether investors take into consideration accounting data when they value firms' stock. It is considered the extent to which policies relating to operating, working capital and financial management influence firms' value.

The findings of this study can be particularly helpful for managers and investors. The findings of this study could facilitate firms' managers to identify the strength and weaknesses of the firms they manage. As a result, they would be in a position to apply the policies that are appropriate for achieving the growth and profit targets they have set for the firms. On the basis of the findings of this study, shareholders would be in position to recognize the value drivers of the shares they own. They could evaluate current firm performance and estimate whether this performance will remain steady or it will change in the future as a consequence of a change in the strategy of a firm. Investors will be able to detect the factors that affect stock returns.

This study contributes to the international literature since it investigates the association between accounting disclosure and stock returns in a developing stock exchange. Furthermore, since the study covers the period 2004-2006, it provides implications about the quality of accounting data immediately after the beginning of application of International Financial Reporting Standards in the financial statements of companies of the Greek Stock Exchange.

The rest of the paper is organized as follows: section 2 reviews the main arguments that have been developed regarding the factors that influence stock returns. In addition, in section 2 are presented the hypotheses that have been tested in this study. The methodology applied in this study is presented in section 3. The findings of the empirical

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investigation are reported in section 4. The main conclusions of this study are discussed in section 5.

2. Previous research and hypotheses

The form of the capital market affects managers' ability to affect the market price of the firm's outstanding shares. In efficient capital markets, the prices of capital market securities fully reflect all the available information (Fama, 1970, 1976). The efficient market hypothesis (EMH) assumes that investors are sophisticated enough to decode published accounting figures and to be in position to discern the true cash flow implications of accounting data (Hand, 1990). According to the EMH, stock prices will react to the announcement of reported figures, only in the case that those figures include information about unanticipated changes in the probability distribution of future cash flows of the firm, and provided that this information was not previously available to the market from other non-accounting sources, with equal precision (Tinic, 1990). Despite the empirical evidence that supports EMH, there is no universal acceptance of the model (Foster, 1986; Kothari, 2001).

An alternative hypothesis is the mechanistic one, which is not consistent with EMH model. According to this hypothesis the capital market is fixated to reported profits. The market prices of the common stock of a firm are determined exclusively on the basis of the earnings reported by the firm, without paying any consideration to the accounting methods employed in order to calculate those earnings. A similar approach is adopted by the functional fixation hypothesis (FFH). According to this approach investors are unsophisticated and are not able to detect the true cash flow implications of reported figures (Watts and Zimmerman, 1986). The mechanistic hypothesis differs from that functional fixation hypothesis in that the latter allows that there are two types of investors: the sophisticated and the unsophisticated ones. Yet, it is the group of the unsophisticated investors that determines the market pricing of common stock (Hand, 1990). The implication of both hypotheses is that different accounting methods would have an impact on stock prices despite the fact that the true cash flow implications of these methods are the same (Tinic, 1990). According to Belkoui (1992):

> The functional fixation and the naïve investor hypotheses assume that a sufficient number of investors are unable to perceive the cosmetic nature of certain accounting changes or are "fixated" on the bottom figure of net income (p. 150)

Empirical evidence indicates that accounting information contains useful information about cash flows and as a consequence influences securities prices (Watts and Zimmerman, 1986). A number of empirical studies found that market can discern whether a choice of accounting method has real cash consequences. For instance, market appears to anticipate the impact of pension liabilities even before they appear on financial statements (Dhaliwal, 1986). In addition, market appears to value research and development expenditures as assets despite the fact that a firm may decide to present them as expenses in its financial statements (Dukes, 1976; Lev and Sougiannis, 1996; Aboody and Lev, 1998). The choice between the purchase and the pooling-of-interests accounting methods for mergers and acquisitions has attracted researchers' attention. If the market were functionally fixated it would react negatively to the amortization of goodwill, which appears in case a firm adopts the purchase method for mergers and acquisitions. A number of studies provided evidence, which is not consistent with the hypothesis that the market is fixated on reported earnings (Hong *et al.*, 1978; Davis, 1990; Rau and Vermaelen, 1998). On the other hand, some empirical findings are not inconsistent with FFH. Jennings *et al.* (1996) and Vincent (1997) find that the price-earnings ratios of the firms that adopted the purchase method are lower than the corresponding ratios for the firms that employed the pooling-of-interests method. Andrade (1999) found a positive and statistically significant association between the stock abnormal return and the change in firms' earnings, attributable to the choice of accounting method for mergers and acquisitions. The magnitude of the association, however, is limited. Hand (1990) proposed an extended version of FFH, under which the extent to which a market is functionally fixated is related to the sophistication of investors. When the unsophisticated investors set the stock prices the market is likely to be fixated. The probability that the unsophisticated investors will set the stock prices is conditioned upon the proportion of firm's share capital controlled by unsophisticated investors. Hand (1990) tested the extended functional fixation with the data on stock returns on the reannouncement date of quarterly earnings, in the quarters in which a sample of firms adopted a policy of swapping equity-for-debt. Hand (1990) argues that results of the statistical test are consistent with the extended FFH. Harris and Ohlson (1987) provided evidence that the stock returns for a sample of firms in the oil and gas industry are significantly associated with book values. Furthermore, in the same study they showed that the market could rationally distinguish between the successful effort and the full cost methods of accounting used by oil and gas companies. In a later study Harris and Ohlson (1990) investigated whether the observed relationship between book values and market values can be attributed to the value content of the book values or to functional fixation of investors. Harris and Ohlson (1990) argue that they did not find evidence that allows them to ascribe the observed relationship to a functional fixation of investors on book values. They conclude that investors do not appear to assign substantial importance to book values.

It has been suggested that functional fixation results from lack of experience or relevant data. As a consequence, this fixation should be eliminated as market participants acquire sufficient experience and data (Gupta and King, 1997; Waller *et al.*, 1999; Chen and Schoderbek, 2000). Yet, empirical research indicates that the behaviour of market participants, such as financial analysts, who are supposed to have opportunities to acquire sufficient experience and data, still exhibits characteristics of functional fixation when predicting securities prices on the basis of accounting information (Hopkins, 1996; Hirst and Hopkins, 1998; Hopkins *et al.*, 2000). Luft and Shields (2001) experimentally investigated whether individuals display fixation when they decide to capitalize or instead to expense intangible expenditures. The findings of the experiment indicate that the acquisition of additional data and experience does not mitigate fixation on accounting figures.

It should be pointed out, however, that is not necessary for the stock market's price formation process to exhibit functional fixation in order to establish incentives for firms to select particular accounting policies. It is sufficient for firms' managers to believe that securities prices are affected by reported figures (Beattie *et al.*, 1994). A number of studies have indicated that managers are not wholly convinced with the regard to the efficiency of capital markets (Mayer-Sommer, 1979; O'Keefe and Soloman, 1985). Kothari (2001) argues that although empirical findings have not offered a convincing indication that market is not efficient, there is a strong evidence that firms' managers behave as if market was fixated to reported earnings. For instance, the common wisdom regarding the choice between the purchase and the pooling-of-interests accounting methods for mergers and acquisitions, is that stock market will prefer the pooling-of-interest method because this method has a positive impact upon reported income and as result on the prices of the common stock (Kothari, 2001). It appears that the pricing of acquisitions is affected by the choice between the purchase and the pooling-of-interests methods.

Empirical evidence suggests acquirers pay a premium when the acquisition will be accounted according the pooling-of-interest method (Nathan, 1988; Robinson and Shane, 1990; Lys and Vincent, 1995; Ayers *et al.*, 1999).

When managers believe that the market is fixated to reported accounting figures are more likely to engage in earnings management by making the appropriate accounting policy choices (Beattie *et al.*, 1994). According to Leuz *et al.* (2003) the extent to which a firm will engage in earnings management is associated with certain characteristics of the business environment prevailing in the country in which the particular firm operates. Firms in countries with developed equity markets, dispersed ownership structures, strong investors rights and strong legal enforcement are less likely to adopt earnings-management policies. A distinct characteristic of the Greek business environment is the high level of ownership concentration. Furthermore, the equity market is not particularly developed, while the investor rights and the legal enforcement is weak (Leuz *et al.*, 2003). Within this context the Greek firms expected to exhibit high levels of earnings management. Findings of empirical research are consistent with this prediction. In the study of Leuz *et al.* (2003) Greek firms appear to achieve the highest aggregate earnings management score among firms from 31 countries. Bhattacharya *et al.* (2003) provide similar evidence, since in their study Greek firms are the most engaged in earnings management among firms from 34 countries. Koumanakos (2007) provides evidence that Greek firms engage not only in earnings management but they attempt to manage other accounting figures as well, e.g. sales turnover. According to the Greek financial and political press, accounting figures have a dominant influence on the firm's stock value. Furthermore, it has been asserted that it is not uncommon for listed companies to get involved in income management through the selective application of accounting policies (Zopounidis *et al.*, 2002; Konstantinidis, 2004). The effectiveness of Greek capital market is assessed by the extent to which firms' market value is in accordance with the value of a firm as this can be estimated on the basis of accounting figures included in firms' financial statements. Accounting ratios that include two or more accounting figures are less susceptible to be target of earnings management. Therefore, it could be accepted that they provide an objective measure of firm's financial position and performance.

This study aims to empirically investigate the efficiency of the Greek capital market by examining the association between policies that concern operating, investment and working capital management, with stock returns within the context of the Greek capital market.

2.1 Operating management

Operating management includes the following ratios:

- *Return on sales (ROS)*: This ratio shows the association between profitability of a firm and its operating activity. In particular, it provides an indication of the capability of a firm to generate profits from each euro of sales.
- *Asset turnover*: This ratio shows how effectively a firm employs its assets in order to increase its sales. In particular this ratio indicates whether a firm has made excessive investments in relation to the level of its sales.
- *Return on assets (ROA)*: This ratio indicates how much profit a company is able to generate for each euro of assets invested. This ratio can be decomposed as a product of the following two factors: ROS* asset turnover.
- *Financial leverage*: This ratio indicates how many euros of assets a firm generates for very euro invested by its shareholders.

- *Return on equity (ROE)*: This ratio indicates how profitably a firm uses the funds invested by the firm's shareholders its assets. This ratio can be decomposed as a product of the following two factors: ROA* financial leverage.
- *EBITDA margin ratio*: This ratio provides an indication of the operating performance of a company by comparing its sales with earnings.

2.2 Investment management

Investment management can be evaluated by the following ratios:

- *Operating working capital turnover*: This ratio indicates what amount of sales has been achieved by each euro of working capital.
- *Inventory turnover*: This ratio indicates how effectively a firm employs its working capital.

2.3 Financial management

Financial management is approached by the current ratio. This ratio provides an indication of firm's liquidity, and the firm's ability to repay its current liabilities. The higher the value of this ratio the less likely is for a firm to face liquidity problems.

Hypothesis. The ratios that concern policies about operating, investment and working capital management are positively associated with stock returns

3. Data and methodology

Data regarding stock returns have been derived from the commercial database of "Datastream".

3.1 The sample

The sample includes companies that were listed in the Athens Stock Exchange for the period 2004-2006. The year 2004 was the first year that Greek listed firms implement international financial reporting standards (IFRS). Thus, the inclusion in the sample of firm-year observation for the period before 2004 would hinder the comparability of the sample. The sample does not include 55 companies from the following sectors: banking sector, insurance sector, investment companies, and financial leasing companies. By excluding the above companies from the sample the findings of this study are comparable with the results of other studies. From the total number of 313 companies listed in the Athens Stock Exchange, were excluded 26 firms because datastream does not provide data regarding their stock returns. The final set of data consists of 287 companies or 861 firm-year observations.

Table I presents the variables that have been calculated for the purpose of this study.

3.2 The methodology

In order to investigate whether stock returns include information regarding the financial position of a firm the following model has been developed and estimated:

$$\begin{aligned} SR_{i,t} = {} & b_0 + b_1\ ROS_{i,t} + b_2\ CURRENT\ RATIO_{i,t} + b_3\ ASSET\ TURNOVER_{i,t} \\ & + b_4\ FINANCIAL\ LEVERAGE_{i,t} + b_5\ OPERATING\ WORKING_{i,t} \\ & + b_6\ INVENTORY\ TURNOVER_{i,t} + b_7\ EBITDA\ MARGIN_{i,t} \\ & + b_8\ MV/BV_{i,t} + e_{i,t} \end{aligned}$$

The dependent variable stock return (SR), is calculated by the following formula:

$$SR_t = (P_t + D_{t-}P_{t-1})/P_{t-1}$$

where SR_t is the daily return on day t, P_t the share price in the last day of exchange t (price on ex-date), P_{t-1} the share price in the previous day, and D_t the dividend paid on the last year of the financial year.

The term MV/BV has been added to the above model in order to control for the growth opportunities of the firms. It is estimated by dividing the market value of equity of company i for the year $t-1$ by the book value of equity of company i for the year $t-1$.

Two of the independent variables that were initially intended to be included in the regression model, i.e. return on assets and return on equity, were not included in it for purely technical reasons. Crucial elements that are necessary for calculating those ratios are already included in other variables. The inclusion of all variables in the model could create a autocolinearity problem between the independent variables of the model. Thus, it has been decided to include only the basic ratios ROS, asset turnover and financial leverage, which are used for the computation of the other ratios.

Table II presents the descriptive statistics of the variables used in this study.

4. Empirical findings

In order to investigate which accounting-numbers based variables influence stock returns, the model (1) has been estimated by using as a dependant variable the stock returns of the companies listed in the Athens Stock Exchange and as independent variables certain accounting ratios (Table III).

The value of *F*-statistic indicates that the particular regression model explains 18.4, 13.6, and 23.0 per cent of stock returns for years 2004, 2005, and 2006, respectively. It appears that the main value driver of stocks' value is EBITDA margin. This variable appears to have a statistically significant association with stock returns. The values of the *t*-statistic for this variable are 2.952 (2004), 2.735 (2005), and 4.215 (2006). The association has a positive sign for all years in the period 2004-2006. This result, which is consistent with the formulated hypothesis, indicates that stock returns are positively affected by the ability of a firm to generate positive cash flows.

The growth of firm as depicted by the variable MV/BV appears to be positively associated with stock returns. In particular, the values of the coefficients in years 2004, 2005, and 2006 are 0.098, 2.249, and 0.147, respectively. The values of the *t*-statistic for this variable are 1.276 (2004), 2.733 (2005), and 2.221 (2006). These results suggest that there is a statistically significant association between the two variables for the years 2005 and 2006. It can be concluded, therefore, that the value of MV/BV provides to

Table I.
Variable definitions

Variables	Definitions
ROS	Net profit/sales
Current ratio	Current assets/current liabilities
Asset turnover	Sales/assets
Financial leverage	Assets/shareholders' equity
EBITDA margin	Earnings before interest, taxes, depreciation and amortization/sales
Operating working capital turnover	Sales/operating working capital
Inventory turnover	Cost of sales/inventories

	Average	Median	Standard deviation	Lower quartile	Upper quartile
Year 2004					
Asset turnover	0.82	0.70	0.52	0.52	1.00
Current ratio	1.82	1.43	1.51	1.09	1.95
EBITDA margin	0.29	0.14	0.56	0.06	0.27
Financial leverage	1.97	1.64	1.60	1.40	2.18
Inventory turnover	8.40	3.71	13.78	2.04	7.60
MV/BV	1.39	1.05	8.67	0.61	1.92
Operating working capital turnover	2.30	2.84	33.21	1.13	5.36
ROA	0.03	0.03	0.06	0.01	0.05
ROE	7.45	5.93	17.67	1.11	13.66
ROS	0.04	0.04	0.09	0.01	0.07
SR	2.45	1.18	3.05	0.62	2.98
Year 2005					
Asset turnover	0.75	0.63	0.51	0.44	0.86
Current ratio	1.64	1.36	1.01	1.02	1.92
EBITDA margin	0.52	0.14	2.76	0.05	0.36
Financial leverage	0.39	1.63	21.75	1.41	2.12
Inventory turnover	9.69	4.12	16.82	2.23	8.90
MV/BV	1.60	1.04	7.58	0.63	1.85
Operating working capital turnover	0.55	2.74	77.66	0.84	5.77
ROA	0.02	0.02	0.06	0.00	0.04
ROE	2.74	4.10	39.74	0.24	10.79
ROS	0.04	0.03	0.26	0.00	0.07
SR	2.75	0.91	5.76	0.40	2.89
Year 2006					
Asset turnover	0.78	0.65	0.55	0.46	0.92
Current ratio	1.72	1.43	1.10	1.06	1.99
EBITDA margin	0.32	0.11	1.78	0.04	0.26
Financial leverage	2.22	1.64	2.50	1.41	2.11
Inventory turnover	10.05	4.37	18.17	2.38	8.90
MV/BV	2.67	1.45	7.91	0.84	2.76
Operating working capital turnover	2.29	2.63	24.27	1.02	5.44
ROA	0.02	0.02	0.09	0.00	0.05
ROE	−6.99	5.54	171.51	−1.29	11.76
ROS	0.03	0.03	0.20	0.00	0.07
SR	3.76	1.05	7.82	0.47	3.28

Table II.
Descriptive statistics

investors an indication of the future value of the firm's share price. It appears that on an average the firms with high MV/BV value have higher stock returns.

ROS appears to be positively associated with stock returns. In particular, the values of the coefficients in years 2004, 2005, and 2006 are 3.656, 2.337, and 2.778, respectively. The values of the t-statistic for this variable are 1.718 (2004), 1.054 (2005), and 1.816 (2006). These results suggest that there is a statistically significant association between the two variables only for the years 2004 and 2006. This observation is in line with the hypothesis that the ratio that links the profitability of a firm with its operating activities is positively associated with the stock return of the firm.

Some of the observed associations are not consistent with the expected ones. However, these associations are statistically insignificant. In particular, it is logical to

Table III.
Cross-sectional OLS regression results (model 1)

Independent variables	Dependent variable ln(RI) Years 2004	2005	2006
(Constant)	0.909 (1.572)*	−0.087 (−0.128)	0.123 (0.179)
MV/BV	0.098 (1.276)	0.249 (2.733)***	0.147 (2.221)**
ROS	3.656 (1.718)**	2.337 (1.054)	2.778 (1.816)**
Current ratio	−0.302 (−1.424)*	−0.059 (−0.230)	−0.062 (−0.300)
Asset turnover	−0.041 (−0.147)	0.039 (0.112)	0.239 (0.714)
Financial leverage	−0.266 (−1.630)*	−0.156 (−0.753)	−0.202 (−0.890)
Operating working capital turnover	−0.004 (−1.659)**	−0.003 (−0.387)	−0.009 (−0.540)
Inventory turnover	−0.025 (1.331)*	−0.024 (−1.016)	−0.022 (−1.230)
EBITDA margin	0.018 (2.952)***	0.015 (2.735)***	0.013 (4.215)***
Adjusted R-squared	0.184	0.136	0.230
F-statistic	4.645	3.377	5.822
Prob(F-statistic)	0.000	0.002	0.000

Notes: White's (1980) t-statistics in parentheses; *Significant at the 10 per cent confidence level; **Significant at the 5 per cent confidence level; ***Significant at the 1 per cent confidence level

expect a positive association between current ratio and the stock returns. Yet, this study found that the association between the two variables was negative for firms included in the sample used in this study. Similarly, a negative association was found between stock returns and inventory turnover, while a negative association was found between working capital turnover and stock returns. In both cases, it would have been sensible to expect a positive association between the two variables. It has been expected a positive association between assets turnover and stock returns. However, the results provided by this study do not fully support the above argument. In 2004 the association between the two variables was negative. The association between the financial leverage of firms and their stock returns was negative, in spite of the fact that a positive association was expected between the two variables.

According to Belsey *et al.* (1980), an indication of multicolliniarity exists when condition index takes a value above 30. The condition indices for the model (1) in years 2004, 2005, and 2006 were 19.320, 18.391, and 18.206, respectively. Therefore, no indication has been found that the model suffers from a multicolliniarity problem.

5. Summary and conclusions

This paper attempted to investigate the association between stock returns and certain accounting-numbers based variables for Greek listed firms in the period 2004-2006. The results indicates that the disclosure that concerns the operating performance of a company, its growth opportunities and capability to generate profits from its sales affect stock returns. It seems, therefore, that market participants (shareholders, investors, analysts, etc.) take into consideration accounting data when they value firms' stock. It should be noted, however, that the impact of this disclosure is not always the expected one. The findings of this study are not consistent with the notion that Greek capital markets are wholly efficient. It is likely that pockets of inefficiency exist within the Greek financial system. The findings of this study can be helpful to managers for selecting and implementing the appropriate business policies. Besides, current shareholders and investors may find the results of this study useful in identifying the drivers of stock values. Furthermore, since the study covers the period

2004-2006, it provides implications about the quality of accounting data immediately after the beginning of application of International Financial Reporting Standards in the financial statements of companies of the Greek Stock Exchange.

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Corresponding author
Constantinos Chalevas can be contacted at: chalevas@aueb.gr

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An Investigation of the Balanced-Scorecard's Applications for Performance Measurement of the Firms Accepted in the Tehran Securities Exchange Market

[1]Dr. Mohammad Namazi (Ph.D., AICPA) and [2]Hamid Allahyari Abhari

[1]Professor of Accounting Shiraz University, Shiraz, Iran
[2]MA in Accounting (Shiraz University)

Abstract: The major purpose of this study is providing a suitable response to this inquiry: What performance evaluation criterions are currently prevalent by various companies listed in the Tehran Stock Exchange (TSE)? And to what extent, do they have adapted the Balanced Scorecard (BSC) mechanism for performance evaluation of their operations and departments? The significant objectives of this research are: 1) seeking to exploit practical performance evaluation techniques, and 2) reporting the BSC'S adaption among the TSE firms. In effect, four perspectives of the BSC, promoted by Kaplan & Norton (1992, 1996 & 2004), including financial, customer, internal process, and learning & growth, are extracted in the framework of different hypothesis. The population of this research encompasses all firms listed in the TSE for the year 2006. Totally, 200 qualified and active firms were identified, and a valid and reliable questionnaire was conveyed to them. However, only 68 of the questionnaires were complete and, therefore could be extricated in this study. The generated data were analyzed by t-test, binominal test and Analysis of Variance (ANOVA) statistical techniques. The major findings of the study revealed that the most dominant traditional performance evaluation measures employed by the TSE firms are: 1) "Net income" (35.3%), 2) "Operating income" (32.4%), and 3) "Total income" (23.5%) accordingly, and only 4.4% of them are exploiting "cash flows" and "ROI" as their first priority. In addition, 38.2% of the respondents have indicated that they are utilizing "Operating income" as the second priority, and 39.7% of them are exerting "Net income" as the third priority. On the other hand, almost 92.6% of selected companies are not explicitly engaged with the BSC. However, most of them are embarking some non-financial measures in their performance evaluation systems. Age, educational degree, field of the study, and years of practical experience of the respondents were not statistically significant in providing the aforementioned results, but "organizational position" demonstrated a significant effect on the BSC'S adaption.

Key words: Performance Measurement System, Balanced Scorecard (BSC), Tehran Stock Exchange (TSE), Traditional Performance Evaluation Measures

INTRODUCTION

Today, companies have proceeded the era of "industrial competition" and have been infatuated with the era of "information". In the new era, manufacturing as well as service companies, would tend to be equipped with contemporary and advanced abilities in order to be successful in the world-wide competition. The companies' focus in exploiting intangible assets is also much more indispensable than the management of the physical and tangible assets[16].

Although various companies have typically invested heavily on their information systems, programs and innovative techniques, but most of them, particularly in developing countries, are still operating based upon primitive performance evaluation systems and they utilize traditional annual reports, quarterly reports, monthly reports and measures for this purpose [12,13]. On the other hand, currently leading companies around the world, are embarking and implementing the Balanced- Scorecard (BSC) to perform their performance evaluation functions and other managerial duties[9,17,3].

The major aim of this study is to determine empirically: what performance evaluation criteria are presently being implemented by various companies listed in the Tehran Stock Exchange (TSE)? And how much do they have adapted the BSC for the purpose of their performance evaluations of departments and operations?

In effect, the significance of this research is providing comprehensive empirical information about the kind and extent of the financial and non-financial performance evaluation measures, which have been

Corresponding Author: Dr. Mohammad Namazi (Ph.D., AICPA), Professor of Accounting Shiraz University, Shiraz, Iran
Tel: + 98 711 6460520 Fax: + 98 711 6460520
E-mail: mnamazi@rose.shirazu.ac.ir

presently adapted by the TSE firms. It would also assimilate a hierarchical preference in applications of the performance evaluation techniques of the TSE firms. In addition, it would disclose the implementation status of the BSC, as a leading contemporary technique, by the TSE companies. Hence, as a first and pioneering empirical study in this area in Iran, it would furnish a suitable international knowledge about this significant, challenging and cultivating managerial accounting technique. In effect, benchmarking in this research domain can also be extended.

2. Theoretical Development & Prior Studies: Prior to 1992, various absolute and relative accounting measures were being utilized for managements' performance evaluations. Prominent accounting measures were "total income", "operating profit", "net profit", "cash flows", "Return on investment", "residual income", and "value-added" income[7,11,10]. However, with the advent of BSC in 1992, limitations of employing accounting measures were shown more clearly on the grounds that they are solely based upon past quantitative accounting information and short-views of the firm's operations.

In 1992, BSC was promoted by Kaplan and Norton in an attempt to provide a more refined, complete and accurate performance criterion mechanism. The major philosophy of BSC is that evaluation is a necessary condition for management. If something cannot be evaluated, it cannot be managed either[12]. In essence, BSC is an integrated system, which makes a balance between the following elements:

1) financial and non-financial (qualitative) performance measures,
2) short-term and long-term criteria,
3) interest of stockholders, as well as customers, employees, and other stakeholders, and
4) valuation of tangible as well as intangible assets. As Figure 1 shows, it actually translates the firm's strategy into the objectives and carefully selected balanced measures in four perspectives:

1) financial,
2) customer,
3) internal process, and
4) learning and growth[15].

These four perspectives together would describe how companies can create a greater value for shareholders and other stakeholders and at the same achieving alignment, process improvement, and an effective communications among the employees[16].

In 1993, Kaplan & Norton investigated the real applications of the BSC in 3 different firms operating in different industries. They concluded that in different market conditions and various production strategies, an appropriate BSC mechanism which would be compatible with the nature of the firm's business, must be implemented.

In 1996, Kaplan & Norton, extended the BSC role as a performance evaluation technique to a "strategic management system", and this novel feature was emphasized by other scholars including Marthinson, *et al*.[20]. Mooraj *et al*.[21] also introduced BSC as an item for today's organizations in which increases the value of the firms. Their major finding was that a BSC implementation depends on the formal & informal process, strategic procedures, social aspects, and management control systems.

In 2000, Libby & Salterio investigated the effect of performance evaluation measures on the BSC judgments. They concluded that only "common measures" are effective for performance evaluation. In 2004, Kaplan & Norton, described the concept of "strategy map" and extended it to four perspectives of the BSC. Libby *et al*.,[18] tested two approaches for reducing variances from "common measures". They showed that by employing "unique measures" the necessity of managers to be hold responsible for their performances would be enhanced. Banker *et al*.,[2] also investigated the relationship between managers' personal performance evaluations and the BSC's strategies. They found that when evaluators do maintain some information about firms' strategies, they would utilize more from those performance evaluation criterion which are directly related to the firms' strategies than the common measures.

Chen *et al*.,[5] investigated the role of significant factors affecting the BSC implementation, and concluded that participation of financial managers, administrative managers, CEOS' support, and size of the company are significant elements. Othman[25] arrived at this conclusion that a successful implementation of the BSC, requires the development of a detailed causal model in the organization.

Papalexandris *et al*.[26] introduced a methodology for applying BSC. A new BSC system was based upon evaluation of the BSC elements, project management, change management, risk management, quality control & information technology. Fernandes *et al*.[6] investigated the BSC application in small and medium size manufacturing companies. They found that BSC could be applied well for small & medium size manufacturing firms. Gumbus & Lussier[9] also investigated the BSC implementation in small, medium and large size companies. Their findings was that BSC application did actually increased the firms' performance, and although 50% of 1000 firms listed in Fortune employed the BSC, only a limited number of small and medium size companies utilized the BSC. Bhagwat and Sharma[3] investigated the BSC implementation in small and medium size companies in India, and introduced relevant measures for evaluating small and medium size supply chain companies.

Kohlbeck *et al*.[17] implemented the residual income model, and considered the effect of unrecorded intangible assets, abnormal earnings and valuation on banking industry. They concluded that the consistency of abnormal profit and multiple valuation in abnormal profit has a significant relationship with the level of unrecorded intangible assets. Thus, the role of intangible assets is vital.

In Iran, just recently a limited number of articles[22,23] has been appeared in the accounting literature which have described major premises of the BSC and its elements, and no empirical work has yet been reported in the leading accounting journals.

In sum, some of the important conclusions which can be drawn from the BSC literature are as follows:

1. BSC is a useful technique for performance evaluation.
2. BSC has suggested the development of different performance evaluation measures in each of it's four perspectives (financial, customer, internal process, and learning & growth) for each industry and each even firm.
3. BSC has actually been applied extensively in practice. However, the degree of it's adaption depends on the social culture, internal structure, size of the company, top managements' support, and even employees' involvement in implementing BSC.
4. Since it's introduction in 1992 to present, BSC has pursued the following four consecutive eras[22]:

1. First era (1992-1996)- employing BSC as an advanced performance evaluation technique.
2. Second era (1996-2004)- exploiting BSC as a potent strategic management system.
3. Third era (2004-2007)- embarking BSC as a strategy map and providing an effective organizational framework.
4. Fourth era (2007-now)- implementing BSC as a vital technique for attaining alignment and coordination of the organization strategies and it's sub-departments.

3- Research Methodology: This study is a practical-based research focusing on a one shot exposit-design only[1,27], and consists of the following sections:

3.1. Research Hypothesis: Following our research questions raised in Section 1, reported results of prior studies relating to BSC, and extricating content of different leading managerial accounting text books in this area[7,10,11], the following research hypothesis were formed:

First Main Hypothesis: TSE firms are exerting traditional accounting performance evaluation techniques for evaluating their operations and different departments.

The minor hypotheses are:

1. TSE firms are exerting "**Total income**" information for evaluating their operations and different departments.
2. TSE firms are exerting **"Operating profit"** information for evaluating their operations and different departments.
3. TSE firms are exerting **"Net profit"** information for evaluating their operations and different departments.
4. TSE firms are exerting **"Cash flows"** information for evaluating their operations and different departments.
5. TSE firms are exerting **"Return on Investments (ROI)"** information for evaluating their operations and different departments.
6. TSE firms are exerting **"Residual Income (RI)"** information for evaluating their operations and different departments.
7. TSE firms are exerting **"Value-Added (VA)"** information for evaluating their operations and different departments.

Second Main Hypothesis: TSE firms are exerting the Balanced Scorecard (BSC) technique for evaluating their operations and different departments.

The minor hypotheses are:

2.1- TSE firms are exerting **"Financial Perspective"** information of the BSC for evaluating their operations and different departments.

2.2- TSE firms are exerting **"Customer Perspective"** information of the BSC for evaluating their operations and different departments.

2.3- TSE firms are exerting **"Internal Process Perspective"** information of the BSC for evaluating their operations and different departments.

2.4- TSE firms are exerting **"Learning and Growth Perspective"** information of the BSC for evaluating their operations and different departments.

3.2. Population of the Study: The population of this research encompasses all companies listed in TSE in the year 2006. No sampling was exploited in order to provide a more valid, reliable, and comprehensive study. Following observation of a total list of TSE active companies, and their information, only 200 firms were qualified, and then selected.

3.3. Methods of Information Gathering: In conducting this study, the "mailed questionnaire" technique[27,8] was deployed. First, a questionnaire was devised based upon selected interviews and a content analysis of the performance evaluation literature. It consisted of three distinct parts. In the first part, general information pertinent to respondents including sex, age, years of experience, field of the study, and certificate of the study, were devised. The second section was devoted to professional information, presenting a brief explanation of the BSC system and its four perspectives (financial, customer, internal process, and learning & growth). In the third section, 11 general closed or structured multiple Liker type questions along with their details relating to BSC and its four perspectives, were presented. A total of 66 choices concerning 11 general questions were established in the questionnaire. In addition, a total of 18 "open questions" relating to BSC and its four perspectives were also designed in order to provide indebt knowledge about the BSC implementation among the TSE firms.

The Validity of the questionnaire was followed via the "construct validity" approach[27,8] by inquiring expert accounting professors, accounting graduate students, and practitioners to review and comment about the form and content of the questionnaire. As a result, the questionnaire was revised. Consequently, a new questionnaire was distributed among 20 selected firms as a pilot study in order to determine the reliability of the questionnaire. The reliability criterion, based upon the "Crohnbach's a" was %81.1 and %76.5 for the first and second hypothesis, respectively. Thus, the questionnaire was approved, and it was mailed to 200 selected firms. However, only 94 complete questionnaires (after a frequent contact and follow-ups) were returned in which 68 of them could be expended.

The generated data was processed by SPSS and MINITB. The statistical t-test, Binominal-test and Analysis of Variance (ANOVA) were employed to test the hypothesis.

4. Research Findings & Analysis: Important results are presented in the following sections:

4.1- General Information: Table 1 illustrates general characteristics of the respondents.

This information clearly reveals that the respondents were qualified to participate in this study.

4.2- Descriptive Information: In this section, the respond to each professional inquiry relating to each hypothesis is presented.

Table 2, represents the TSE firms' replies to the first hypothesis' questions. The results would indicate that, among other things, 35.3% of the respondents have selected "net profit" as the first measure of performance evaluation, 32.4% "operating profit", 23.5% "total revenue", and only 4.4% are exploiting "cash flows" and "ROI" as their first priority. Also, 38.2% of the respondents have indicated that they utilize "operating profit" as the second priority and 39.7% of them exert "net profit" as the third priority.

Tables 3, 4, 5 and 6 assimilate findings relating to the second major and its minor hypothesis. Table 3 indicates that no firm has actually implemented BSC fully with all of its four perspectives, and only 7.35% of them have adapted it "to some extent".

With respect to the customer's perspective in BSC, table 4, among other things, demonstrates that 58.8% respondents have indicated "customers' satisfaction", 23.5% "number of customers' complains" and 17.6% "market share", accordingly as their first priority that must be/are considered in the BSC system. Also, 42.6% of them have mentioned "market share", 25% "customer satisfaction", and "number of complains" and 7.4% "percentages of new customers" as their second priority. Furthermore, 36.8% of the respondents have identified "number of customer complains", 32.4% "percentages of new customers", 16.2% "customer satisfaction", and 14.7% "market share" as their third priority.

Results of the internal process perspective of the BSC are shown in table 5. It reveals that 36.8% of the respondents have selected "unfavorable variances from standard costs", 32.4% "percentage of sales of new products", 22.1% "production cycle efficiency", and 8.8% "time required for producing a unit of goods", accordingly as their first priority to be included in the BSC system. Furthermore, 26.5% of them have pointed out "percentage of sales of new products", 23.5% "unfavorable variances from standard costs", 17.6% "time required for productizing a unit of goods", and 14.7% "production cycle efficiency" as their second priority. In addition, 19.1% of them have identified "unfavorable variances from standard costs", 16.2% "percentage of sales of new products", and 10.3% "production cycle efficiency" as their third priority.

Findings regarding the "learning & growth" perspective of the BSC are shown in table 6. It reveals that 41.2% of the respondents have indicated "employees education hours", 32.4% "listening to employees ideas and suggestions", and 26.5% "employees value added" accordingly as their first priority. Furthermore, 57.4% of them have mentioned "employees education hours" 22.1%, "listening to employees ideas and suggestions" and 19.1% "employees value added" as the second priority. In addition, 45.6% of them have identified "employees turn-around", 20.6% "employees value added" and 19.1% "listening to employees ideas and suggestions" as their third priority.

Table 1: General Characteristics of the Respondents

		Frequency	Percentage
Sex	Male	68	100
	Female	0	0
	Total	68	100
Age	Between 25 to 30 years	4	5.09
	Between 30 to 45 years	49	72.0
	Between 45 to 55 years	14	20.6
	More than 55 years	1	1.5
	Total	68	100
Educational Degree	Doctorate	5\4	5.9
	Master	55	80.9
	Bachelor	9	13.2
	Total	68	100
Field of the Study	Accounting	37	54.4
	Finance	14	20.6
	Management	14	20.6
	Economics	3	4.4
	Total	68	100
Years of Experience	More than 20 years	10	14.7
	Between 15 to 20 years	14	20.6
	Between 10 to 15 years	18	26.5
	Between 5 to 10 years	15	22.0
	Less than 5 years	11	16.2
	Total	68	100
Position	Financial Managers	36	52.9
	Head of Accounting	25	36.8
	Treasurer	7	10.3
	Total	68	100

4.3. Statistical Hypothesis Testing:

4.3.1. First Hypothesis: The first major null hypothesis can be presented as follows:

The average TSE firms are not exerting traditional accounting performance evaluation techniques for their operations and different departments.

Since for this hypothesis, 7 hierarchical measures are considered, and their score values are from 1 to 7, the average score for the hypothesis is equal to 3.5 times 7, i. e., 24.5. Thus, the null hypothesis and its alternative hypothesis could be formally expressed as follows:

H_{01}: $\mu \le 24.5$

H_{11}: $\mu > 24.5$

Table 7 and Figure 2 illustrate the findings and a relevant graph for the first major hypothesis.

Consequently, it can be concluded that the TSE firms are utilizing traditional performance evaluation techniques for evaluating their operations and different departments.

Results of the binomial tests (H_0: $P \le ½$ and H_1: $P > 1/2$) for the minor hypotheses of the first hypothesis are shown in table 8.

From the above table, it can be inferred that H_0 is rejected; this indicates that, more than half of the respondents, have replied to traditional performance measures criterion positively; therefore, the average active TSE firms are utilizing the traditional performance evaluation techniques.

Table 2: The TSE Firms' Applications of the Traditional Performance Evaluation Techniques

First hypothesis question: Do you use any performance evaluation measures in your company for the purpose of evaluating the performance of your departments' operations? If yes, currently which of the following financial measures are being employed by your company for the purpose of departments' performance evaluation operations? Please answer based upon your hierarchy, accordingly.

		Net profit		Operating profit		Total revenue		Cash flows		Return on Investment		Residual Income		Economic value added	
	Hierarchy	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Yes	1	24	35.3	22	32.4	16	23.5	3	4.4	3	4.4	0	0	0	0
	2	9	13.2	26	38.2	23	33.8	3	4.4	7	10.3	0	0	0	0
	3	27	39.7	11	16.2	22	32.4	5	7.4	3	4.4	0	0	1	1.5
	4	7	10.3	5	7.4	0	0	17	25	16	23.5	13	19.1	7	10.3
	5	0	0	3	4.4	7	10.3	17	25	23	33.8	6	8.8	9	13.2
	6	0	0	1	1.5	0	0	11	16.2	8	11.8	22	32.4	20	29.4
	7	0	0			0	0	9	13.2	2	2.9	21	30.8	16	23.5
No	For some reasons, we are not using these measures	0	0	0	0	0	0	0	0	3	4.4	4	5/9	5	7/4
	We would like to use	1	1.5	0	0	0	0	3	4.4	3	4.4	0	0	10	14.7
	We would not like to use	0	0	0	0	0	0	0	0	0	0	2	2.9	0	0
	Total	68	100	68	100	68	100	68	100	68	100	68	100	68	100

Table 3: The Frequency Distribution of the Second Hypothesis

Is BSC being used by your company to evaluate operations of the different departments?

		Frequency	Percentage
Yes	Fully	0	0
	To some extent	5	7.35
No		63	92.65
Others		0	0
Total		68	100

Table 4: Information Relating to the BSC (Customer Perspective)

Second hypothesis question: Do you use the following criteria? If yes, which of the following criteria are currently being employed by your company for performance evaluation of your departments? Please indicate your answer based upon a hierarchical order.

		Customer satisfaction		Number of customer complains		Market share		Return of goods as % of sales		Percentage of customers kept from prior periods		Percentage of new customers	
	Hierarchy	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Yes	1	40	58.8	16	23.5	12	17.6	0	0	0	0	0	0
	2	17	25	17	25	29	42.6	0	0	0	0	5	7.4
	3	11	16.2	25	36.8	10	14.7	0	0	0	0	22	32.4
	4	0	0	5	7.4	17	25	2	2.9	22	32.4	17	25
	5	0	0	0	0	0	0	29	42.6	18	26.5	7	10.3
	6	0	0	0	0	0	0	22	32.4	11	16.2	0	0
No	For some reasons we are not using these measures	0	0	0	0	0	0	0	0	5	7.4	0	0
	We would like to use	0	0	5	7.4	0	0	15	22.1	12	17.6	17	25
	We would not like to use	0	0	0	0	0	0	0	0	0	0	0	0
	Total	68	100	68	100	68	100	68	100	68	100	68	100

Table 5: Information Relating to the BSC (Internal Process Perspective)

Second hypothesis question: Which of the following criteria are currently being employed by your company for performance evaluation of your departments? Please indicate your answer based upon a hierarchical order.

		Unfavorable variances from standard costs		Percentage of sales of new products		Production cycle efficiency		On time delivery as a percentage of total delivery	
	Hierarchy	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Yes	1	25	36.8	22	32.4	15	22.1	0	0
	2	16	23.5	18	26.5	10	14.7	0	0
	3	13	19.1	11	16.2	7	10.3	6	8.8
	4	8	11.8	7	10.3	6	8.8	0	0
	5	0	0	5	7.4	0	0	17	25
	6	1	1.5	0	0	0	0	12	17.6
	7	0	0	0	0	18	26.5	4	5.9
No	For some reasons we are not using these measures	0	0	0	0	0	0	0	0
	We would like to use	5	7.4	5	7.4	12	17.6	29	42.6
	We would not like to use	0	0	0	0	0	0	0	0
	Total	68	100	68	100	68	100	68	100

Table 5: Continue

Second hypothesis question: Which of the following criteria are currently being employed by your company for performance evaluation of your departments? Please indicate your answer based upon a hierarchical order.

		Work in process as a % of sales		Time of supplying new products to market		Number of good units produced		Delivery cycle time	
	Hierarchy	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Yes	1	0	0	0	0	0	0	0	0
	2	0	0	2	2.9	2	2.9	0	0
	3	0	0	1	1.5	11	16.2	0	0
	4	0	0	6	8.8	11	16.2	0	0
	5	0	0	18	26.5	14	20.6	0	0
	6	0	0	6	8.8	5	7.4	11	16.2
	7	0	0	6	8.8	0	0	13	19.1
No	For some reasons we are not using these measures	18	26.5	0	0	5	7.4	8	11.8
	We would like to use	50	73.5	29	42.6	20	29.4	36	52.9
	We would not like to use	0	0	0	0	0	0	0	0
	Total	68	100	68	100	68	100	68	100

Continued Table 5: Information Relating to the BSC (Internal Process Perspective)

Second hypothesis question: Which of the following criteria are currently being employed by your company for performance evaluation of your departments? Please indicate your answer based upon a hierarchical order.

		Time required for producing a unit of goods		% of responding time to customer's order		Quality control costs		Start-up time		Time spanned from ordering to delivering goods to customers		% of customers' complains which have been acted quickly		Time of performing customers' claims	
	Hierarchy	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Yes	1	6	8.8	0	0	0	0	0	0	0	0	0	0	0	0
	2	12	17.6	0	0	0	0	2	2.9	0	0	0	0	1	1.5
	3	3	4.4	0	0	4	5.9	1	1.5	0	0	5	7.4	1	1.5
	4	17	25	0	0	0	0	0	0	0	0	5	7.4	4	5.9
	5	2	2.9	0	0	1	1.5	6	8.8	0	0	0	0	0	0
	6	1	1.5	0	0	1	1.5	4	5.9	11	16.2	1	1.5	9	13.2
	7	0	0	0	0	1	1.5	0	0	13	19.1	0	0	7	10.3
No	For some reasons we are not using these measures	0	0	29	42.6	0	0	13	19.1	8	11.8	0	0	0	0
	We would like to use	27	39.7	39	57.4	61	89.7	42	61.8	36	52.9	57	83.8	46	67.6
	We would not like to use	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	68	100	68	100	68	100	68	100	68	100	68	100	68	100

Table 6: Information Relating to the BSC (Learning & Growth Perspective)

Second hypothesis question: Which of the following criteria are currently being employed by your company for performance evaluation of your departments? Please indicate your answer based upon a hierarchical order.

		Employees education hours		Listening to employees ideas and suggestions		Employees value added		Employees turn-around	
	Hierarchy	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Yes	1	28	41.2	22	32.4	18	26.5	0	0
	2	39	57.4	15	22.1	13	19.1	0	0
	3	0	0	13	19.1	14	20.6	31	45.6
	4	0	0	8	11.8	13	19.1	18	26.5
No	For some reasons we are not using these measures	0	0	0	0	0	0	7	10.3
	We would like to use	1	1.5	10	14.7	10	14.7	12	17.6
	We would not like to use	0	0	0	0	0	0	0	0
	Total	68	100	68	100	68	100	68	100

Table 7: Result of the First Major Hypothesis

Results (at a=%5)	P-Value	t-Value	Standard deviation	Average Score	Number of respondents
H_0 Rejected	0.000	10.51	2.193	27.29	68

Table 8: Results of the Binomial Test for the Minor Hypothesis of the First Hypothesis

Currently which of the following performance criteria are being employed for evaluating the performance of your departments?	Number of answers	Ratio of yes answers	Significance	P-value	Conclusion at α = %5
Total revenue	68	0	1	0.000	H_0 Rejected
Operating profit	68	0	1	0.000	H_0 Rejected
Net profit	67	1	0.98	0.000	H_0 Rejected
Cash flows	65	3	0.95	0.000	H_0 Rejected
Return on Investment (ROI)	62	6	0.91	0.000	H_0 Rejected
Residual Income (RI)	62	6	0.91	0.000	H_0 Rejected
Economic Value Added (EVA)	53	15	0.78	0.000	H_0 Rejected

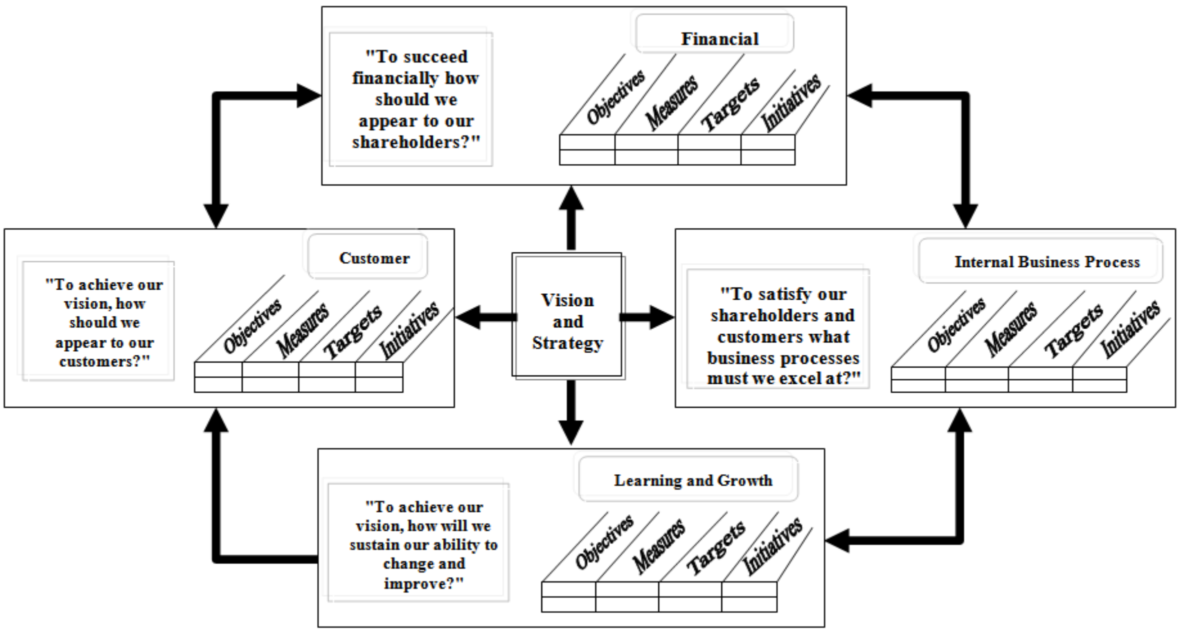

Fig 1: The Major Perspectives of the Balanced Scorecard

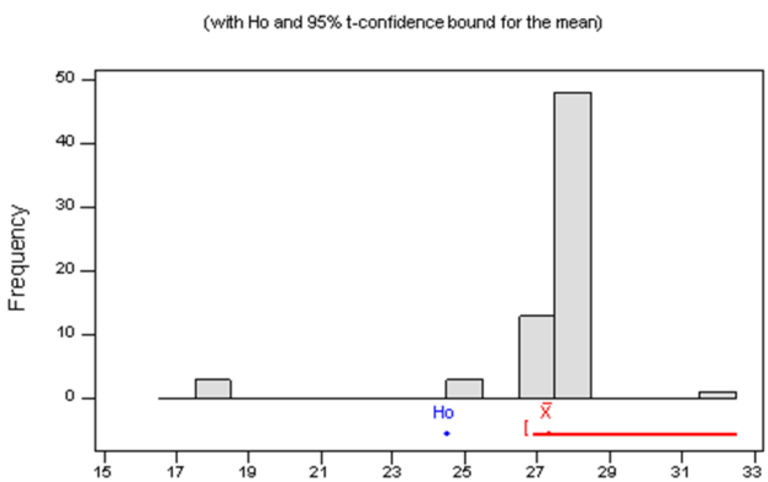

Fig. 2: Histogram of the First Major Hypothesis

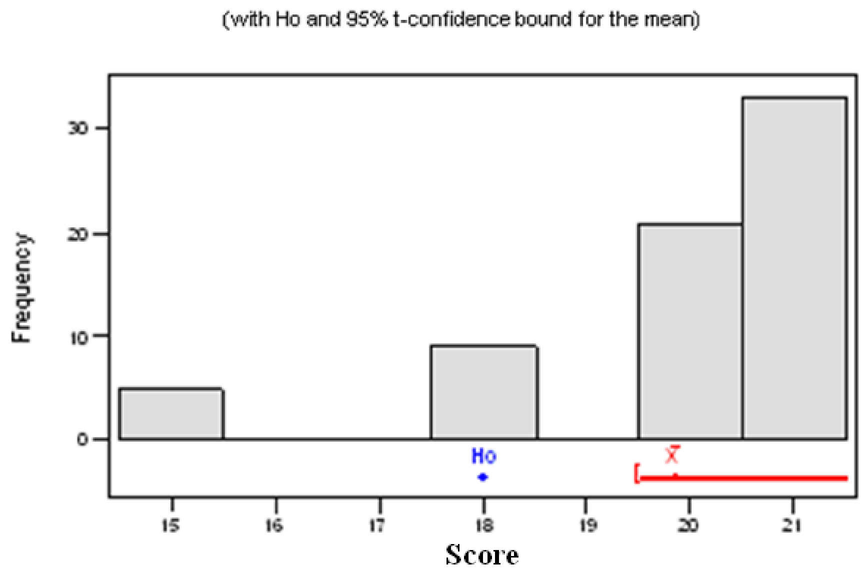

Fig. 3: Histogram of the "Customer Satisfaction" Hypothesis

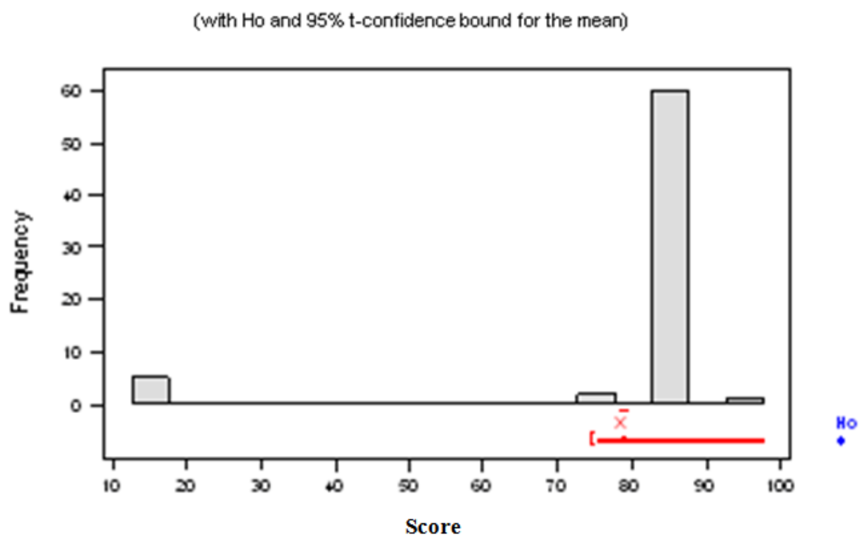

Fig. 4: Histogram of for "Internal Process" Hypothesis

4.3.2. Second Hypothesis: Results of the binomial test for the second hypothesis (H_{02}: P ≤ ½ , H_{12}: P > ½) is shown in table 9. From the information presented, it can be concluded that the average TSE firms are not expending BSC for performance evaluation of their operations.

Important findings of the minor hypothesis relating to the second major hypothesis are as follows:

Results of the first minor hypothesis ($H_{02\text{-}1}$) are actually the same as the H_{01}, which was presented earlier. Thus, it can be concluded that the average active firms in the TSE are utilizing some elements of the BSC "financial perspective" in their performance evaluation systems. Table 10 shows the results of the second minor hypothesis ($H_{02\text{-}2}$: μ ≤ 18, $H_{12\text{-}2}$ μ >18, 6 questions times the average score 3). Its graph is shown in Figure 3. Consequently, it can be concluded that the average TSE firms are employing some measures of the "customer perspective" in their performance evaluation system, even though they are not formally applying the BSC.

Table 11 and Figure 4 shows the results and a graph of the third minor hypothesis ($H_{02\text{-}3}$: μ ≤ 112.5, $H_{12\text{-}3}$: μ > 112.5; 15 measures times the average score value of 7.5). From this information, it can be concluded that the average active TSE firms do not

Table 9: Results of the Binomial Test for the Second Major Hypothesis

	Number of response		Ratio of yes answers	P-value	Results at α = %5
	Yes	No			
Is BSC currently being used in your company for performance evaluations of the departments' operations?	5	63	0.0735	1.00	H_0 cannot be rejected

Table 10: Results of the Customer Satisfaction Hypothesis

Result (at α =%5)	P-Value	t-Value	Standard deviation	Average	Number of respondents
H_0 Rejected	0.000	9.01	1.69	19.85	68

Table 11: Results of the "Internal Process" Perspective

Resultat α = %5	P-Value	t-Value	Standard deviation	Average	Number of respondents
H_0 cannot be rejected	1.000	-15.22	18.25	78.82	68

Table 12: Results of the "Learning and Growth" Perspective

Resultat α = %5	P-Value	t-Value	Standard deviation	Average	Number of respondents
H_0 rejected	0.000	8.5	1.20	9.23	68

Table 13: Results of ANOVA for Determining the Significance of the Respondents' General Characteristics

Variable	Hypothesis	F-Value	P-value	Result (at α = 5%)
Age	1	0.731	0.535	H_0 Not Rejected
	2	0.650	0.584	H_0 Not Rejected
Educational degree	1	0.746	0.526	H_0 Not Rejected
	2	2.964	0.134	H_0 Not Rejected
Field of the study	1	0.510	0.729	H_0 Not Rejected
	2	1.428	0.228	H_0 Not Rejected
Years of practical experience	1	1.150	0.336	H_0 Not Rejected
	2	0.587	0.672	H_0 Not Rejected
Organizational position	1	2.143	0.121	H_0 Not Rejected
	2	1.264	0.026	**H_0 Rejected**

adequately implement the "internal process perspective" in their performance evaluation systems.

Table 12 and Figure 5 reveal findings and graph of the fourth minor hypothesis (H_{02-4}: $\mu \le 8$, H_{12-4}: $\mu > 8$; 4 measures times the average score 2). This information indicates that the average active TSE firms are exerting some elements of the "learning & growth perspective" in their performance evaluation systems.

4.3.3- Determining the Significance of the Respondents' Characteristics: In order to determine the importance of the respondents' general characteristics in the aforementioned findings, Analysis of Variance (ANOVA) test was performed for identifying general characteristics' impacts. Table 13 presents the results. It indicates that none of the general characteristics have had a significant statistical impact on the responses. The position of the respondents, however, is the only factor that has had a significant effect on the BSC implementation hypothesis.

5. Concluding Remarks & Discussion: This study demonstrated that more than 86.8% of the respondents in the TSE, actually did hold a master or a Ph.D. degree, and fields of the studies of 75% of them were closely related to accounting and finance. Also more than 62% of them maintained more than 10 years of practical experience, and more than 89.7% of them were in the financial management and/or accounting positions. Thus, they were qualified to participate in this study.

Results of the first major and its minor hypothesis revealed that 100% of the respondents are employing "total revenues" and "operating profits", 98.5% "net profit", 95.6% "cash flows", 91%, ROI and RI, and 78% "EVA" for performance evaluations of their operations. However, as far as the hierarchical preferences is concerned, statistical frequency analysis and other information indicated that firms listed in the TSE are embarking, "net income", "operating profit", "total revenues", "ROI", "cash flows", "RI" and "EVA", accordingly.

Results of the second major and its minor hypothesis showed that only 7.35% of TSE firms are exerting BSC explicitly to some extent. In spite of this, TSE firms, on the average, are utilizing financial as well as non-financial measures for their performance evaluation systems, without any formal recourse to the BSC. The statistical analysis relating to investigated firms also indicated that, with respect to "customer perspective" of the BSC, the firms are exploiting "customer satisfaction" (100%), "market share" (100%), and number of customers complains" (92.6%), accordingly. In internal process perspective, employing "unfavorable variances from standards" (92.6%), and "percentage of sales of new products" (92.6%), are the most prevalent criteria which are being employed by the TSE firms. For "learning & growth perspective", the most dominant measures are, "employees education hours" (98.5%), "listening to employees ideas and suggestions" (85.3%), and "employees value added" (85, 3%), accordingly.

In general, results of this study are more or less consistent with other studies conducted in other countries, particularly in developing countries[12,13,8,3]. However, the difference is that TSE companies performance evaluations are not explicitly based upon the BSC and, therefore, it is not clearly following a formal system which would be based upon a designated set of missions, objectives and strategies. As a result, TSE performance evaluation systems are not directly and formally linked to their strategies.

It seems like the most reasons that TSE firms, are not adapting and implementing the BSC formally, are dovetailed to the following factors:

1. lack of some managers' familiarity with the BSC's concept and its perspectives.
2. lack of the interest on the parts of some Chief Executive Officers (CEO) with respect to implementing an advanced and contemporary performance evaluation system.
3. The existence of the public institutions and sole producers or distributors of the goods or services.
4. lack of completion in the market place for some industries and organizations.

6. Suggestions: The following suggestions are made briefly:

1. This study and other related collected information indicate that the applications of the BSC among large TSE firms are growing. Thus, it is suggested in the future, the implementation of this important and challenging technique along with its advantages and disadvantages in different industries be investigated by accounting researchers.
2. Given the importance of performance evaluation information for managers, stockholders and investors, it is suggested that the TSE or the Audit Organization of Iran promulgate the adaption of the BSC for large companies. This suggestion, of course, must be followed after an in depth analysis and a comprehensive research.
3. It is suggested that a specific organization for ranking TSE various firms' performances and assimilation of the relevant information in this area, be established in Iran.
4. It is suggested that the impacts and effects of the BSC applications in those national and international companies which have attempted to implement it be investigated, and its advantages, disadvantages at the theoretical as well as practical level be reported comprehensively. In that case, the significance, importance, and cost benefit of the BSC would be disclosed more accurately and thoroughly.

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Accounting anomalies and fundamental analysis: A review of recent research advances ☆

Scott Richardson, İrem Tuna [a], Peter Wysocki [b,*]

[a] London Business School, Regent's Park, London NW1 4SA, United Kingdom
[b] University of Miami, School of Business Administration, 5250 University Drive, Coral Gables, FL 33146, United States

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ABSTRACT

We survey recent research in accounting anomalies and fundamental analysis. We use forecasting of future earnings and returns as our organizing framework and suggest a roadmap for research aiming to document the forecasting benefits of accounting information. We combine this with opinions from the academic and practitioner communities to critically evaluate key clusters of papers about accounting anomalies and fundamental analysis disseminated over the last decade. Finally, we provide a new analysis on how an ex ante and ex post treatment of risk and transaction costs affects the accrual and PEAD anomalies, and offer suggestions for future research.

1. Introduction

In this paper, we review the literature on accounting anomalies and fundamental analysis. Given the existence of numerous excellent literature reviews of closely related topics, we have constructed our review to complement them. We focus on research studies that have publication or distribution dates after the year 2000, examine accounting-related anomalies and fundamental analysis geared toward forecasting future earnings and security returns, and examine empirical research methods.

An underlying theme of our survey is that the information contained in general purpose financial statements can help investors make better portfolio allocation decisions. To this end, an investor can use information in these statements to forecast earnings for the reporting entity, estimate the risk of these earnings, and ultimately make an assessment of the intrinsic value of the firm that can be compared to observed market prices. We use this forecasting activity as our primary

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* Corresponding author. Tel.: +1 305 284 8618; fax: +1 305 284 5737.
E-mail addresses: scottaricho@gmail.com (S. Richardson), ituna@london.edu (İ. Tuna), pwysocki@bus.miami.edu, p.wysocki@miami.edu (P. Wysocki).

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organizing principle for research on accounting anomalies and fundamental analysis.[1] While we recognize the co-existence of other accounting properties and objectives, we view forecasting as a powerful organizing concept for reviewing the recent literature.

The first part of our review tabulates the most highly cited research studies on accounting anomalies and fundamental analysis published or distributed after the year 2000. We then categorize these highly cited studies by identifying their common and overlapping citations to earlier papers in the literature. The second part of our survey presents results from a questionnaire of investment professionals and accounting academics about their opinions on accounting anomalies and fundamental analysis and how academic research has informed investment practice and to highlight some differences between that and the research conducted by investment professionals. The third part of our survey lays out a desired framework for research seeking to document the forecasting benefits of accounting information, which we then use to critically evaluate the relevant research disseminated over the last decade. In the fourth part, we present some empirical analysis on how an ex ante and ex post treatment of risk and transaction costs affects the well known accrual and PEAD anomalies. In the final part of our review, we offer suggestions for future research.

Our survey focuses on empirical research covering accounting anomalies and fundamental analysis. However, empirical research is (or should be) informed by theory, because the interpretation of empirical analysis is impossible without theoretical guidance. While we do not review in detail papers already covered in prior surveys or those papers covered in concurrent *Journal of Accounting and Economics* survey papers (see, e.g., Beyer et al., this issue; Dechow et al., this issue), we do attempt to recognize linkages between them.

Our survey, in some respects, reiterates a central theme from Kothari (2001). Specifically, academic research that seeks to explore relations between accounting attributes and future firm performance, particularly stock returns, should strive to keep market efficiency as a maintained null hypothesis. The mere finding of an association between an accounting attribute and future stock returns is not prima facie evidence of market inefficiency. As with the research reviewed in Kothari, we continue to find that researchers may be too quick to deviate from the maintained assumption of market efficiency. Furthermore, the documented deviations from market efficiency are many and varied, with little attempt to provide a framework linking them together so as to provide a compelling alternative hypothesis. We are believers in the potential for market inefficiencies; however we think that the hurdle for documenting these inefficiencies is non-trivial.

Our survey also contains a citation analysis of recently published and working papers on accounting anomalies and fundamental analysis. This citation analysis lets the "academic research market speak" on which research papers on accounting anomalies and fundamental analysis have attracted the attention of other researchers and have had a meaningful impact on the subsequent literature. While many of the most highly cited papers are from finance journals, there are some very influential papers from accounting journals that are broadly cited in both types of journals (see, e.g., Xie, 2001; Richardson et al., 2005).

We conduct a citation analysis on papers disseminated in the last decade and find four main clusters of overlapping citations common among these papers. We apply the following labels to the four clusters of research papers: *Fundamental Analysis, Accruals Anomaly* (including related investment anomalies), *Underreaction to Accounting Information* [including post-earnings announcement drift (hereafter PEAD) and other forms of momentum], and *Pricing Multiples and Value Anomaly*.

The *Fundamental Analysis* cluster cites a number of prior foundational papers including Abarbanell and Bushee (1997, 1998) and Feltham and Ohlson (1995). The citation foundation of the *Accruals Anomaly* cluster is from Sloan (1996). The *Underreaction to Accounting Information* cluster most often cites Bernard and Thomas (1989, 1990), Foster et al. (1984), and Jegadeesh and Titman (1993) as foundational papers. The *Pricing Multiples and Value Anomalies* cluster is bound together by references to the foundational papers of Basu (1977), Reinganum (1981), Ball (1992), and Fama and French (1993, 1995).

We categorize, evaluate, and discuss some of the main research advances after the year 2000 in each of the four research clusters. In addition, we identify what we believe to be essential components of "good" archival empirical research within the accounting anomalies and fundamental analysis umbrella. Those components are: (1) credible alternative hypotheses (relative to market efficiency) with sound theoretical foundations; (2) robust (in and out of sample) predictive power; (3) a sound treatment of risk; (4) a sound treatment of transaction costs (for research looking at future stock returns); (5) attempting to document additivity to pre-existing accounting attributes; and (6) incorporating non-price based tests to help strengthen inferences about risk versus mispricing. We then use these key ingredients to provide a structure for our survey.

The questionnaire we distributed to investment professionals and to accounting academics indicate some interesting similarities and differences of opinion regarding the current state of research on accounting anomalies and fundamental analysis and where that literature should proceed. While our findings suggest that many of the conventions and techniques used in academic research differ from those in the investment community, both the practitioners and academics who completed our questionnaire placed high importance for future academic research on theoretically motivated empirical tests of investor behavior; empirical tests of asset pricing, risk, and factor models; empirical research on forecasting firm and industry fundamentals; and the empirical discovery and investigation of new "anomalies" or signals.

[1] We keep the discussion of accounting anomalies and fundamental analysis distinct from each other as this is how the literature has evolved. But we note that fundamental analysis could be characterized as subsuming the accounting anomaly literature (i.e., both have the primary goal of forecasting earnings and returns).

We conduct our own empirical analyses to help illustrate some concepts and approaches to be considered and applied in future research studies. Specifically, based on the prominence of the accruals and PEAD anomalies in the recent literature and the practitioner interest in innovations related to empirical tests of investor behavior, asset pricing, and risk and factor models, we illustrate the time-series variation in the negative relations between future returns and both accruals and PEAD, and whether these relations are robust to a more comprehensive empirical treatment of risk and transaction costs, both from an ex ante and ex post perspective. Our empirical analysis shows that the negative relation between accruals and future stock returns is robust to a comprehensive treatment of risk and transaction costs, but that it has greatly attenuated in recent years (see also Green et al. (2009) for accruals anomaly only). For the relation between PEAD and future stock returns, we find that the relation is only marginally significant after accounting for transaction costs and that it has also greatly attenuated in recent years.

In addition, we provide suggestions for future research on accounting anomalies and fundamental analysis. Based on our citation analysis, literature review, practitioner/academic questionnaire, and empirical analyses, we identify six major areas of opportunity. First, there is a significant opportunity for researchers to provide greater structure to the forecasting exercise. To date, very little research combines multiple accounting attributes to forecast future earnings or returns. Second, there is a lack of research that uses macroeconomic data to forecast future earnings, risk, and value. Third, current research does not fully exploit the wealth of information contained in general purpose financial reports. Fourth, there appear to be limitations to current forecasting techniques and opportunities to overcome these limitations. Fifth, we discuss the use of accounting information by external capital providers beyond common equity holders. With the increased development of credit markets in the last decade there is now a wealth of data available on credit related instruments that can be used to help make inferences about the usefulness of accounting information for a wider set of capital providers. Sixth, we note that many capital market participants are using the same information sources to forecast future earnings and stock returns. This has lead to increased correlation in stock price movements, creating interesting market settings to explore how information is impounded into security prices.

1.1. *Relation to prior surveys*

While we are arguably the first to provide a focused survey of the vast archival empirical literature related to accounting anomalies and fundamental analysis, there are a number of prior surveys. Perhaps the paper most related to our survey is Kothari (2001) and the related Lee (2001) discussion. As the coverage of Kothari captures the broad umbrella of capital markets research in accounting, it also includes a thorough review of the academic literature related to accounting anomalies and fundamental analysis prior to 2000. Appendix A highlights key attributes of several of the more recent survey papers. A general pattern across this previous work is that the focus tends to be on older, and non-accounting related research. In particular, recent finance surveys on anomalies focus almost exclusively on behavioral finance and do not cover accounting anomalies or fundamental analysis. Classic papers such as Fama (1970), and recent papers like Keim and Ziemba (2000) and Barberis and Thaler (2003), focus on issues related to market efficiency; such as technical, fundamental and event-driven anomalies, and the now maturing field of behavioral finance. Also, because our review of accounting anomalies and fundamental analysis is related to valuation, we refer the reader to insightful reviews contained in Damodaran (2005), Ohlson (2009), and Easton (2009).

The rest of the paper proceeds as follows: Section 2 uses citation analysis to identify high impact papers from the recent literature and organizes the literature into four main research clusters. Section 3 summarizes the results of a questionnaire of investment professionals and accounting academics. Section 4 provides a synthesis of recent advances in each of the research clusters identified above. Using the relation between accruals (and SUEs) and stock returns as case studies. Section 5 presents a benchmark model for evaluating accounting anomalies employing a more-encompassing definition and treatment of risk and transaction costs. Building on the findings in Sections 2–5, we then discuss our suggestions for future research in Section 6. Section 7 summarizes and concludes.

2. Citation and cluster analysis

Our survey focuses on research studies published or circulated after the year 2000. As a starting point, we use academic citation data to identify high impact research papers on anomalies and fundamental analysis. Using citation analysis to quantify research impact has solid foundations in the accounting literature (e.g., McRae, 1974; Brown and Gardner, 1985a, 1985b; Brown and Heufner, 1994). In general, academic citation analyses use the number of citations listed on the *ISI Web of Science* and the *SSCI (Social Sciences Citation Index)*.[2] However, this citation data can paint an incomplete picture of important recent developments and innovations in an academic field. Moreover, with the advent of the internet and research sites such as the *Social Sciences Research Network (*www.ssrn.com*)* and *Research Papers in Economics (www.repec.org),* working papers are quickly and widely cited by other researchers.

[2] For example, Schwert (2007) uses *ISI Web of Science* citation data to rank papers published in the *Journal of Financial Economics* between 1974 and 2005 by the number of citations per year. Citations reported in *ISI Web of Science* are for published papers that receive citations from other published papers drawn from a set of widely-read academic journals.

Therefore, to capture a broad and timely picture of recent papers on accounting anomalies and fundamental analysis literature, we apply the methods of Keloharju (2008) and analyze citations using results returned by Google Scholar, a service that complements the citations generated by the core journals covered by *ISI Web of Science* with citations from other journals and, more importantly, from working papers. We collect the citation data by using the general citation search function of Anne-Wil Harzing's "*Publish or Perish*" program, downloadable at http://www.harzing.com/. This program uses on-line data from Google Scholar to generate the cumulative number of citations to each paper. Because the cumulative number of citations to a research study depends not only on impact, but also on the passage of time since its original circulation or publication, we follow Schwert (2007) by accounting for this "age effect" and divide the number of citations by the number of years since original circulation or publication of a paper.

We construct a list of the most highly cited recent papers by first performing a keyword search on the *ssrn.com* e-library database to identify candidate working papers and published papers related that to financial market anomalies and fundamental analysis.[3,4] We then scan the titles and abstracts of the candidate papers to determine if they (i) were posted or published after the year 2000, and (ii) focus on or have implications for empirical tests of accounting anomalies and fundamental analysis. We then obtain citation counts for these papers from Google Scholar using the "*Publish or Perish*" program. We collect citations to both working paper versions and published versions of each paper and combine duplicate entries to the same article and correct erroneous title, year, and publication year information.

2.1. Citation impact results

For the sake of brevity, the full list of the most highly cited research papers on anomalies and fundamental generated by our search of Google Scholar can be obtained from the authors directly. The ten papers with the highest average number of citations per year are:

(1) Jegadeesh and Titman (Journal of Finance, 2001), "Profitability of momentum strategies: an evaluation of alternative explanations (Jegadeesh and Titman, 2001)."
(2) Hong, Lim, and Stein (Journal of Finance, 2000), "Bad news travels slowly: size, analyst coverage, and the profitability of momentum strategies (Hong et al., 2000)."
(3) Diether, Malloy, and Scherbina (Journal of Finance, 2002), "Differences of opinion and the cross-section of stock return (Diether et al., 2002)."
(4) Zhang (Journal of Finance, 2005), "The value premium (Zhang, 2005)."
(5) Chan, Chan, Jegadeesh, and Lakonishok (Journal of Business, 2006), "Earnings quality and stock returns (Chan et al., 2006)."
(6) Lewellen (Journal of Financial Economics, 2004), "Predicting returns with financial ratios (Lewellen, 2004)."
(7) Zhang (Journal of Finance, 2006), "Information uncertainty and stock returns (Zhang, 2006)."
(8) Xie (Accounting Review, 2001), "The mispricing of abnormal accruals (Xie, 2001)."
(9) Richardson, Sloan, Soliman, and Tuna (Journal of Accounting and Economics, 2005), "Accrual reliability, earnings persistence and stock prices (Richardson et al., 2005)."
(10) Vuolteenaho (Journal of Finance, 2002), "What drives firm-level stock returns? (Vuolteenaho, 2002)."

Of the 165 papers, there are 54 papers published in accounting journals. The 10 papers published in accounting journals with the highest average citations per year are:

(1) Xie (Accounting Review, 2001), "The mispricing of abnormal accruals (Xie, 2001)."
(2) Richardson, Sloan, Soliman, and Tuna (Journal of Accounting and Economics, 2005), "Accrual reliability, earnings persistence and stock prices (Richardson et al., 2005)."
(3) Hirshleifer and Teoh (Journal of Accounting and Economics, 2003), "Limited attention, information disclosure, and financial reporting."
(4) Khan (Journal of Accounting and Economics, 2008). "Are accruals mispriced? Evidence from tests of an intertemporal capital asset pricing model (Khan, 2008)."
(5) Mashruwala, Rajgopal, and Shevlin (Journal of Accounting and Economics, 2006), "Why is the accrual anomaly not arbitraged away? The role of idiosyncratic risk and transaction costs (Mashruwala et al., 2006)."
(6) Fairfield, Whisenant, and Yohn (The Accounting Review, 2003), "Accrued earnings and growth: implications for future profitability and market mispricing (Fairfield et al., 2003)."

[3] The keyword search on SSRN included separate searches based on the following key words in the title or abstract of papers posted on SSRN: "accounting anomaly", "fundamental analysis", "fundamental accounting", "valuation fundamental", "accounting inefficiency", "market inefficiency", "earnings drift", "price multiple", "book market equity", "accruals anomaly", and "accounting reaction". We also use the bibliographic references in these papers to identify other recent papers on accounting anomalies and fundamental analysis that were not captured by our initial keyword searches on SSRN.

[4] The bibliographic references contained in each paper are also used to classify related research papers and topics. This analysis is discussed in the next subsection.

(7) Beneish and Vargus (*The Accounting Review*, 2002), ''Insider trading, earnings quality, and accrual mispricing (Beneish and Vargus, 2002).''
(8) Desai, Rajgopal, and Venkatachalam (The Accounting Review, 2004), ''Value-glamour and accruals mispricing: one anomaly or two? (Desai et al., 2004).''
(9) Pincus, Rajgopal, and Venkatachalam (The Accounting Review, 2007), ''The accrual anomaly: international evidence (Pincus et al., 2007).''
(10) Bartov, Radhakrishnan, and Krinsky (The Accounting Review, 2000, ''Investor sophistication and patterns in stock returns after earnings announcements (Bartov et al., 2000).''

2.2. Organizing the literature: common citations to prior work

In the previous subsection, we used citation analysis of both published papers and working papers to identify which research papers on accounting anomalies and fundamental analysis have attracted the attention of other researchers and therefore have had an influence on the subsequent literature. Then we organize the literature by identifying clusters of research papers that have overlapping references to prior research studies.

In order to identify clusters of papers and topics, we look for common citation patterns across research papers. We start with the sample of highly cited papers in Section 2.1 and then join all citations from these papers with other research papers. Each unique cited research paper is given an identifying code.[5] After coding each cited paper, we perform a *k*-means cluster analysis of overlapping citations from papers in our main sample. We limit the number of possible clusters to less than six to create a tractable mapping of the literature. The cluster analysis reveals four main clusters of overlapping citations to common sets of prior papers. Upon examination of the papers in the four main clusters, we assign the clusters the following labels: *Fundamental Analysis, Accrual Anomaly, Underreaction to Accounting Information, Pricing Multiples and Value Anomaly*. These four main categories largely span the literature. In addition, the four clusters include subcategories of related studies such as investment anomalies (falling within the *Accruals Anomaly* cluster), earnings drift related anomalies (e.g., PEAD), return momentum (falling within the *Underreaction to Accounting Information* cluster), and information uncertainty (as it relates to *Underreaction to Accounting Information).*[6] We use these clusters to organize Section 4 of the paper, which reviews the literature on accounting anomalies and fundamental analysis.

3. Academics' and practitioners' opinions on anomalies/fundamental analysis

In addition to our citation analysis of high impact research papers on accounting anomalies and fundamental analysis, we supplement this with a survey of the academic and practitioner communities. In this section, we highlight some of the key responses received from the academic and practitioner respondents to the questionnaire. Throughout the rest of our survey, we weave the respondents' insights into our review of the literature (Section 4), and into our suggestions for research (Section 6).

Past and future demand for research on accounting anomalies and fundamental analysis is potentially influenced by what happens in practice. Therefore, to assess the relevance of past research and help indicate directions for future research, we survey investment professionals and academics to gain a better understanding of how they view the state of the art on the fundamental analysis and anomalies research. In doing so, we document any differences in opinions on research between these two major constituents, as well as assess the awareness, demand for, and use of academic research on accounting anomalies and fundamental analysis.

3.1. Practitioner questionnaire

To survey the opinions of investment professionals on the broad topic of academic research on investment strategies, accounting anomalies and fundamental analysis, we worked in cooperation with the market research group of the *CFA Institute* to construct and administer a mini-survey of investment professionals. We constructed the survey questions in order to capture how investment professionals apply fundamental analysis and other quantitative techniques in their daily job activities and how academic research informs their practice. In addition, we included questions about the sources and uses of ''research information'' for their daily job activities. The market research team from the CFA Institute provided suggestions on the format of the questions that would maximize the likelihood and usefulness of the survey responses. We were not allowed to collect detailed demographic information from the respondents due to CFA restrictions. Furthermore, since we had to work within CFA's resource constraints, our final response rate may have been limited. Once the CFA Institute survey was distributed, we used a similar format for the academic survey.

[5] This coding process was partially automated and, as a result, was subject to some errors as some papers in our sample cite the working paper version of a study, while other papers include a more up-to-date citation of the published version of the same study. In addition, there are also possible transcription errors by both authors of the papers and by us in tabulating references to create the citation database.

[6] Again, for the sake of brevity, the full tabulation of papers within each cluster is available from the authors upon request.

The practitioner survey was administered and distributed by the CFA Institute via e-mail on January 26, 2009. A reminder e-mail was sent to non-respondents February 10, 2009 and the survey closed on February 12, 2009. The population from which the sample was drawn consisted of all active members of the *CFA Institute*, excluding those without a valid e-mail address and those that requested not to be sent e-mails or surveys. The sample was generated using a stratified random sampling technique; this produced a representative sample of 6,000 members to receive the survey based on key demographics (in this case, region and years holding the CFA charter). There are, of course, limitations to our sampling procedure. For example, it is possible that we ended up sampling multiple individuals from the same entity, thereby violating the assumption of independence across responses. Alternatively, we could have identified a non-representative set of the investor community. We tried to mitigate these eventualities by working with the CFA Institute research team, but ultimately we were unable to quantify these potential concerns due to our inability to access data on participant demographics. We obtained 201 usable responses, giving an overall response rate of 3.4%. While this response rate may seem low at first glance, it is useful to compare it to the 8.5% response rate in Graham and Harvey (2001), which had the benefit of targeted mailing and repeated follow-ups.

3.2. Academic questionnaire

In order to benchmark and contrast the practitioners' opinions, we sent the questionnaire described in Section 3.1. to academics who work and teach in the field of financial analysis. The sample of academics was identified by randomly selecting 40 active researchers whose names appear in the academic references listed at the end of this paper and 40 accounting academics who teach financial statement analysis (FSA) classes to MBA students. The sample of FSA teachers was identified from a Google search using the combined search terms: "MBA," "Financial Statement Analysis, and "Syllabus."[7] The e-mail questionnaire was sent out to the sample of academics in May and June of 2009. The cutoff for the academics' responses was June 30, 2009. As of that date, 63 out of 80 (79%) of the academics in the sample responded to the survey questions. The number of academic respondents for each question is listed in Table 1. The high response rate likely resulted from the fact that the e-mailed survey directly identified the purpose of the survey (i.e., for the upcoming *Journal of Accounting and Economics Conference)* as well as the likely familiarity of the respondents with the names of the accounting academics who conducted the survey.

3.3. Analysis of responses to survey questions

Table 1 provides a summary tabulation of the responses to each of the survey questions. The samples consist of 201 practitioner responses to the questionnaire and 63 academic responses to the questionnaire. The test of difference across the sample mean for each answer is calculated using a chi-square test of populations of unequal size and unequal variance. The *p*-values are adjusted using Cochran–Cox's approximation of the degrees of freedom for unmatched samples.

While there are many consistent responses across the sample of practitioners and academics, we highlight some of the key differences. For example, Question 1 of the survey asked "Which risk model is most appropriate for risk calibration of an equity trading strategy?" There is a large gap between the opinions of academics and practitioners. While 55% of academics recommend some variation of the Fama-French 3-factor model, only 29% of practitioners recommended this approach. The largest fraction of practitioners (35%) recommended the use of a CAPM model with industry and size adjustments, while only 7% of academics recommended this approach. This observation suggests a striking difference between how academics and practitioners assess risk.

We revisit this issue directly in more detail in Section 5, but for now we note that a key source of this difference stems from one's perspective in thinking about risk. Academic research seeks to test the nature of the relation between a given attribute such as accruals and future returns. To the extent that the documented association is a manifestation of risk, then standard ex post analyses such as the Fama and French time-series factor-mimicking portfolio regressions are appropriate techniques to help distinguish risk and mispricing explanations for an observed relation between an attribute and future returns. Therefore, the academic responses indicating the Fama-French approach as the model of choice is not surprising. However, to the extent that one is interested in constructing a portfolio that optimally trades off expected returns and expected risk, one may wish to look at more than the three mimicking factors that are included in the standard Fama and French testing procedure. The practitioner responses suggest that industry membership is an important consideration for risk. Given that a significant portion of cross-sectional variation in returns can be attributable to industry membership, and the desire of equity investment managers to minimize tracking error relative to index benchmarks, it is not too surprising to see this difference in opinion on the importance of industry membership in the context of risk.

Another area with a major difference of opinion arises in Question 4 of the survey that focuses on which techniques were used and generated successful outcomes for equity trading strategies. The most striking feature of the responses is the concentration of academics along the 'neutral' dimension. This is perhaps a reflection of the difference in beliefs in

[7] Additional factors influencing the selection of the sample of FSA teachers includes: (a) the availability of the FSA teacher's valid e-mail address as generated from the Google search criteria, and (b) the ranking of the FSA teacher's website/web presence as generated by Google (we sequentially gathered e-mail addresses based on the appearance of web hits generated from the original Google search criteria).

market efficiency across academics and practitioners, and is perhaps not surprising given the self-selection to respective professions. We also note that there are large differences of opinion on the success of various strategies over the past decade. While 61% of practitioner respondents claimed that earnings or cash flow momentum was successful, only 22% of

Table 1
Summary of results of questionnaire/survey of investment professionals' and academics' opinions on academic research on fundamental analysis and equity market anomalies.

The samples consist of 201 practitioner responses to the questionnaire and 63 academic responses to the questionnaire. The differences across the sample mean for each answer are calculated using a chi-square test of populations of unequal size and unequal variance. The *p*-values are adjusted using Cochran–Cox's approximation of the degrees of freedom for the unmatched samples.

Q1: Which risk model is most appropriate for risk calibration of an equity trading strategy?

	Practitioner opinions (%)	*Academic opinions* (%)
CAPM with size and industry adjustments	35	*7***
Fama-French 3-factor model (market, size, book value/market value)	24	*22*
Multifactor model	11	*4***
Other model	11	*15*
CAPM	10	*4**
Fama-French 3-factor model plus other factors	5	*33***
CAPM with size adjustments	4	*15***

Q2: Which risk model(s) have you used in the last 12 months for risk calibration of an equity trading strategy?

	Practitioner opinions (%)
CAPM with size and industry adjustments	29
Fama-French 3-factor model (market, size, book value/market value)	10
Multifactor model	15
Other model	8
CAPM	23
Fama-French 3-factor model plus other factors	4
CAPM with size adjustments	11
There are no academic responses to question 2.	

Q3: What effect do you think the current financial market will have on the use and/or demand for each of the following? (Practitioner—solid/*Academic*—*italics*)

	Increase use/ demand (%)	No effect (%)	Decrease use/ demand (%)
	69	22	9
Practitioner demand for new academic research on fundamental analysis/anomalies	*55**	*37**	*8*
Risk models used in investment management (general)	68	17	14
	68	*24*	*8*
Techniques used in fundamental analysis and quant fund management	55	31	14
	62	*34*	*4***
Risk models used in investment management (quant funds specifically)	58	19	23
	60	*29*	*21*
PhDs in quant fund management	26	38	37
	27	*49*	*24**

Q4: For the following equity trading strategies, please indicate how successful each has been over the past decade? (Practitioner—solid/*Academic*—*italics*)

	Successful (%)	Neutral (%)	Unsuccessful (%)
Earnings or cash flow momentum	61	28	11
	*22***	*65***	*13*
Value strategies (for example, book value multiples)	56	28	16
	52	*35*	*13*
Growth strategies (for example, earnings growth)	57	25	18
	*22***	*52***	*26*
Return momentum	47	35	18
	*70***	*26*	*4***
Misreaction to earnings announcements or management forecasts	40	42	18
	52	*44*	*4***
Accounting quality (for example, accruals anomaly)	41	36	23
	*74***	*22***	*4***
Misreaction to analyst forecasts	29	45	26
	35	*60***	*5***

Q5: For the following equity trading strategies, how frequently each will be used over the next five years? (Practitioner—solid/*Academic*—*italics*)

	Frequently (%)	Infrequently (%)	Never (%)
Earnings or cash flow momentum	70	27	3
	*46***	*54***	*0**
Value strategies (for example, book value multiples)	58	39	3
	*83***	*13***	*4*
Growth strategies (for example, earnings growth)	53	39	8
	*30***	*61***	*9*
Return momentum	48	48	4
	*74***	*22***	*4*
Misreaction to earnings announcements or management forecasts	37	59	4
	*71***	*29***	*0**
Accounting quality (for example, accruals anomaly)	37	57	6
	*71***	*29***	*0***
Misreaction to analyst forecasts	32	59	9
	*50***	*46**	*4**

Q6: Over the last 12 months, how often have you used the following valuation techniques in your work? (Practitioner—solid/*Academic*—*italics*)

	Frequently (%)	Infrequently (%)	Never (%)
Earning multiples	74	2	3
	*54***	*33*	*13***
Book value multiples	52	41	7
	*38**	*50*	*12*
Cash flow multiples	53	39	8
	*25***	*29*	*46***
Discounted free cash flow model	59	28	13
	58	*38*	*4***
Discounted dividend model	26	43	31
	21	*50*	*29*
Residual income (economic profit) model	16	46	38
	*71***	*17***	*12***
Other multiples	26	25	49
	23	*41**	*36**
Other valuation models	25	22	53
	29	*38***	*33***

Q7: How frequently do you read or reference the following academic and practitioner research for your work? (Practitioner—solid/*Academic*—*italics*)

	Regularly (%)	Sometimes (%)	Never (%)
Journal of Finance	10	44	46
	*83***	*14***	*3***
Journal of Financial and Quantitative Analysis	5	32	63
	8	*67***	*25***
Journal of Financial Economics	6	26	68
	*72***	*28*	*0***
Review of Financial Studies	6	23	71
	*51***	*45***	*4***
Journal of Banking and Finance	6	23	71
	*0***	*32*	*68*
Journal of Accounting and Economics	3	16	81
	*88***	*8*	*4***
Contemporary Accounting Research	0	18	82
	*48***	*48***	*4***
The Accounting Review	1	14	85
	*92***	*8*	*0***
Journal of Accounting Research	1	11	88
	*92***	*8%*	*0***
CFA Magazine	48	44	8
	*0***	*32*	*68***
Financial Analysts Journal	49	37	14
	*24***	*60***	*16*
CFA Institute Conference Proceedings Quarterly	28	46	26
	*0***	*17***	*83***
Journal of Portfolio Management	12	34	54
	*4***	*44*	*52*
Journal of Investment Management	6	31	63
	*0***	*11***	*89***

Table 1 (*continued*)

Q7: How frequently do you read or reference the following academic and practitioner research for your work? (Practitioner—solid/*Academic*—*italics*)

	Regularly (%)	Sometimes (%)	Never (%)
Journal of Investing	3	28	69
	*0**	*16***	*84**
Journal of Fixed Income	2	22	76
	0	*8***	*92***
Journal of Applied Corporate Finance	2	18	80
	4	*72***	*24***
European Financial Management	1	10	89
	0	*7*	*93*

Q8: How frequently do you read or reference the following new, unpublished academic research for your work? (Practitioner—solid/*Academic*—*italics*)

	Regularly (%)	Sometimes (%)	Never (%)
Papers posted on specific university department or business school websites	7	39	54
	*20***	*52*	*28***
Papers posted on specific faculty member or researcher websites	6	38	56
	*21***	*71***	*8***
Papers posted on "Social Sciences Research Network" (http://www.ssrn.com)	9	18	73
	*95***	*5***	*0***
Papers posted on "EconPapers" (http://econpapers.repec.org)	4	12	84
	*16***	*41***	*43***

Q9: How important is it that future academic research on fundamental analysis and anomalies focus on the following? (Practitioner—solid/*Academic*—*italics*)

	Important (%)	Neutral (%)	Not important (%)
Empirical tests of investor behavior	62	22	16
	*92***	*8***	*0***
Empirical research on forecasting firm and industry fundamentals	59	25	16
	*75**	*15*	*10*
Empirical tests of asset pricing, risk, and factor models	62	20	18
	52	*44***	*4***
Empirical discovery and investigation of new "anomalies" or signals	55	25	20
	55	*36*	*9***
Theoretical models of investor behavior	51	29	20
	*68**	*28*	*4***
Empirical implementation of trading strategies	51	26	23
	63	*28*	*9***
Theoretical asset pricing, risk, and factor models	44	31	25
	56	*37*	*7***
Theoretical models of trading strategies	27	43	30
	*48***	*48*	*4***

Q10: Overall, do academic research studies about anomalies/trading strategies have appropriate emphasis on: (Practitioner—solid/*Academic*—*italics*)

	Too much emphasis (%)	Appropriate emphasis (%)	Not enough emphasis (%)
Theoretical foundations of a strategy?	21	61	18
	*4***	*40***	*56***
Empirical tests of a strategy?	11	64	25
	*24***	*40***	*36*
Possible (alternative) risk-based explanations?	7	54	38
	*24***	*40**	*36*
Potential market impact of executing a strategy?	10	44	46
	4	*28**	*68***
Economic/psych. origins of an anomaly that leads to a strategy?	8	42	50
	*3**	*65***	*32**
Real world transactions and trading costs for a strategy?	9	41	50
	5	*36*	*59*
Applicability of strategy to other markets (countries/types of markets)?	4	45	51
	*12***	*47*	*41*

* Indicates difference in means across practitioner and academic sample answers are significant at 5% level.
** Indicates difference in means across practitioner and academic sample answers are significant at 1% level.

academic respondents believed that this type of strategy was successful. Similarly, 57% of practitioner respondents claimed that growth strategies were successful, while only 22% of academic respondents believed that growth strategies were successful, and 56% of practitioners and 52% of academics claimed that value strategies were successful. On the other hand, 74% of academic respondents believed that accounting quality was a successful strategy over the past decade, a percentage that far exceeds the 41% of practitioner respondents who believe that this signal was successful over the same period. These differences of opinions point to possible differences in how expected returns and risks are measured, and how trade impact and transactions costs are quantified and accounted for in trading models.

The responses to Question 6 are particularly germane to our topic of review: fundamental analysis. We observe significant differences between academics and practitioners about the type of valuation model they use. 71% of academics note they use some version of residual income valuation and only 16% of practitioners use this type of valuation model. Instead, we see 74% (52%) of practitioners using simple earnings (book) multiples. These contrast with only 54% (38%) of academics respectively. This is suggestive of simplistic heuristics being used in practice but can also indicate that the quality of inputs necessary to use residual income valuation approaches (most notably forecasts of future earnings and earnings growth) is currently too low to be fully harnessed in practice. We come back to this issue in Section 4 when discussing the state of the current literature on accounting anomalies and fundamental analysis.

In terms of what academics and practitioners would like to see from future research we do observe some similarities. Notably the responses to Question 9 suggest that empirical research on forecasting firm and industry fundamentals is viewed to be important [59% (75%) of practitioners (academics) view this as important], empirical discovery of new variables to assist in forecasting earnings or returns is viewed to be important [55% (55%) of practitioners (academics) view investigation of new anomalies as important]. But we continue to see some striking differences, especially on the need for theory, where academics find it more important than practitioners. We see that academics view the need for theory as very important, as evidenced by the greater weight of responses on tests of investor behavior [62% (92%) of practitioners (academics) view this as important], theoretical models of investor behavior [51% (68%) of practitioners (academics) view this as important], and theoretical models of trading strategies [27% (48%) of practitioners (academics) view this as important]. While these responses do not help us shed light as to what that 'theory' would be, it is useful to note that this is of general concern to the literature that we review. As we detail further in Section 4, we feel that it is paramount for all research in accounting anomalies and fundamental analysis to rest on sound and testable hypotheses.

Also, we note that there is considerable agreement on where the current state of research is lacking. Question 10 asks respondents to comment on whether various aspects of the current research have the correct emphasis. Similar to the responses for Question 9, we find that academics view the current research as having too little emphasis on theoretical foundations [18% (56%) of practitioners (academics) view this as insufficiently emphasized]. However, both academics and practitioners, find that current research does not adequately reflect transaction costs: 68% (46%) of academic (practitioner) respondents believe that there is too little emphasis on the potential market impact of executing a trading strategy, and 59% (50%) of academic (practitioner) respondents believe that there is too little emphasis on the impact of real world trading costs for a strategy. We revisit the topic of transaction costs, both from an ex ante and ex post perspective, in Sections 4 and 5 of this study. For now, we note that a key limitation is access to high-quality trade data that would allow researchers to calibrate meaningful models of market impact, and hence incorporate that into the empirical analysis. We are fortunate enough to have access to such data which we explore in Section 5.

4. Survey of recent research papers

In this section, we summarize a framework for research on fundamental analysis and accounting anomalies. We outline why forecasting is an important activity for current and potential investors in a firm. The decision-making usefulness of financial information is ultimately tied to its ability to generate reliable and accurate forecasts of a firm's future earnings and associated risks, which in turn helps investors make optimal investment decisions. Consistent with this investor perspective, an important objective of empirical archival research is to understand the properties of financial accounting information and how this information might help generate better forecasts of those investment inputs. In so doing, research can then help shed light on other fundamental questions such as market efficiency and more generally the price discovery process.

We also offer a series of broad observations and recommendations about the desirable elements of well-executed archival empirical research on fundamental analysis and accounting anomalies. The main desirable elements are credible alternative hypotheses with solid foundations, robust (in and out of sample) predictive power, a sound treatment of risk and transaction costs, evidence that an 'anomalous' relation is incremental to relations that have been previously documented in the literature, and the inclusion of supplemental non-price tests (in addition to price- and returns-based tests) to strengthen inferences about market efficiency. Section 4.2 expands on these observations and recommendations.

Next, we use these observations and recommendations to place the literature into context and offer our critique. Rather than compile an exhaustive summary of each and every paper that has been written over the last decade on these topics, we discuss some general themes that emerge along with our critique on what we see the research lacking.

4.1. Forecasting framework

To help place some structure on the forecasting that is at the heart of the research in accounting anomalies and fundamental analysis, it is useful to start with the traditional dividend discount model. Most, if not all, of the papers we survey start with this model and combine it with the additional assumption of clean surplus accounting (i.e., net dividends, D, is equal to income, Y, less the change in book value, BV). As Ohlson (1995), Kothari (2001) and others have shown, this model gives price as a function of earnings, expected returns, and change in book value:

$$P_t = \sum_{\tau=1}^{\infty} E(D_{t+\tau})/(1+r)^{\tau} = \sum_{\tau=1}^{\infty} E(Y_{t+\tau} - \Delta BV_{t+\tau})/(1+r)^{\tau} \tag{1}$$

Eq. (1) is a simple transformation stating that price is a function of forecasted (expected) returns (r), and forecasted (expected) future financial statement variables (Y and BV). This framework shows that it is important to forecast returns, earnings and asset growth. This framework, similar to the Fama and French (2006) framework, suggests that expected (and hence realized returns) should be positively related to expected profitability and negatively related to asset (or book) growth, and much empirical evidence supports this basic prediction.

The framework offers several key insights. First, given price and forecasts of accounting information (i.e., income and growth in book values), one can estimate the expected rate of return. This is the literature on implied cost of capital, which we discuss later. Importantly, this approach assumes both market efficiency and accuracy in the forecasts of accounting information. As we note later, deviations from these assumptions cast doubt on the quality of estimates of implied cost of capital. Second, given forecasts of expected returns and accounting information, one can estimate an intrinsic value (V) as is done in the fundamental analysis literature. In contrast to the implied cost of capital literature, this approach entertains the possibility of inefficient prices to the extent that the estimated intrinsic value is then compared with price (e.g., V/P). Third, if one is able to predict future accounting information and show that these forecasts are different from those embedded in price, it is possible to use this framework to forecast excess returns. This is the accounting anomalies literature. If investors' expectations of future earnings are higher (lower) than actual future earnings, current prices will be too high (low), and future returns will be low (high).

A central feature of the literature that we survey is how investors use accounting information to forecast the level and risk of a firm's dividends and then discount the dividends to estimate the value of claims to a firm. If the estimated value and the observed market value of these claims diverge, then an investor must decide if anticipated gains, net of current and forecasted future transactions costs, are sufficient to generate a profitable investment opportunity.

While the framework described above is a convenient way to link the various papers that we survey, it does not offer much insight from the perspective of how accounting information can help forecast the level and riskiness of firm earnings. We return to this in Section 4.3.1 below.

4.2. Desirable elements of fundamental analysis and accounting anomalies research

In this subsection we describe desirable features of a well-executed archival empirical research study on fundamental analysis and accounting anomalies. In our view, the most important features are a credible alternative hypothesis, robust predictive power, a sound treatment of risk and transaction costs, ensuring incremental forecasting additivity of newly discovered attributes, and the inclusion of supplemental non-price tests to strengthen inferences. We use these six elements as a foundation for discussing recent literature.

4.2.1. Credible alternative hypotheses

Research examining the usefulness of accounting information to forecast future firm performance should strive to articulate credible hypotheses based on solid foundations (such as economic, psychological, and institutional foundations). As argued in Kothari (2001) it is reasonable to maintain a null hypothesis of efficient security prices. Empirical capital markets based research then needs to offer credible alternative hypothesis to this null hypothesis of efficient capital markets. In other words, why will a given piece of accounting information help forecast future earnings and stock returns? This is especially important for research examining the association between accounting attributes and future returns. Why do stock prices fail to incorporate information in a timely and unbiased manner?

As discussed in the context of Eq. (1), it is important to note that the forecasting exercise need not imply market inefficiency (e.g., Fama and French, 2006). Documentation of a given accounting attribute that helps forecast levels of future earnings will help form forecasts of expected returns. This forecasting says nothing about market efficiency or inefficiency. For example, the differential persistence of earnings components that is at the heart of the accruals anomaly (e.g., Sloan, 1996), need not imply anything about market efficiency. It is possible that using earnings components rather than aggregate earnings generates a superior forecast of future earnings, but that the market understands this relation and correctly prices this differential persistence.

A researcher must be able to articulate clearly why it is that a given variable is associated with future returns. Because our focus is on accounting anomalies, we focus on the association coming from one's ability to forecast future fundamentals (e.g., profitability). Therefore, a research study should attempt to highlight the friction through which market prices do not incorporate this fundamental information in a timely fashion. Kothari (2001, p. 173) also makes a similar plea to researchers when he says "… [accounting] research has to move beyond reporting descriptive statistics and evidence of the success of trading strategies into proposing theories and presenting empirical tests of the hypotheses derived from the theories." While we are not suggesting that all forecasting research lacks a sound theoretical foundation, we suggest that researchers articulate a good reason why a given accounting attribute is likely to be useful in generating a superior forecast. In particular, when forecasting future stock returns, there is a high hurdle to be met to explain why stock prices in a highly competitive capital market are not efficient and why a given accounting attribute seems to be ignored by a myriad of individuals who have strong financial incentives to exploit any and all useful forecasting information.

The pursuit for a credible alternative hypothesis is not new. Indeed, Foster et al. (1984) and Bernard and Thomas (1989), two of the most widely cited papers that examine anomalous relations between accounting attributes and future returns, struggle with the reasons for a delayed price response. Kothari (2001) notes potential inconsistencies across research papers on this point. In some cases, there are accounting attributes for which the market under-reacts to the release of that information (e.g., earnings surprises). In other cases there are accounting attributes for which the market over-reacts to the release of that information (e.g., earnings components such as accruals). It is worth re-iterating the importance of well specified, ex ante, predictions on relations between accounting attributes and future returns (or future earnings). Bernard and Thomas (1989, 1990) are a classic example of research that recognizes this importance. They establish a temporal pattern between adjacent earnings surprises and show that the market reaction to the initial surprise is consistent with the market failing to understand the expected pattern of future earnings surprises. Richardson et al. (2005) is another example. They predict that the least reliable components of earnings will be associated with reduced persistence, and provide empirical support for this conjecture. The negative relation between measures of accruals and future returns is then consistent with the capital market ignoring this differential persistence when setting prices. Specifically, stock prices behave as though capital market participants assume earnings components are equally persistent, thereby ignoring the ex ante differential persistence in earnings components when prices are initially set.

4.2.2. Robust predictive power

After articulating a credible alternative hypothesis, a researcher can then seek to document whether the data confirms the conjectured relation. For example, is the attribute (or characteristic) examined robustly related to future returns? Therefore, it is desirable to utilize the longest time series and broadest cross-section of data available. In addition, out-of-sample tests are necessary to strengthen the inferences that can be made about the usefulness of a given accounting attribute to forecast either future earnings or future stock returns. If there are relevant institutional factors or other characteristics that vary through time or across firms, then variation in these influential factors should be tested and variation in the observed outcomes can also be used to strengthen inferences. Tests of predictive ability of a given attribute need to be conducted in a 'fair' manner. The researcher should ensure that all data is available at the time the 'back test' is run (e.g., observations should be ranked based on information that would be available to all investors before they would make investment decisions, and the researcher should allow a 'waiting period' after the end of a fiscal period to be sure that financial statement data was available to investors), and that there are no survivorship issues with the sample.

A good recent example of assessing the robustness of a given relation is Kothari et al. (2006). While not "out of sample" in the sense of testing a given hypothesis in a different time period or geographic region, Kothari et al. test whether a given hypothesis, underreaction to information, holds across different sets of information. Specifically, they take the firm level post earnings announcement drift result documented in Bernard and Thomas (1990) and test whether similar 'anomalous' drift-related price behavior is evident at the aggregate market level. They compute market-level, earnings-change variables and show that while these earnings changes exhibit similar time series properties to those seen at the firm level, there is not any evidence to suggest that aggregate stock prices fail to understand this relation (if anything the relation is of the opposite sign, i.e., when the market experiences a positive aggregate earnings surprise returns are lower in the future). This 'no result' does raise the question on the external validity of the firm level post earnings announcement drift anomaly. But we would emphasize that there are many other papers that show that firm level post earnings announcement drift persisted into the 1990s (after the publication of Bernard and Thomas, 1989) and is evident in other countries.

4.2.3. Risk

Researchers seeking to document a relation between an accounting attribute and future returns, and to attribute these anomalous future returns to inefficient processing of this accounting information by market participants, must take care to ensure that a risk-based explanation is not also consistent with the empirical relation. This is the standard joint hypothesis criticism (Fama, 1970). We encourage researchers to give primacy to the risk-based alternative explanation. Fortunately, there are a variety of empirical tests available to researchers to help distinguish between an efficient risk-based explanation and a market-inefficiency explanation. We stress that the two explanations need not be mutually exclusive, and it is indeed very hard to completely rule out a risk-based explanation as a given attribute can always be 'labeled' as a candidate risk factor (see, e.g., the discussion in Fama and French, 2006; Hirshleifer et al., 2006).

Assessing risk is done with a variety of ex post analyses. These include: cross-sectional regressions of characteristic portfolio returns on candidate risk measures in the Fama and MacBeth (1973) style; time-series regressions of zero-cost characteristic portfolios on candidate mimicking factor portfolio returns in the Fama and French (1993) style; time-series regressions of characteristic portfolio returns on macro state variables in the Chen et al. (1986) style; attempts to track abnormal returns before and after the sorting period to allow for time varying beta to explain the abnormal returns (e.g., Foster et al., 1984); showing that the returns of a zero-cost characteristic portfolio are positive in up and down markets, as a risk explanation would not be consistent with a stable return stream across different macroeconomic environments (e.g., Bernard and Thomas, 1990); and examining the extent to which the future returns are concentrated around subsequent earnings announcements (e.g., Bernard and Thomas, 1989), since returns concentrated in a couple of days around future earnings announcements are harder to attribute to time varying risk explanations, as one would need sharp changes in risk over these relatively short windows.

4.2.4. Transaction costs

Researchers who make inferences from documented associations between an accounting attribute and future returns also need to address trading costs. Specifically, it is important to show that the documented relation cannot be readily explained away by trading costs or other market frictions. This is very important as an inference of market efficiency is quite different if the return magnitude is within the bounds of expected trading costs or not. If it is not, and can be reliably shown to be so, then this would provide more compelling evidence against efficient prices.

The literature takes several approaches to examine the importance of trading costs to support documented associations between accounting attributes and future returns. These tests comprise the following: (i) partitioning the sample on market capitalization, analyst following, trading volume, institutional ownership, idiosyncratic risk (and other variables expected to be associated with trading costs) and examining the strength of the return relation across groups (if the return relation is only in the set of smallest stocks with no analyst coverage, or with little trading volume, then the 'anomaly' is probably not 'implementable' and hence within the bounds of efficient prices), (ii) benchmarking the returns on simple round-trip transaction-cost estimates and combining this round-trip trading cost with the turnover of the proposed strategy to assess if the returns are still significantly different from zero after accounting for the total trading costs, and (iii) examining the symmetry of the return pattern (if it is all driven on the short side of the strategy then it is harder to get over the transaction-cost hurdle, as the borrow cost (or stock lending fee) that needs to be paid to support a short position on a security can be large, especially for smaller, less liquid securities).

It is important to consider what is included in trading costs. It is not only direct costs (e.g., taxes, commissions and crossing the bid-offer spread), but also indirect costs from trading activity impacting prices. Fortunately, there exist benchmark empirical estimates to help with this calibration. For example, using aggregate trading and commission data, Stoll (1993) suggests that the round-trip transaction cost for investing in a large cap common share was about 1%. In the last decade, this round-trip cost has fallen to about 0.3% for the constituents of indexes like the SP 500 and the Russell 1000 (see, e.g., Elkins/McSherry LLC, 2009).

4.2.5. Additivity

One striking aspect of the literature that we survey below is the large and growing set of accounting attributes that have been examined. Given the commonality of business models and the articulation inherent in financial statements, the dimensionality of the relevant attributes for forecasting is not very large and these attributes are certainly correlated. We encourage researchers to carefully consider the previously documented attributes and describe how the new attribute differs (both conceptually and empirically) from what has already been documented in the literature.

Perhaps the most striking example here is the various measures of accruals and external financing. These measures are related in deterministic ways: growth in the balance sheet (measures of accruals) must be financed from somewhere (e.g., measures of external financing). We will discuss this deterministic relation in more detail in Section 4.3.5.1, but we want to highlight the point here that it is important for research to start articulating true incremental contribution to the myriad of existing variables that have been examined previously. Subrahmanyam (2010) notes more than fifty variables that have been examined as potential candidates to explain the cross-section of returns. His summary captures all potential determinants of returns, including changes in expectations about discount rates, which arguably fall outside the scope of our review, but it emphasizes the haphazard nature of this line of research.

To date very few papers have made a serious attempt to bring some structure to the anomaly literature. Fama and French (2006) discussed earlier in this section, and Penman and Zhang (2006) are the most obvious examples. Penman and Zhang first build a theoretically motivated comprehensive forecast of future earnings using previously documented variables. They then use this forecast to split observed earnings multiples into a justified and abnormal component, and show that the relation between earnings multiples and future returns is concentrated in the abnormal component. While we may debate the interpretation of their results (i.e., is the result that the relation between earnings multiples and future returns is concentrated in the 'abnormal' component indicative of mispricing or not?), the paper is worthy in its attempt to provide structure to the earnings forecasting exercise. Irrespective of the nature of the commonality between accounting attributes, future research should strive to impose structure on the growth of the anomaly literature.

4.2.6. Non-price based tests

As discussed in Section 4.2.3, it is often difficult to empirically differentiate between risk-based and market-inefficiency explanations for an accounting anomaly. This is particularly true if one relies exclusively on price- or returns-based tests. While there are a variety of standard ex post analyses that can help rule out a risk-based explanation, researchers can supplement these price- and returns-based tests with non-price tests to further discriminate between risk-based and market-inefficiency explanations for anomalous returns. For example, to the extent that we can observe or infer the actions of particular capital market participants (e.g., sell-side analysts) and their actions are a reasonable proxy for the overall behavior of capital market participants, then this can help give insights into possible "irrational" behavior by market participants. For example, researchers can use sell-side analysts' earnings and price forecasts to examine the extent to which these forecasts are inefficient with respect to the relevant accounting attribute. The benchmark test here is to document whether future analyst forecast errors or revisions can be explained by that accounting attribute. An example of this approach is Bradshaw et al. (2001), who show that analyst forecast errors are more optimistic for firms with high levels of accruals relative to low levels of accruals. This is consistent with analysts failing to incorporate the differential mean reversion of income implied by cross-sectional variation in accruals.

4.3. Using our framework to survey recent research

In this subsection, we summarize and critique key studies that have been circulated since the year 2000 that examine the usefulness of accounting information to forecast future firm performance. We use our six recommendations for archival empirical research studies (credible hypotheses, robust predictive power, sound treatment of risk, sound treatment of transaction costs, incremental additivity, and the inclusion of non-price tests) to serve as our discussion framework. Our citation analysis in Section 3 generates four main clusters of research topics: *Fundamental Analysis, Accruals Anomaly, Underreaction to Accounting Information*, and the *Pricing Multiples/Value Anomaly*. Therefore, we discuss each of our recommendations as they relate to recent research papers in each of these clusters. For some of our recommendations, we group our discussion of fundamental analysis and pricing-multiple papers together.

Given the breadth of the recent literature on fundamental analysis and accounting anomalies, we do not discuss in detail every paper circulated since the year 2000. We are selective in our review of the literature over the past decade that best reflects how research in accounting anomalies and fundamental analysis has developed credible hypotheses, demonstrated robust predictive power, conducted rigorous testing of risk and transaction costs, explored incremental additivity and sought to buttress returns based tests with non-price tests.

4.3.1. Does recent research test credible hypotheses?

4.3.1.1. Fundamental analysis—credible hypotheses. Penman (2009) defines fundamental analysis as "the analysis of information that focuses on valuation." As noted by Kothari (2001), an important motivation for fundamental analysis research and its use in practice is to identify mispriced securities relative to their intrinsic value for investment purposes. Hence, the majority of the fundamental analysis research in accounting seeks to come up with better forecasts of earnings or stock returns to assist in the valuation or identification of mispriced securities. As discussed in Section 4.1, there is a considerable overlap between research on fundamental analysis and accounting anomalies. Fundamental analysis is of interest to believers and non-believers of market efficiency, as it can help us understand the determinants of value to assist in informed investment decisions and the valuation of non-publicly traded assets for which market inefficiency is not a concern.

Eq. (1) is the lens through which all of the literature on fundamental analysis can be evaluated. While it does provide some structure for examining how variables relate to each other, and how variables relate to future profitability, asset growth and returns, it fails to capture the role of an accounting system. Specifically, what is missing from that framework is an explicit statement that financial statement information is produced by an accounting system and that the accounting system may reflect the underlying asset risk of a business. Arguably, an appreciation of how the accounting system reflects risk will lead to a superior understanding of how accounting information can in turn be used to measure and forecast risk. For example, the current accounting system underlying US GAAP and IFRS rests largely on conservative accounting principles. This conservatism generally means that revenues are often deferred until the receipt of revenue is almost certain. Many costs are expensed as soon as they are incurred rather than being capitalized and expensed over many periods (e.g., advertising and research and development expenditures). A result of this accounting system is that book values tend to be less than market values. This wedge between book and market values, the B/P ratio, could be related to the risk of a firm's operations, and hence reflect expected returns. For example, the types of activities that require significant capital and R&D related expenditures to develop are often risky in nature, and this risk is reflected in the conservative accounting principles that govern GAAP.

A good example of how incorporating an understanding of the accounting system can help articulate relations between returns, multiples, and earnings growth can be found in Penman and Reggiani (2010). Starting with the empirical observations that E/P and B/P are associated with future returns and the residual income framework, they show that expected returns are a linear combination of E/P, B/P, and earnings growth. The key to the framework in Penman and Reggiani is that earnings growth and expected returns are not independent as is often assumed in Eq. (1).

For example, consider two firms preparing financial statements under the same accounting system that are facing the same cost of capital with the only difference being that one firm is increasing its investment activity. It is easy to show that the B/P and E/P for the growing firm will be lower. A cursory examination of the multiples suggests that this firm is less risky. But its earnings growth is at risk and once this is recognized there is no difference in expected returns across the two firms.

However, Fama and French (2006), assert that it is possible to isolate determinants of expected returns by varying one of their three components (*B*/*P*, expected asset growth, or expected future earnings), while holding the other two variables fixed. This comparative static approach is limited, as it fails to capture the intended interactions of a well articulated accounting system. For example, growth can affect both reported earnings and book values. As Penman and Zhang (2002) note, biased accounting systems that fail to recognize assets such as advertising and research and development will lead to lower current book values and higher future accounting rates of return. Thus, growth will affect *B*/*P* and expectations of future profitability simultaneously. These linkages get even more complicated when assessing the cross-sectional relation between expected returns, *E*/*P*, *B*/*P*, and earnings growth as is standard in the literature we review, because the components are correlated with each other and are correlated with other potentially relevant variables. Further, there is likely a positive relation between earnings growth and expected returns as captured in Eq. (1). Due to the conservative nature of the accounting system, only relatively certain transactions are reflected in current earnings leaving a lot of uncertain transactions to be recognized later in future periods when they are realized. This creates a natural positive relation between earnings growth and expected returns. The point we want to emphasize here is that there is a great opportunity for future research to explicitly incorporate information from the design of accounting systems into measuring and forecasting risk.

In recent years, fundamental analysis research has generally focused on forecasting earnings, forecasting stock returns, or estimating a firm's cost of capital. Prior to 2000, there was a flurry of research that used accounting variables (and ratios of these variables) to predict future returns (see, e.g., Ou and Penman, 1989; Lev and Thiagarajan, 1993; Abarbanell and Bushee, 1997). In general, these studies either explicitly or implicitly took the idea that if the market does not efficiently price expected earnings and financial statement information, then better forecasts of earnings will predict future returns. This earlier work was certainly subject to the criticism of a ''kitchen sink'' approach to the forecasting exercise. A number of correlated variables were included in predictive regressions for future earnings or future returns leading to concerns of in-sample identification of predictive variables. We emphasize that although the general approach of using accounting information to forecast future earnings is a sound exercise, the selection of explanatory variables should be guided by theory.

More recent fundamentals-based return studies have sought to bring this line of research closer to a credible alternative hypothesis. Several papers in the last decade have focused their analysis on subsets of securities where mispricing is expected to be the greatest.

Piotroski (2000) focuses on neglected high *B*/*P* securities and applies standard financial statement analysis to this subset of stocks and finds surprisingly strong predictive power for future returns. Beneish et al. (2001) apply a two-stage approach to financial statement analysis, first using market based signals to identify likely extreme performers, and then applying fundamental signals to differentiate between winners and losers among the firms identified as likely extreme performers in the first stage. Baker and Wurgler (2006) use a variety of measures of investor sentiment (e.g., share turnover, the closed-end fund discount, and first-day IPO returns) and show that stocks that are difficult to arbitrage exhibit large reversals in months following periods of high aggregate investor sentiment. Zhang (2006) shows that stocks with greater information uncertainty exhibit stronger statistical evidence of mispricing in terms of return predictability based on cross-sectional regressions with an ex ante book-to-market ranking. Finally, Nagel (2005) shows that mispricing is greatest for stocks where institutional ownership is lowest by using institutional ownership as a proxy for the extent to which short-selling constraints bind, and relying on the assumption that short-selling is cheaper for institutional investors. A considerable fraction of recent research in fundamental analysis that links accounting attributes to future returns has started to focus their design on securities where the frictions that would support an ''anomalous'' relation are expected to be the greatest.

These papers are certainly not without criticism, as Guay (2000) summarizes in his discussion of Piotroski (2000). A primary concern is the external validity of the documented results. Specifically, there are a large number of accounting attributes to select from and in various combinations. The standard criticism here is in-sample fitting, or rather, computing test statistics without correcting for the appropriate degrees of freedom. The majority of empirical research in fundamental analysis can be subjected to this criticism as the entire data set is typically examined. To ensure external validity of the results one must use a hold out sample. We come back to this topic in Section 4.3.2 when we talk about robustness, but at this juncture we can state that the F-Score metric originally proposed by Piotroski has held up since the publication of that paper, mitigating criticisms of in-sample fitting (e.g., Mohanram, 2005).

4.3.1.2. Determining the implied cost of capital using fundamentals—credible hypotheses. A large stream of academic research that is closely related to traditional fundamental analysis investigates the measurement of the implied cost of capital (ICC). While there are certainly errors in the measurement of ICC, the quality of this measurement has improved in recent years.

Prior to the recent development of the ICC, most studies have tended to rely on realized stock returns as a proxy for ex ante expected stock returns because they are not directly observable. However, these estimates are problematic because realized returns are noisy (see, e.g., Elton, 1999). To address some of the limitations of asset-pricing methods used to determine a firm's cost of capital, recent accounting and finance studies propose an alternative approach to estimate expected returns: the implied or imputed equity cost of capital (e.g., Claus and Thomas, 2001; Gebhardt et al., 2001; Botosan et al., 2009; Pastor et al., 2007; Easton, 2009). The implied equity cost of capital for a company is the internal rate of return (IRR) that equates the company's stock price to the present value of all expected earnings available to equity-holders. In other words, it is the rate that the market uses to discount the expected earnings of the company as in Eq. (1).

This ICC approach relies heavily on forecasting a firm's future earnings, and much of the work uses analysts' forecasts of future earnings as the key forecasting variable. A key challenge with this approach is the forecasting horizon. Explicit forecasts are typically only available for the next five years and the precision of those forecasts decreases as the horizon lengthens. These constraints necessitate some assumptions about how to calculate terminal values. And given that equity is typically a long duration asset; calculations of expected returns can be very sensitive to these assumptions. A major advantage of the ICC approach to risk measurement is that it does not have to rely on noisy realized returns or on a specific asset-pricing model other than a discounted future-cash-flows model. Therefore, the ICC approach applies standard fundamental valuation techniques and uses observed market prices and forecasts of earnings to derive the market's assessment of the equity risk (cost of capital) of a firm. For the firm as a whole, under the assumption of market efficiency and if one has accurate forecasts of future earnings, one can invert Eq. (1) to solve for r (e.g., Claus and Thomas, 2001; Gebhardt et al., 2001; Easton, 2009).

This approach is based on a sound theoretical foundation, but it is open to multiple interpretations. Hence, we caution against the blind use of these measures of ICC. For example, an estimate of ICC from Eq. (1) can be interpreted as the price one might pay for a given amount of risk and earnings growth. That is, allowing for inefficient prices, the estimate of expected returns extracted from Eq. (1) could merely reflect the extent of that inefficiency. As stated in the introduction, it is reasonable to start with the null hypothesis of market efficiency, but care should be taken when interpreting results that are based on that assumption. Furthermore, the quality of the cost of capital estimate extracted is only as good as the forecasts of earnings and earnings growth rates.

4.3.1.3. Accruals anomaly—credible hypotheses. The accruals anomaly originally documented by Sloan (1996) suggests that firms with high (low) reported accruals in a fiscal period tend to have abnormally low (high) future earnings and stock returns. Sloan's original paper hypothesizes that investors naively fixate on bottom line income and they do not appear to understand that earnings are composed of both operating cash flows and (non-cash) accruals, and that the cash flow and accrual components of earnings have different abilities to predict future earnings. In particular, accruals tend to reverse in future periods, and investors do not appear to understand this time-series property when they develop their forecasts of future earnings and therefore set current stock prices.

Sloan (1996) defines accruals by using changes in balance sheet items, and measures accruals as changes in non-cash working capital minus depreciation expense scaled by average total assets. The precise definition of this accrual measure is as follows:

$$\begin{aligned} Accruals = {} & [(\Delta CurrentAssets - \Delta Cash) - (\Delta CurrentLiabilities - \Delta ShortTermDebt \\ & - \Delta TaxesPayable) - Depreciation]/AverageTotalAssets. \end{aligned} \tag{2}$$

All components of accruals above correspond to the following Compustat data items: (1) current assets (annual field 'ATC' and quarterly field 'ATCQ'); (2) cash and short-term investments (annual field 'CHE' and quarterly field 'CHEQ'); (3) current liabilities (annual field 'LCT' and quarterly field 'LCTQ'); (4) short term debt (annual field 'DLC' and quarterly field 'DLCQ'); (5) taxes payable (annual field 'TXP' and quarterly field 'TXPQ'); (6) depreciation (annual field 'DP' and quarterly field 'DPQ'); and (7) total assets (annual field 'AT' and quarterly field 'ATQ').

A more general definition of accruals is introduced in Richardson et al. (2005). They separate operating from financing activities, and recast the standard balance sheet identity of assets (A) equal to liabilities (L) plus book value of equity (B). Specifically, assets have an operating component (operating assets, OA) and a financing component (financial assets, FA), and liabilities have an operating component (operating liabilities, OL) and financing component (financial liabilities, FL). Re-arranging the basic accounting identity obtains the following:

$$NOA = NFO + B \tag{3}$$

This recognizes that net operating assets (operating assets less operating liabilities) are equal to net financial obligations (measured as short-term debt plus long debt less financial assets) plus book value of equity. This relation also holds for changes:

$$\Delta NOA = \Delta NFO + \Delta B \tag{4}$$

The left-hand side of Eq. (4) is the broad measure of accruals. It captures the current accruals reflected in the original Sloan (1996) measure such as changes in inventory, accounts receivables, and accounts payable. But it also includes many non-current accruals such as intangibles, property, plant and equipment, and deferred employment obligations. Table 1 in RSST outlines all of the various components of the ΔNOA accrual measure. Appendix B summarizes how the original accrual measure from Sloan (1996) is related to the broader definition of accruals in RSST. The main differences are that the Sloan measure ignores non-current accruals, excludes taxes payable, and treats depreciation expense as a current accrual.

The accruals anomaly can be viewed using Eq. (1) as follows: investors attempt to forecast a firm's earnings using both cash flow and accrual information, but they do not properly weight the information. Therefore, they have a biased forecast of future earnings, and the current price is then incorrect. The evidence presented in Sloan (1996) is consistent with the hypothesis that investors do not properly weight earnings components in generating their forecasts. Much of the follow-up work on Sloan (1996) refines the forecasting of future earnings, risk, and returns.

The hypotheses for this area of research are based on priors that certain components of income are expected to be less persistent. Researchers have used these priors to refine research designs over the last decade and focused testing on types of accruals that are most consistent with them. This research has generally found that the various accrual components of income are indeed less persistent than the cash flow component.

The hypothesis development for returns forecasting uses the evidence from the earnings forecasting hypotheses and then combines it with additional assertions about capital market imperfections that can support stock prices that do not completely impound information in a timely manner. This is the most challenging aspect of accounting anomaly and fundamental analysis literature. Kothari (2001, pp. 191–192) comments on this very point. In terms of the accrual anomaly literature, though, there is a well specified prior as to the direction of the expected mispricing. A reasonable null hypothesis is that the market is efficient and investors price components of earnings consistent with their differential ability to forecast future earnings. Hence the alternative hypothesis is that investors assume earnings components are equally persistent, which can then be tested by looking for evidence of differential pricing implications across earnings components. The research has generally found that the accrual component of earnings has a negative association with future returns, consistent with this alternative hypothesis. Of course, there is a remaining question as to why this relation would ever exist (assuming for now that it is not a reflection of risk). One possibility is behavioral biases discussed in, e.g., Hirshleifer (2001) and Subrahmanyam (2007).

The accrual anomaly related papers published in the last decade have sought to extend the original hypothesis in Sloan (1996) that naïve investor fixation on bottom line earnings is the source of the negative relation between accruals and future earnings and returns. First, many papers have exploited measures of investor sophistication or settings where fixation is less likely to occur and use this to sharpen empirical tests of Sloan's original hypothesis. Examples of this approach include the following: Ali et al. (2000) find that abnormal returns are not lower for firms that are followed by "sophisticated investors" (e.g., the largest firms, those with high analyst following and high institutional ownership). Sophisticated investors should be able to understand the properties of accruals, therefore providing evidence inconsistent with the naïve investor fixation hypothesis. Zach (2005) finds that there is little evidence of accruals actually reversing, and suggests that a simple naïve fixation story is hard to reconcile with the results. Kothari et al. (2007) find that overvalued firms have incentives to remain overvalued, but undervalued firms have no incentives to prolong their undervaluation. These incentives generate an asymmetric relation between measures of accruals and past and future returns. They argue this relation is more consistent with an agency theory of overvalued equity rather than a naïve investor fixation explanation for the accrual anomaly. Conversely, the recent work of Hirshleifer et al. (2004) suggests that the limited attention of investors who focus on accounting profitability without taking into consideration the other factors in forecasting future cash profitability can explain the mispricing of net operating assets scaled by total assets, which is consistent with the investor fixation hypothesis.

Second, some of the recent papers examining the accrual anomaly have sought to attribute the relation to a combination of earnings management and accounting distortions. These papers tend to show that the negative relation between accruals and either future earnings or future returns is strongest for accruals that can be characterized as reflecting either earnings management or accounting distortions. Note that the evidence from these papers on the association between different types of accruals and future stock returns is still consistent with a type of investor fixation or limited attention. These papers seek to identify components of accruals with greater issues of reliability that would lead them to have a lower association with future earnings. For example, Xie (2001) argues that the anomaly is attributable to the mispricing of discretionary accruals as a consequence of overestimating the persistence of the discretionary accruals. Chan et al. (2006) essentially replicate Sloan (1996) and show from a variety of analyses that most of the evidence supporting a negative relation between accruals and future returns is consistent with accruals capturing the earnings management activities of the management. Beneish and Vargus (2002) document that the lower persistence of income increasing accruals is concentrated when there is insider selling, suggestive of an earnings management-based explanation for the accrual anomaly. Richardson et al. (2005) extend the original Sloan (1996) measure and argue that investors fail to appreciate the least reliable accruals where there is likely to be the greatest amount of distortion and earnings management.

Third, some other recent papers have explored whether diminishing marginal returns to new investment can explain the negative relation between accruals and future earnings. Fairfield et al. (2003) argue that the lower persistence of accruals may be attributable to the effect of growth on profitability. They document that accruals co-vary more with invested capital, the denominator used in the computation of profitability, than cash flow. As such, Fairfield et al. examine how growth in the net operating assets has an association with future earnings. Consistent with their hypothesis of diminishing marginal returns to new investment, they find that firms that have grown the most experience lower levels of future profitability.

In follow-up work, Richardson et al. (2006a) show that by decomposing the change in net operating assets (the broad measure of accruals described above) into a sales growth component and a change in asset turnover component, the negative relation between accruals and future earnings is concentrated in the change in asset turnover component. Asset turnover (the ratio of sales to assets) measures both efficiency and the majority of accounting distortions present in the balance sheet. To the extent that the firm has not expensed assets as it should have, or has capitalized assets it should not have, the ratio of sales to assets will reflect this choice. Specifically, firms that have the largest decrease in asset turnover are those that have the greatest concentration of asset related accounting distortions. This is confirmed by their later empirical analysis that shows a relation between changes in asset turnover and severe cases of earnings management that result in SEC enforcement actions. Although researchers can make subjective ex ante classifications as to the quality of earnings (e.g., Richardson et al., 2005), it is useful to confirm those subjective choices with an objective ex post classification. Specifically, research in the last decade has shown that firms with high accruals tend to be subject to more SEC enforcement actions, class action lawsuits, and fewer qualified audit opinions (see, e.g., Bradshaw et al., 2001 and the summary in Wu et al., 2010). This association between the measures of accruals and ex post accounting problems is consistent with managerial manipulation of financial statement data that investors do not understand.

In summary, these studies show how the accruals anomaly literature has evolved over the past decade. Overall, each paper has attempted to provide insights into the problems that investors have in using current accounting information to correctly forecast future earnings and returns. The primary explanation for the negative relation between accruals and future stock returns (holding aside the issue of risk) is that capital market participants fail to correctly use accrual information in their forecasts of future earnings.

4.3.1.4. Underreaction (PEAD)—credible hypotheses. The first documented major accounting-based market anomaly is known as post-earnings announcement drift (PEAD) (see, e.g., Bernard and Thomas, 1989). The main feature of the PEAD anomaly is that investors appear to underreact to earnings news and a firm's stock price "drifts" in the direction of the earnings news after an earnings announcement. The PEAD anomaly can also be summarized as follows: investors attempt to forecast a firm's earnings using innovations to current reported earnings, but they underestimate the implications that current earnings have for future earnings. This underreaction generates anomalous returns because prices do not reflect all of the information contained in current earnings changes. Recent studies attempt to explain why the anomaly occurs and why it has persisted. In addition, the literature has expanded to consider underreaction to other corporate information and its relation to momentum in stock returns. We focus the review in this section only on the PEAD literature, but readers should note that our discussion also applies to other research studying the underreaction to other sources of accounting information (e.g., option expense disclosures, pension footnotes, new product releases, and a variety of corporate actions).

A general problem for "drift" related research is whether to expect an under- or overreaction to a relevant event. The prevailing prediction is underreaction to an event, but a prediction for overreaction is also possible. As Kothari (2001, p. 191) states "currently the null of market efficiency is rejected regardless of whether positive or negative abnormal returns (i.e., under- or overreaction) are observed." It is therefore plausible for the market to overreact or underreact to a given piece of information, and absent a compelling reason for underreaction, the alternative hypothesis is not well specified. That said, most of the recent research has sought to isolate settings where underreaction is most likely to occur. This approach is similar to what we discussed earlier for the accrual anomaly literature.

Some examples of drift research in the last decade include the following: Bartov et al. (2000) find that institutional ownership (as a proxy for investor sophistication) has a negative association with the magnitude of the abnormal returns after earnings announcements, which suggests that it is the trading by unsophisticated investors, who do not appear to realize the implications of current earnings for forecasts of future earnings and stock returns, that is generating the drift. Battalio and Mendenhall (2005) find that investors executing small trades seem to respond to a less sophisticated signal that does not fully impound the implication of current earnings changes for future earnings, also consistent with the suggestion that small investors underlie the PEAD. Shivakumar (2006) also finds that small traders appear to underreact to earnings surprises relative to larger traders, again suggesting that small (and likely less informed) traders are a driver of the PEAD phenomenon. In contrast, Hirshleifer et al. (2008) present findings that the returns to the PEAD strategy cannot be explained by the trading activity of individual investors. While this set of papers generally suggests that smaller and less informed traders are responsible for the drift to earnings surprises, this still leaves open the question as to why larger, more informed, traders do not fully exploit this relation. We revisit this topic in Section 5 where we document a substantial decline in the PEAD over the last decade.

One concern about the studies listed above is that the quality of the proxies used to capture investor sophistication, such as trade size and institutional ownership, is questionable. This is especially the case for trade size. Over the last decade, there has been an increasing use of algorithmic trading by various institutional investors. This method results in trade sizes getting increasingly smaller (see, e.g., Elkins/McSherry LLC, 2009). It is therefore more difficult to attribute small trades to less sophisticated individuals. This change in market microstructure and the trading behavior of large institutions over the last decade also has implications for any empirical measure that uses trade size as a key input (e.g., measures of informed trading as in Easley and O'Hara, 1987). It is also useful to contrast the results across the drift and accrual anomaly literatures on the dimension of investor sophistication. In the previous section, we noted that research has found that the accrual anomaly is not weaker in the presence of larger institutional investors, but we see some evidence that the drift anomaly is. The relative consistency of explanations across anomalous variables is something to which future research should pay more attention.

In a similar vein to investor sophistication, some of the recent research related to drift has explored whether limited attention and other investor cognitive biases give rise to the drift. DellaVigna and Pollet (2006) assume that investors are distracted more at the end of the week, and find that earnings announcements that take place on Fridays have more drift than earnings announcements that occur on other weekdays. Liang (2003) finds investors' overconfidence about their private information and the reliability of earnings results in the underreaction to current earnings innovations and a slow revision of investors' forecasts of future performance, which in turn leads to PEAD. Hirshleifer and Teoh (2006) find that drift to earnings surprises is greater when there is a larger number of related companies also announcing earnings at the same time, consistent with the limited ability of investors to process large amounts of information.

In addition, a paper by Chordia and Shivakumar (2005) suggests that the illusions of inflation can create the observed drift after earnings surprises are announced. This hypothesis suggests that investors do not incorporate the effect of inflation in their forecasts of future earnings growth rates. Specifically, they find that the sensitivity of earnings growth to inflation monotonically increases across earnings surprise portfolios, and that controlling for the predictive ability of inflation reduces the predictive ability of earnings surprises for future returns. This is a novel extension of the drift literature but it is an explanation that could also hold for other earnings based anomalies. Future research can assess whether illusion of inflation can explain additional anomalous associations between earnings attributes and future stock returns.

4.3.2. Robust results

4.3.2.1. Fundamental analysis—robustness. Given the simple and practical foundations of the ICC approach, it has been used in many recent studies related to empirical asset pricing (e.g., Chava and Purnanandam, 2010; Chen and Zhao, 2009; Pastor et al., 2007) and also applied in other settings where cost of capital is an important market outcome (e.g., Francis et al., 2005; Hail and Leuz, 2006). Despite the wide-spread use of the ICC estimates, studies have documented *negative* correlations between ex ante measures of ICC and ex post stock returns, suggesting that these estimates are poor measures of a firm's expected equity returns (e.g., Easton and Monahan, 2005; Guay et al., 2005), or that ex post returns are too noisy to serve as a useful benchmark of the quality of measures of expected returns (e.g., Botosan et al., 2009). Specifically, Easton and Monahan show that ICC estimates are negatively correlated with ex post observed stock returns, and they suggest that the problem arises from the quality of analysts' earnings forecasts used to calculate the ICC. Indeed, McInnis (2010) shows that it is analyst optimism that accounts for the previously documented negative relation between earnings smoothness and the ICC.

There is continued discussion on the lack of an association between measures of ICC and future stock returns. Botosan et al. (2009) are able to document a positive association between some measures of ICC and future stock returns after first decomposing stock returns into initial expectations of returns, changes in expectations about future earnings (cash flows), and changes in expectations about future discount rates. We expect this to be an active debate over the next few years because the empirical measures of earnings news and discount rate news themselves are quite noisy especially at the security level. The original decomposition of the two was intended for the aggregate market (e.g., Campbell, 1991). Extensions to the security level started with Vuolteenaho (2002), but these extensions do not yet make extensive use of accounting attributes.

A considerable portion of the recent research on estimating the ICC has therefore attempted to address criticisms that these measures are noisy and/or biased (e.g., Easton and Monahan, 2005; Easton, 2009). It is well known that there are biases and selection issues related to analyst forecasts and these biases will be reflected when used in measures of ICC. There are many studies that suggest that analysts' forecasts are biased at various time horizons (see, e.g., Dechow and Sloan, 1997; Richardson et al., 2003; Easton and Sommers, 2007). In general, analysts' medium- and long-range earnings forecasts tend to be too optimistic. Also, analysts tend to cover relatively few firms, and available forecasts tend to be for near-term earnings such as earnings for the coming quarter or fiscal year. There are also apparent biases in which firms are covered by analysts. For example, financially distressed firms are often not covered or are dropped by analysts (Diether et al., 2002).

To address some of the limitations of the ICC approach, Hou et al. (2009) outline a novel method to estimate a firm's ICC. They build on Fama and French (2000, 2008), Hou and Robinson (2006), and Hou and van Dijk (2008) and apply a cross-sectional model to forecast the earnings of individual firms. Their approach captures across-firm variation in future profitability using publicly available accounting information at the time of the forecast. Examples of the predictive variables in this earnings forecast include: dividend payout ratios, current profitability, firm size, and accruals. Hou et al. then use these earnings forecasts as inputs for a discounted residual income model to estimate ICC. An advantage of this forecasting method is that it does not rely upon analysts' forecasts to generate cost of capital estimates. An interesting aspect of this approach is that is has foundations in the fundamental analysis literature. We revisit this approach later in Section 4.3.5 on the topic of additivity and the general lack of an agreed upon set of predictive variables to forecast future earnings.

Following Easton and Monahan (2005), Hou et al. (2009) assess the reliability of their model-based ICC estimates by testing their correlation with future observed stock returns. In contrast to previous findings, Hou et al. find that their ICC estimates are positively correlated with future stock returns. They also show that the greater reliability of their forecasting-model-based estimates of ICC arises from the improved earnings forecasts generated by their cross-sectional model. Therefore, there appears to be promise in using this type of forecasting method for future research on ICC and other fundamentals-based research.

4.3.2.2. Accruals anomaly—robustness. Recent papers have examined the robustness and generalizability of the accruals anomaly. Although a vast majority of the papers that examine the accruals anomaly find that the original findings in Sloan (1996) are robust in different samples, several recent papers have directly tested the implications of potential method concerns, sample characteristics, or the choice of benchmark returns on the accruals anomaly. For example, Zach (2005) finds that excluding observations related to mergers and acquisitions, divestitures, NASDAQ-listed firms, and the use of size and book-to-market adjusted returns instead of just size-adjusted returns reduce the abnormal returns to the accrual anomaly, but that the majority of the returns are robust.

Kraft et al. (2007) find that Mishkin tests supporting the accruals anomaly are not robust to the addition of omitted variables, and that such omitted variables lead to incorrect inferences about the pricing of accruals. Since Sloan (1996), the Mishkin test is often used in the accounting anomaly literature. As applied in the accrual anomaly context, it requires simultaneously specifying a predictive regression for future earnings and a regression articulating how unexpected earnings map into future returns. These regressions are estimated jointly via an iterative process. In addition to a simple structure for the formation of stock prices, where unexpected earnings are the sole determinant, there are data requirements (i.e., knowledge of future earnings) that make this technique subject to hindsight bias.

While these criticisms are valid, it is important to remember what the Mishkin test is designed to do (see also Lewellen, this issue). It is purely a predictive regression that places some priors on the forecasting so as to allow inferences to be made about the validity of that structure. So while it is valid to criticize the data requirements for a given application of the Mishkin test, it does not invalidate the predictive ability of a given variable. For example, it is true that the Mishkin test as implemented in Sloan (1996) requires knowledge of future earnings information to calibrate the test, hence, casting doubt on the external validity of that analysis. However, a simple predictive regression of measures of accruals for future earnings and future returns is still supported in the data (e.g., Sloan, 1996). It is premature to explain away the accrual anomaly with a criticism of the Mishkin test.

Furthermore, claims in some recent papers that the accrual anomaly is sensitive to outlier returns are incorrect. Kraft et al. (2006) note that excluding less than 1% of observations based on extreme returns greatly reduces the positive returns from low accrual firms and conclude that the resulting inverted U-shaped relation between accruals and future returns is hard to reconcile with functional fixation by investors. However, such an inference is incorrect. All return realizations other than data errors are valid observations. An investor is exposed to the average return of an entire portfolio and this can be influenced substantially by extreme, but valid, return realizations. For example, if one removes the largest five monthly returns from the S&P 500 Index over the last 25 years (five months out of 25 years of data is less than 2%), then the cumulative market return falls from 449% to 283% for the period December 1987 to October 2009. Deleting extreme, but valid, return observations is inconsistent with the very forecasting exercise that an investor undertakes (e.g., Kothari et al., 2005).

A few papers examine whether the accruals anomaly is globally generalizable. The findings from these studies are somewhat mixed: LaFond (2005) and Pincus et al. (2007) document that the accruals anomaly exists outside the U.S.; Pincus et al. find that the accrual anomaly is more likely to occur in countries where: accrual accounting is used more, outside shareholder rights are weaker, concentration of share ownership is lower, and the legal system is of common-law origin. In contrast, however, Leippold and Lohre (2008) document that the "global" results are sensitive to method choices.

However, most studies that follow Sloan (1996) find that the accrual anomaly is robust in various samples, and that it is mainly attributable to investors' inability to incorporate the implications of discretion in accruals for the persistence of earnings in their forecasts of future earnings. But, as we discuss below, the anomaly has largely disappeared in recent years.

4.3.2.3. Underreaction (PEAD)—robustness. Most of the research seeking to document the robustness of the original drift result use alternative measures of earnings surprise. The original Bernard and Thomas (1989) paper uses a relatively simple standardized measure of seasonally adjusted quarterly earnings. With the advent of conference calls and extensive dissemination of financial information at the time of the earnings announcement in recent years, a simple seasonally adjusted difference in earnings may be an insufficient statistic to identify "earnings surprise." Research in the last decade has used alternative measures. For example, Doyle et al. (2006) and Livnat and Mendenhall (2006) both use earnings surprises measured with respect to prevailing consensus forecasts rather than historical earnings, and find a stronger drift using this measure. Brandt et al. (2008) show that the return drift is stronger using the stock price reaction around earnings announcements as proxy for earnings surprise. By using ex post returns as an alternative measure of earnings surprise, Brandt et al. provide some out of sample evidence in support of the original Bernard and Thomas.

Other recent papers on drift have explored whether isolating properties of earnings affect the relation. Narayanamoorthy (2006) finds that investors underestimate the implications of accounting conservatism for future earnings and shows that the returns to the PEAD strategy are greater if accounting conservatism is incorporated into the analysis. Shivakumar (2006) decomposes earnings surprises into unexpected accruals and unexpected cash flows and documents that the cash flow component is a better predictor of future stock returns, and finds that a trading strategy that uses the two components separately outperforms the one that is based on the total earnings surprise.

Perhaps the most interesting paper from the last decade related to drift in the context of robustness is Kothari et al. (2006). As discussed earlier in Section 4.2.2, they compute market level earnings change variables and show that, while these earnings changes exhibit similar time series properties to that seen at the firm level, there is no evidence to suggest that aggregate stock prices fail to understand this relation. Specifically, Kothari et al. find that the serial correlation in aggregate seasonally differenced quarterly earnings is positive for up to the next three quarters (Table 3 of Kothari et al.). Indeed, the aggregate relation is even stronger than that observed at the firm level. Most striking in their analysis is that while their firm level analysis shows the standard positive relation between seasonally differenced quarterly earnings and future stock returns, this relation is negative at the aggregate level. Kothari et al. then explore whether a Campbell (1991) decomposition of returns can explain this negative relation. They find that earnings changes have a contemporaneous and negative correlation with changes in the default spread (a candidate measure of discount rate news), and a positive relation with real growth variables such as changes in industrial production. The aggregate change in earnings could therefore reflect both earnings and discount rate news. The negative relation is concentrated in the portion of the aggregate change in earnings that is attributable to discount rate news. The implication from Kothari et al. for the firm level earnings drift anomaly is that the behavioral bias (underreaction) suggested as a support is unable to explain a similar drift for aggregate earnings.

Although the findings in Kothari et al. (2006) raise questions on the external validity of the cognitive bias explanation for the firm-level drift anomaly, it is premature to conclude that there is no out-of-sample evidence supporting the drift anomaly. Recent studies have also tested the robustness of the PEAD anomaly in other settings. For example, using a sample of U.K. firms, Liu et al. (2003) find that PEAD exists outside of the U.S. as well. Griffin et al. (2007) document that the returns to the PEAD strategy in emerging markets are similar to implementing the strategy in developed markets. Together, these analyses from non-U.S. settings help to confirm the original drift result reported in Bernard and Thomas (1989).

4.3.3. Risk

In this section, we review the treatment of risk in recent studies on accounting anomalies. A couple of general comments apply to the majority of the recent research on accounting anomalies and fundamental analysis. Very few papers published in the last decade have included the full set of return analyses described in Section 4.2.3. Most notably, very few papers look at anything beyond a set of Fama-French time series portfolio regressions and Fama-Macbeth cross-sectional characteristic regressions. The literature generally could do more to exhaust potential risk based explanations (see the list articulated in Section 4.2.3).

Second, there is some confusion in recent studies on accounting anomalies as to what risk is. We want to emphasize that if there is an observed relation between an attribute and future returns, it may be a reflection of risk. However, merely labeling this attribute as a risk factor is insufficient. The appropriate way to test an attribute is to examine whether established and theoretically based risk variables are able to explain that relation. Part of the challenge here is attributable to the lack of an agreed upon framework for capturing risk, especially for accounting related variables such as B/P, E/P, and earnings growth.

4.3.3.1. Accruals anomaly—treatment of risk. A considerable portion of recently published papers on the accrual anomaly have examined alternative risk-based explanations for the negative relation between accruals and future stock returns. Khan (2008) is perhaps the most ambitious paper in this respect. He uses an intertemporal CAPM-based four-factor model. Specifically, he estimates earnings and discount rate news betas consistent with the Campbell and Vuolteenaho (2004) (CV) framework and seeks to examine whether inclusion of these betas is able to explain the observed returns across accrual portfolios. Khan tests five different asset pricing models [single-factor CAPM, a two-factor CV model, a three-factor Fama and French (FF) model, a four-factor combined CV and FF model, and a distress risk-factor model]. Across the five models, the negative relation between accruals and future returns cannot be explained by four of the models, and can only be partially explained by the combination of the CV and FF models.

While this is suggestive of a potential risk-based explanation for accrual anomaly, Hirshleifer et al. (2006) find that it is the accrual characteristic, not the accrual factor loading, which has an association with future stock returns. As originally argued in Daniel and Titman (1997), it is important to empirically distinguish (1) the covariance between stock returns and a given attribute from (2) the returns attributable to the characteristic. Finding evidence in support of (1) is consistent with a risk based explanation for the return relation, whereas finding (2) would suggest mispricing. Specifically, Hirshleifer et al. (2006) find that high (low) accrual firms earn lower (higher) returns after controlling for the extent to which high (low) accrual firms load on a factor mimicking portfolio reflecting the accrual return. This evidence suggests that the relation between the accrual measure and future returns is due to the characteristic and not comovement, and tends to support the mispricing explanation over the risk-based explanation for the accrual anomaly.

More recently, Wu et al. (2010) articulate a risk-based explanation for the accrual anomaly. They appeal to the "q-theory" of investments that has an intuitive property of diminishing marginal returns to scale. This is a potentially compelling explanation for the observed negative relation between measures of accruals and future stock returns. It is also consistent with earlier work by Fairfield et al. (2003) and Dechow et al. (2008) who find evidence to support the idea that accruals measure changes in invested capital, and that changes in invested capital have an association with diminishing marginal returns to new investment (and related overinvestment). However, what is less clear from Wu et al., is how their empirical analysis can support a risk-based explanation from this diminishing marginal returns explanation for the accrual anomaly. First, as is standard with ex post analyses of stock returns, they conduct standard factor mimicking portfolio regressions. The dependent variable in these time series regressions is the return spread across extreme deciles of accrual portfolios; measured using the change in non-cash working capital, discretionary accruals, or a broader measure of accruals similar to that in Richardson et al. (2005). The independent variables are the standard Fama and French (1992) factors (SMB, HML and MKT) as well as a mimicking factor portfolio return that is long (short) companies that experienced high (low) levels of investment.

Wu et al. (2010) measure "investment" as the ratio of investment (sum of changes in property, plant and equipment, and changes in inventory) to lagged total assets. This new investment factor is mechanically related to accrual measures such as ΔNOA. Appendix B makes this relation clear by highlighting that ΔNOA can be rewritten as investment less changes in operating liabilities less the remaining portion of changes in operating assets that are not labeled as investment. The investment measure of Wu et al. includes many of the key components of standard accrual measures and is indeed highly correlated with the accrual measures. Across the three accrual measures examined, the average cross-sectional correlation with their investment variable is between 0.20 (discretionary accruals) to 0.66 (Richardson et al., 2005 ΔNOA measure of accruals). Thus, it is not surprising that the returns to a portfolio formed by ranking securities based on investment explains the returns to a portfolio formed by ranking securities based on accruals. This re-labeling of accruals as a risk factor does not help resolve the risk versus mispricing debate.

Wu et al. (2010, p. 190) also test the hypothesis that returns to the accrual strategy are time-varying and countercyclical. To do this, they project the accrual returns onto a measure of time varying risk premium extracted from the difference between market level implied volatilities and historical volatilities. The regression tests in Table 13 of Wu et al. support this hypothesis: their measure of time varying risk premium has a positive and significant association with accrual portfolio returns (adjusted R^2 of about 5%). Thus, they are able to reject the null hypothesis that accrual portfolio returns are not time-varying or countercyclical at conventional levels. Their evidence supports the existence of both a negative and time-varying relation between measures of accruals and future returns. They suggest that "the deterioration of the accrual anomaly in recent years might be temporary and likely to mean-revert in the near future" (p. 216). This is an alternative interpretation to the Green et al. learning story.

4.3.3.2. Underreaction (PEAD)—treatment of risk. Early work by Foster et al. (1984) and Bernard and Thomas (1989) undertake extensive analyses of possible risk-based explanations for the PEAD anomaly. Hence there has been little need for recent research to revisit the potential for risk-based explanations. A notable exception is Sadka (2006) who examines whether unexpected systematic variation in the variable component of firm liquidity is priced in PEAD portfolio returns. He decomposes firm level liquidity into a fixed and variable component, noting that the variable component most likely reflects the presence of private information (e.g., Kyle, 1985). He finds that shocks to the variable component of liquidity are priced in both momentum and PEAD portfolio returns. He interprets this evidence as being consistent with investors receiving excess PEAD returns in exchange for bearing systematic liquidity risk.

4.3.3.3. Pricing multiples and value effect—treatment of risk. A primary debate over the last two decades in this line of research is whether the positive relation between multiples such as B/P and future stock returns is generated from risk or mispricing. Going back to Fama and French (1992) and Lakonishok et al. (1994), the literature consistently shows that the book-to-market ratio (B/M) of a firm has a strong and positive correlation with future stock performance. Fama and French argue that high B/M stocks earn excess returns compared to most firms because of their greater risk, as many high B/M firms are in financial distress. More recent research by Vassalou and Xing (2004) appears to confirm that book-to-market risk essentially represents default risk in high B/M firms. On the other hand, Griffin and Lemmon (2002) show that firms with high distress risk exhibit the largest negative returns around earnings announcements. If it is the case that distress, as measured by accounting- or market-based variables, is a candidate risk factor then stocks exposed to this should have positive returns at earnings announcements. The findings that these high distress stocks experience negative future returns and that these returns are concentrated around subsequent earnings announcements are hard to attribute to a risk-based explanation.

There is a continuing debate as to the source of a risk-based explanation for variables such as B/P. The recent literature is starting to incorporate an understanding of accounting systems to help guide that empirical analysis. Penman et al. (2007) show that B/P masks a complicated relation with market leverage and then show that the positive relation between B/P and future returns can, in part, be attributable to a negative relation between market leverage and future returns, which is very hard to reconcile with a risk-based explanation. Penman and Reggiani (2010) start to link aspects of an accounting system together to articulate how a combination of B/P, E/P, and earnings growth can help observed relations with future returns. This literature, though, is far from settled.

4.3.4. Transaction costs

There tends to be very little in-depth analysis of transaction costs in recent studies on accounting anomalies and fundamental analysis. A primary reason for this is the lack of high quality trade data for researchers to quantify actual transaction costs. Instead studies have tended to either identify measures expected to correlate with actual trading costs (e.g., market capitalization, analyst following, and trading volumes) and then seek to document cross-sectional variation based on these trading cost proxies on the strength of the anomalous relation; or use trade and quote data to estimate relative and effective spreads, which tend to over-state actual transaction costs experienced by institutional investors (e.g., Stoll, 1993). Common to all of the papers incorporating some treatment of transaction costs is an attempt to assess whether the anomalous returns are within the bounds of market frictions or not. So, we also include in this subsection research related to arbitrage risk and other capital market frictions that can give rise to seemingly anomalous relations.

The prevailing treatment of transaction costs in the academic anomaly literature involves partitioning samples based on measures of perceived trading costs (e.g., market capitalization, stock price, volumes, etc.). There are some exceptions, notably Korajczyk and Sadka (2004), who examine whether the momentum anomaly is robust to sophisticated measures of transactions costs and price pressure, Bushee and Raedy (2006), and the papers examining arbitrage risk and liquidity costs (e.g., Pontiff, 2006; Mashruwala et al., 2006; Ng et al., 2008). However, a closer inspection of these papers shows a round-trip transaction cost in excess of several percentage points. For example, Ng et al. note that the return to a zero-cost investment portfolio (using a measure of unexpected earnings scaled by market capitalization) is about 10–12% depending on the weighting method. They then claim that this return falls to around 3% after accounting for transaction costs. Ignoring the impact of portfolio turnover, this fall suggests that the round-trip transaction cost for implementing a PEAD trading strategy is in the order of 8%. These numbers seem too large for most large stocks. The typical round-trip transaction cost for institutional orders of large securities that are S&P 500 or Russell 1000 index constituents has declined from about 80 basis points in 1998 to about 30 basis points in 2009 (see, e.g., Elkins/McSherry LLC, 2009). It is important to note that this estimate is a lower bound on transaction costs, as they are estimated relative to a volume-weighted average price, understating the true market impact of a given trade. However, market impact is not enough to increase trading costs to 8%. For earlier periods (i.e., pre-1998) it is more difficult to get reliable data to estimate round-trip transaction costs for institutional trades, but stock trades of large securities were typically fixed at \$0.25 per share prior to 1975 and ticks were 1/8th of a dollar so the minimum spread was \$0.125. Assuming a stock price of \$20 per share this implies a round-trip cost of $2*[0.25+0.125/2]/20=1.5\%$. This is much larger than trading costs today but it is still far lower than estimated trading costs documented in recent studies. At a first pass, it seems hard to explain away the documented annual returns to an annually rebalanced zero-cost (equal or value weighted) investment strategy of 10% or more (e.g., Sloan, 1996) with transaction costs. We revisit this topic directly in Section 5.5.

To the defense of Ng et al. (2008), and other academic research, they do demonstrate that their measures of transaction costs (effective spreads, quoted spreads, and estimated commissions) vary strongly with the earnings surprise variable. Specifically, they find that estimated transaction costs are three times larger for firms in the extreme deciles relative to firms in the middle deciles, suggesting that transaction costs are still a relevant consideration. So even though the levels of estimated transaction costs seem too high, Ng et al.'s analysis indicates that it is necessary to take transaction costs into account when assessing the implementability of a potential trading strategy.

4.3.4.1. Accruals anomaly—transactions costs. Only a handful of papers have an in-depth analysis of the impact of transaction costs or other market frictions on the accrual anomaly. Mashruwala et al. (2006) find that the accruals anomaly is concentrated in firms with high idiosyncratic return volatility, low price, and low volume, suggesting that transaction costs may provide an obstacle to investors to trade away the accrual anomaly. Lev and Nissim (2006) find that the extreme accrual firms are small, risky, and have low profitability. Hence, they do not attract the attention of large institutional investors. Lev and Nissim find evidence that some active institutional investors trade based on the accrual anomaly, but their trading activity appears to be too small (at least in Lev and Nissim's sample period) to arbitrage away the anomaly. Collins et al. (2003) find that firms with high institutional ownership and that exceed a minimum level of holdings by active institutional investors have accruals that are less mispriced, which is suggestive of reduced anomalous pricing in the presence of sophisticated investors. This evidence is in contrast to the results of Ali et al. (2003a) discussed in Section 4.3.1.3, who find that the accrual anomaly is not weaker in the presence of increased institutional ownership. Finally, Ali et al. (2008) find that even the mutual funds that have the largest exposure to low accrual stocks have limited exposure, suggesting that few actively managed funds trade on the accrual anomaly, and, for those who can, the magnitude of the returns is not large enough to be attractive to the investor.

In summary, recent research has shown that the accrual anomaly is indeed stronger in the presence of capital market imperfections but these explanations cannot account for all of the negative relation between measures of accruals and future returns.

4.3.4.2. Underreaction (PEAD)—transactions costs. As with the recent research on accruals, there are a handful of papers assessing the ability of market frictions to explain the drift result. As discussed above, Ng et al. (2008) find that transaction costs as measured by relative and effective spreads can explain a large portion of the drift returns. Mendenhall (2004) shows cross-sectional variation in PEAD based on arbitrage risk, which is consistent with an underreaction explanation to PEAD but one that is challenging for investors to exploit due to the idiosyncratic risks involved. Reed (2007) shows that firms with larger short-sale constraints have a lower portion of their long-term price reactions to earnings announcements occurring on subsequent earnings announcement dates. This result is consistent with capital market frictions supporting the drift to the earnings-related news.

A variety of other market frictions have been explored in the context of the PEAD anomaly. Kimbrough (2005) and Levi (2008) find that firms that supplement earnings releases with additional disclosures experience less underreaction to their earnings surprises. Ke and Ramalingegowda (2005) find that transient institutional investors generate large returns from trading on the PEAD and that their trading increases the speed with which prices impound the earnings information. Ke and Ramalingegowda also document that these investors trade less in companies with higher transaction costs, which could explain why PEAD persists.

It is worth noting some potential inconsistencies across these papers. For example, the finding in Kimbrough (2005) that the drift anomaly is weaker in the presence of more detailed information about the earnings release seems at odds with Hirshleifer and Teoh (2006), who find that the drift anomaly is stronger when there is more information provided to investors from related firms announcing earnings *at the same time*.

4.3.5. Additivity

In this subsection, we attempt to link together the various streams of accounting anomaly and fundamental analysis research. This is important to do as it is useful to know whether the relation between a given accounting attribute and future earnings or stock returns is unique and incremental to previously documented attributes. We find this aspect of the current literature to be lacking and are hopeful that future research will endeavor to achieve this objective. Our discussion focuses mostly on the accrual anomaly, as the potential links between it and a vast literature on financing related anomalies is a good example of the extent of this additivity challenge.

4.3.5.1. Accruals anomaly—additivity. There are a variety of papers that have addressed the question as to whether the accrual anomaly is distinct from other anomalies. The majority of the evidence supports the view that the accruals anomaly is distinct and is incremental to other previously documented anomalies. For example: Collins and Hribar (2000) show that the accrual anomaly is distinct from the post-earnings announcement drift. Barth and Hutton (2004) show that the predictive ability of accruals for future returns is not subsumed by the predictive ability of analysts' forecast revisions, and Cheng and Thomas (2006) document that the accrual anomaly is distinct from the value-glamour anomaly.

A thorough analysis of this last overlap between the accrual and the value-glamour anomalies is contained in Desai et al. (2004) who posit that the value and accruals anomalies are related because both anomalies represent overreactions to past accounting data. In the value-glamour anomaly, investors extrapolate past growth in sales and earnings, and realize subsequently (mostly at the time of future earnings announcements) that such growth is not sustainable because growth rates mean-revert. In the case of the accruals anomaly, investors extrapolate past accruals into the future and are surprised when earnings announced subsequently are lower or higher due to reversals in accruals. Thus, both anomalies relate to errors in expectations about future earnings. Further, certain proxies for the value-glamour and accrual anomalies are closely linked. For example, sales growth, one of the proxies for value-glamour, has a positive correlation with accruals. While they are related, they are, at least empirically, additive in their ability to forecast future stock returns.

The more interesting aspect of additivity for the accrual anomaly stems from the balance sheet identity. As outlined in Section 4.3.1.3, measures of accruals like ΔNOA are closely related to measures of financing. Appendix B summarizes this relation and highlights a clear link between the accrual anomaly literature (i.e., changes in net operating assets, ΔNOA) and the vast literature in finance on anomalous relations between various measures of external financing (i.e., changes in net debt contained within net financial obligations and net external financing contained within changes in book value, $\Delta NFO+\Delta B$) and future stock returns.

Over the past decade, there have been numerous studies investigating the association between a firm's corporate asset investment and disinvestment actions and future stock returns. The findings suggest that corporate events associated with the expansion of a firm's scale and its assets (i.e., acquisitions, public equity offerings, public debt offerings, and bank loan initiations) tend to be followed by periods of abnormally low long-term stock returns. On the other hand, corporate events associated with decreases in the scale of the firm and asset contraction (i.e., spinoffs, share repurchases, debt prepayments, and other payouts) tend to be followed by periods of abnormally high long-term stock returns.[8]

In addition to these long-term event studies, other research has documented a negative relation between various forms of corporate investment and future stock returns. For example, an increase in accruals, capital investment, sales growth, and external financing all tend to be negatively related to subsequent stock returns. Recent studies include Fairfield et al. (2003), Richardson and Sloan (2003), Titman et al. (2004), and Hirshleifer et al. (2004). More recent research studies whether firm growth is fairly priced in the cross-section by introducing and fine-tuning measures of growth (see, e.g., Richardson et al. (2006a, 2006b); Anderson and Garcia-Feijoo, 2006; Cooper et al., 2008). In addition, these studies attempt to understand the underlying sources of firm-level growth effects. The refined measures of firm growth are motivated by the observation that prior studies on the effects of growth on returns use components of a firm's total investment or financing activities and often ignore the larger picture of potential total asset growth effects of comprehensive firm investment and disinvestment.

Cooper et al. (2008) use a general measure of firm asset growth that comprises the year-on-year percentage change in total assets and a panel of U.S. stock returns. They document a negative correlation between firm asset growth and subsequent firm abnormal returns. They find that asset growth remains significant in explaining future stock returns that include book-to-market ratios, firm capitalization, short- and long-horizon lagged returns, and other growth measures that include growth in sales from Lakonishok et al. (1994); growth in capital investment from Titman et al. (2004); accruals from Sloan (1996); and the cumulative accruals measure (net operating assets) from Hirshleifer et al. (2004). It is important to note the mechanical relation between the change in total assets, ΔTA, and the change in net operating assets, ΔNOA, variable described above. The results in Cooper et al. can easily be recast as an examination of ΔNOA. A change in total assets, TA, equals changes in operating assets and changes in financial assets: $\Delta TA=\Delta OA+\Delta FA$. A change in net operating assets, NOA, equals changes in operating assets less changes in operating liabilities: $\Delta NOA=\Delta OA-\Delta OL$. Thus, $\Delta TA=\Delta NOA+\Delta OL+\Delta FA$. Therefore, Cooper et al. are ignoring the offsetting relation between operating assets and operating

[8] References include acquisitions (Asquith, 1983; Agrawal et al., 1992; Loughran and Vijh, 1997; Rau and Vermaelen, 1998); public equity offerings (Ibbotson, 1975; Loughran and Ritter, 1995); public debt offerings (Spiess and Affleck-Graves, 1999); bank loan initiations (Billet et al., 2006); spinoffs (Cusatis et al., 1993; McConnell and Ovtchinnikov, 2004); share repurchases (Lakonishok and Vermaelen, 1990; Ikenberry et al., 1995); debt prepayments (Affleck-Graves and Miller, 2003); and dividend initiations (Michaely et al., 1995).

liabilities that are examined in Richardson et al. (2005) and are shown to be important in improving the forecasting ability of accruals. They are also including the changes in financial assets. As we discuss next this is a source of improvement as retained cash is reliably associated with lower future firm performance.

In an attempt to bring these literatures together, Dechow et al. (2008) show how the accrual anomaly literature is related to the various investing/financing anomalies through the balance sheet identity. While the theoretical reasons for the observed relation between these attributes and future stock returns may differ, they are very closely related. The question from a forecasting perspective is then whether they are additive in forecasting future earnings and returns. The main identity exploited in Dechow et al. is that $\Delta NOA = \Delta NFO + \Delta B$ can be extended by recognizing that the changes in book value must result from net equity issuance, $\Delta EQUITY$, and Income. With some algebraic manipulation, it is easy to show that $\Delta NOA = \Delta XFIN - \Delta FA + Income$, where $\Delta XFIN = \Delta DEBT + \Delta EQUITY$.[9] Then Dechow et al. show that the association between a broad measure of accruals (ΔNOA) and future stock returns is stronger than the relation between a measure of external financing ($\Delta XFIN$ or its constituents, $\Delta DEBT$ and $\Delta EQUITY$). Specifically, they show that the accrual measure (ΔNOA) is more effective in explaining the cross-section of returns than the net financing measure ($\Delta XFIN$), and, after first sorting on the accrual measure, the financing measure is not able to capture any return variation. An interpretation of this result is that it is the use of the external financing proceeds (i.e., ΔNOA) that predicts future returns, rather than the raising or distribution of financing (i.e., $\Delta XFIN$), as suggested by earlier studies and reviewed by Ritter (2003).

While the evidence in Dechow et al. (2008) is suggestive of the importance of a broad-based measure of accruals to forecast future earnings and returns due to the associated discretion embedded in accruals, it is important to note alternative explanations for this robust empirical relation. They state on p. 564: "An alternative interpretation is that accruals measure changes in invested capital and that changes in invested capital are associated with diminishing marginal returns to new investment (and related overinvestment). Note that these alternative interpretations are not mutually exclusive and probably coexist." Further, as we discussed in Section 4.3.3.1, Wu et al. (2010) find that the accrual anomaly may be partially consistent with time varying expected returns.

Also, we note that changes in net operating assets as a broad measure of accruals is related to the cumulative accruals measure from Hirshleifer et al. (2004). This cumulative measure (net operating assets deflated by the beginning of period total assets) can be recast as changes in net operating assets scaled by beginning of period assets and a measure of operating leverage. Specifically, using the accounting identities described above (i.e., $NOA = OA - OL$ and $TA = OA + FA$, so $NOA = TA - FA - OL$), we can re-write the Hirshleifer et al.'s measure of balance sheet bloat as follows:

$$\frac{NOA_t}{TA_{t-1}} = \frac{NOA_t - NOA_{t-1}}{TA_{t-1}} + \frac{NOA_{t-1}}{TA_{t-1}} = \frac{NOA_t - NOA_{t-1}}{TA_{t-1}} + \frac{TA_{t-1} - FA_{t-1} - OL_{t-1}}{TA_{t-1}}$$

$$\frac{NOA_t}{TA_{t-1}} = \frac{\Delta NOA_t}{TA_{t-1}} + 1 - \frac{FA_{t-1}}{TA_{t-1}} - \frac{OL_{t-1}}{TA_{t-1}} \tag{5}$$

Thus, the Hirshleifer et al. (2004) measure is an algebraic transformation of the ΔNOA measure from Richardson et al. (2005) combined with operating liability leverage and financial assets. This reconciliation is described in Richardson et al. (2006a, 2006b), who show that the predictive power of the cumulative accruals measure from Hirshleifer et al. is almost entirely attributable to the changes in net operating assets. Again, it is important for researchers to recognize accounting relations to help move the accounting anomaly and fundamental analysis literature forward.

In summary, the accrual anomaly literature has evolved over time to make clear explicit links with other anomaly papers, most noticeably those of financing and investing. Recent research (e.g., Dechow et al., 2008) suggests that the accrual anomaly actually subsumes these related anomalies. Overall, it appears that investors have difficulty interpreting the performance of firms that have significant changes in net operating assets.

4.3.5.2. Fundamental analysis—additivity. As discussed in Kothari (2001), the residual income model (Ohlson, 1995) has had a sizable impact on valuation approaches and the application of fundamental analysis in both academics and practice (see, also Claus and Thomas, 2001; Gebhardt et al., 2001; Easton et al., 2002; Baginski and Wahlen, 2003). Ohlson (2005), Ohlson and Gao (2006), Ohlson (2009), and Easton (2009) provide excellent reviews of some of the technical and analytical advances in accounting-based valuation models over the past decade. However, the question remains as to whether the recent literature has added anything new to the earlier development of the residual income model. All valuation models are theoretically the same and are merely transformations of the discounted dividend model shown in Eq. (1) with varying assumptions and data requirements (see Ohlson, 2005). However, the applicability and utility of a given valuation model depends on the plausibility of the assumptions underlying the model (e.g., the persistence of abnormal earnings) and the quality and availability of data (e.g., earnings forecasts) required by the model.

Recent advances in this area include both refinements of the valuation models and application of these models (see also Lewellen, this issue for a discussion). A particularly interesting example of a recent valuation refinement is the "OJ model" presented in Ohlson and Juettner-Nauroth (2005). This model focuses on abnormal earnings growth with no clean surplus

[9] Note that this decomposition treats deferred taxes as an operating asset or liability, but this can easily be recast to treat deferred taxes as a financial liability if the researcher so desires.

accounting, which is generally required by previous models (e.g., Ohlson, 1995). The OJ model differs from a traditional residual income model by specifying earnings per share, instead of book value per share, as the fundamental forecasting benchmark, which is far easier to implement in practice.

The proliferation of valuation models has spawned a growing debate about the superiority, applicability, and empirical properties of various models (e.g., Francis et al., 2000; Lundholm and O'Keefe, 2001; Penman, 2001; Courteau et al., 2001; Richardson and Tinaikar, 2004; Juettner-Nauroth and Skogsvik, 2005). These studies have compared the bias and accuracy of different valuation models. Not surprisingly, the various benchmarking studies conclude that different implementation techniques and the different assumptions of various valuation models lead to different abilities of the models to predict future returns.

Most studies argue that no single accounting-based valuation model has dominant empirical properties. However, the OJ model has some advantages over the traditional residual income models. Specifically, Ohlson (2005) analyses a number of situations and concludes that truncation errors of terminal streams are smaller and less frequent under the OJ model compared to a traditional residual income model that relies on book equity as a performance benchmark. These smaller terminal value errors imply that a finite-term OJ model will likely outperform a finite-term residual income model. Ohlson shows that capitalized earnings under the OJ model better capture the market value of equity than the book value of equity in a world of conservative accounting. Recent research has shown the superior ability of the OJ model to help forecast future returns. For example, Ali et al. (2003b) compare the ability of different valuation measures to predict future abnormal returns. They find that all of the valuation measures, including the OJ model, have the ability to predict future returns, and that the incremental contribution of the OJ model is significant in regressions of future returns on the value-price and *B*/*M* ratios. These findings suggest that the OJ model has some ability to predict future abnormal stock returns.

4.3.6. Non-price based tests

In this subsection, we provide a short summary of research in the last decade related to the anomaly literature that has attempted to use non-price based tests to strengthen mispricing-based explanations for relations between accounting attributes and future stock returns. We discuss these papers collectively rather than by cluster as there are not too many examples of this approach.

The primary non-priced based test is the use of analyst forecast information. Assuming that analyst earnings or price forecasts are a reasonable proxy for general market expectations, then finding an accounting attribute that is associated with future forecast errors, or that is able to forecast future revisions to those forecasts, makes it easier to classify a relation between an accounting attribute and future returns as mispricing. If analysts are unable to incorporate the attribute into their forecasts, then it might be reasonable to assume that the market also shares that inability. Bradshaw et al. (2001) find that analyst forecast optimism is greater for firms with high accruals, which is consistent with market participants not fully incorporating predictable earnings reversals associated with high accruals when forming expectations about future earnings that in turn determine prices. Bradshaw et al. (2006) find a similar relation between analyst forecast errors (short term earnings, long term earnings and target prices) and broad-based external financing measures.

While most of the non-price based tests have focused on the accrual anomaly, there is some evidence of this in the context of *B*/*P*. The early work of Fama and French (1995), examines the behavior of stock returns in relation to the value effect using non-price tests based on firms' earnings attributes. They argue that value stocks (high *B*/*M*) should have persistent, poor earnings and growth stocks (low *B*/*M*) should have persistent, strong earnings. They present empirical evidence consistent with this idea and suggest that non-price based information (i.e., earnings) can help corroborate the returns results. It is worth highlighting that the results in Lakonishok et al. (1994) and Dechow and Sloan (1997) suggest that a mispricing based explanation for the value-glamour anomaly can be corroborated by the naïve extrapolation of firm fundamentals and expectations of future growth.

In the more recent literature, there have been relatively few studies that have applied follow-up non-price tests to the value effect. One exception is Doukas et al. (2002) who examine analysts' earnings forecasts for value- and growth-stock portfolios to capture the market's expectation of future earnings. They then compare analysts' estimates with the actual earnings outcomes across value and growth stocks to determine whether the market's initial optimistic forecast bias is more pronounced for glamour stocks than value stocks. Doukas et al. find that value stocks (high *B*/*M*) display higher forecast errors and larger downward forecast revisions than glamour stocks (low *B*/*M*), indicating that investors are more optimistic about value than growth stocks. Overall, they find that investors make larger forecast errors in predicting future earnings for small-cap and value than large-cap and growth stocks.

5. Benchmark model for evaluating anomalies using ex ante treatment of risk and transaction costs: accruals and PEAD case study

Our comparison of survey responses from academics and practitioners revealed three key observations. Academic research assesses risk based on an ex post analysis of returns, rather than forecasting risk; it does not typically incorporate a firm's industry affiliation in models of expected risk; and it typically does not capture the effect of transaction costs on the implementability of a trading strategy in a sophisticated manner. We provide empirical evidence that speaks to all three of these issues in this section.

Specifically, we undertake a case study of the accruals and post earnings-announcement drift anomalies, based on how practitioners build portfolios. Our aim is to demonstrate the importance of ex ante considerations of risk and trading costs in building an implementable portfolio with a high Sharpe ratio.[10] While we focus on the accrual and PEAD anomalies, the approach outlined in this section can be extended to any accounting or non-accounting signal.

It is important to note that empirical analysis seeking to discriminate risk-based versus mispricing explanations must incorporate some variant of ex post analysis. The standard approaches are to test whether the observed attribute-return relation is robust to the inclusion of conjectured risk measures, both in time series portfolio-level tests and cross-sectional characteristic tests. As discussed in Section 4, these ex post return analyses are critically important in anomaly papers. But, our focus here is on the ex ante side of portfolio construction. Specifically, how does ex ante portfolio optimization for risk and trading costs affect one's assessment of the relation between accruals, PEAD, and returns?

This section proceeds in distinct subsections. First, we describe our accrual and earnings surprise variables and the data we use in the following empirical analysis. Second, we describe the standard mean-variance approach to portfolio construction, with particular emphasis on using a fundamental multiple factor model to forecast risk at the portfolio level (e.g., Ross, 1976). Third, we describe and use a standard model to forecast direct and indirect transaction costs. Fourth, we document that the negative relation between measures of accruals and future returns and PEAD are robust to an ex-ante and ex post consideration of risk and transaction costs for the period 1973–2000, but they have attenuated substantially in the last decade. Fifth, we provide evidence on the performance difference between a simple equal or value weighted zero-cost investment portfolio and a full characteristic portfolio resulting from optimally combining forecasts of expected returns, risk and trading costs. We illustrate that incorporating ex ante information on risk can dramatically improve investment performance ex post. For example, we compare returns between decile sorted portfolios and fully optimized portfolios, and show that the Sharpe ratio on the latter is almost twice that of the former. Finally, we conclude with some philosophical points on the risk versus mis-pricing debate.

5.1. Measures of accruals and post earnings-announcement drift

As discussed in Section 4, earnings can be additively decomposed into a cash flow and an accrual component. Previous research has shown that the accrual component is less persistent than the cash flow component and is negatively associated with future stock returns (e.g., Sloan, 1996; Richardson et al., 2005). Our aim is to assess how this negative relation is affected by a comprehensive ex ante treatment of risk and transaction costs.

We use both the narrow and broad measures of accruals from Sloan (1996) and Richardson et al. (2005). The narrow definition of accruals, ΔWC, is simply the change in non-cash working capital. The broad definition of accruals, ΔNOA, is the change in net operating assets. As described in Section 4.3.5.1., and shown in Appendix B, the balance sheet identity of *Assets* (A)=*Liabilities* (L)+*Equity* (E), can be recast into operating and financing components allowing the derivation of this broad based measure of accruals. Consistent with Richardson et al., we measure these items using balance sheet data so we can extend our sample period back further in time. We construct our sample from U.S. firms using Compustat data during the 1973–2008 period.

The precise definitions of these two accrual measures are as follows: ΔNOA is defined as the change in non-cash assets less the change in non-debt liabilities. Non-cash assets are calculated as total assets (quarterly field 'ATQ') less cash and short-term investments (quarterly field 'CHEQ'). Non-debt liabilities are calculated as total liabilities (quarterly field 'LTQ') less total debt (quarterly field 'DLTTQ' plus quarterly field 'DLCQ'). ΔWC is defined as the change in non-cash current assets less the change in non-debt current liabilities. Non-cash current assets are calculated as total current assets (quarterly field 'ACTQ') less cash and short-term investments (quarterly field 'CHEQ'). Non-debt current liabilities are calculated as total current liabilities (quarterly field 'LCTQ') less short term debt (quarterly field 'DLCQ'). We require total assets and total liabilities to be non-negative. Other variables are set equal to zero if they are missing. We deflate each of these variables by average total assets. Consistent with previous research (e.g., Richardson et al., 2005), we winsorize each deflated component of earnings at +1 and -1 in order to eliminate the influence of extreme outliers.

To generate as realistic results as possible, we compute rolling twelve month values for ΔNOA (and hence focus on quarterly balance sheet information). We wait three months before assuming that this data is available to the market. For example, if a firm has a December 31 year end, then the value for ΔNOA in July of year t+1 will reflect the four quarters up to the end of March year t. Our stock return tests use data from the CRSP monthly files, inclusive of dividends and other distributions.

To measure PEAD we follow the definition of standardized unexpected earnings (*SUE*) outlined in the work of Bernard and Thomas (1989, 1990). Specifically, we compute seasonally differenced return on average assets divided by the rolling 12 quarter standard deviation of this seasonal difference. We use income before extraordinary items (Compustat quarterly field 'IBQ') and total assets (quarterly field 'ATQ'). Since interim financial reports are only available starting in 1976, and because of the requirement of three-year data to measure PEAD, our analysis of PEAD starts in 1979.

[10] Korajczyk and Sadka (2004) and Bushee and Raedy (2006) investigate whether various anomalies are robust to assumed ex post trading costs. Korajczyk and Sadka (2004) do a limited investigation incorporating ex ante trading costs. In contrast, we examine both ex ante and ex post transactions costs, and ex ante risk.

Our model of forecasted risk (described in Section 5.2) starts in 1973. However, we present our results from the 1979 to 2008 periods to ensure an overlapping period with the PEAD and accrual anomalies. The exclusion of the first six years of data does not affect our inferences about the accrual anomaly. We also restrict our attention to the largest 1,000 securities based on market capitalization, as our forecasts of transaction costs are superior for larger firms. An added benefit of focusing on the largest securities is that potential biases related to bid-ask bounce and asynchronous trading are muted. Researchers who report results based on equal weighted returns should note that such portfolios often require extensive rebalancing costs and that the calculated returns are likely to be biased (e.g., Blume and Stambaugh, 1983; Asparouhova et al., 2010). For example, Korajczyk and Sadka (2004), note that momentum based equally weighted strategies perform the best (worst) before (after) trading costs are taken into account.

5.2. Forecasting risk

We forecast risk with the standard mean-variance framework (see, e.g., Grinold and Kahn, 2000). An investor is concerned about co-movement in the securities that she holds in her portfolio. Assuming the investor faces a quadratic utility function (standard assumption), the investor is then interested in maximizing expected returns subject to minimizing co-movement risk. We can represent this optimization problem as follows for a set of N assets:

$$\max \alpha^T h - \lambda h^T X F X^T h - \lambda h^T \Delta h, \tag{6}$$

where α is a $(N \times 1)$ vector of expected returns, h is the $(N \times 1)$ vector of portfolio holdings, X is a $(N \times K)$ matrix of exposures to common factors, F is a $(K \times K)$ matrix of variances and covariances of common factor returns, and Δ is a diagonal $(N \times N)$ matrix with the diagonal terms representing the variances of specific returns. λ is the aversion to risk. In this framework risk is F and Δ.

How do we measure risk? There is a long tradition in financial economics (e.g., Sharpe, 1964; Lintner, 1965) suggesting that assets with similar characteristics will behave in similar ways. Ross (1976) develops a linear asset pricing framework where security returns are related to the expected returns associated with a set of underlying systematic factors. These multiple common factor models are widely used to measure the risk associated with a given set of securities. The empirical challenge with this arbitrage pricing theory (APT) is how to specify the underlying systematic factors and associated security specific exposures. Fortunately, there are many who have endeavored to do this, and we can use their common factor models for our purposes here.

In the context of the standard optimization problem described above, we require a forecast of risk. Rather than estimate a complete $N \times N$ asset level variance-covariance matrix, we reduce the dimensionality of the problem by projecting total returns onto common factors, thereby decomposing total returns into a common factor component and a residual (or specific) return component. We allow common factor returns to co-vary in this framework, but not the specific returns.

A standard way to specify the common factors is via characteristic exposures.[11] The approach is as follows:

1. Specify the set of common factors. This typically includes a set of characteristics that are cross-sectionally standardized to allow direct comparison across factors (e.g., leverage, size, earnings yield, growth, value, momentum, and various macro sensitivities such as oil, metals, interest rates), and fixed effects capturing industry membership.
2. Run periodic (e.g., monthly) cross-sectional regressions where total returns are projected onto the common factors specified in stage 1.
3. Extract the regression coefficients from stage 2. These are the estimated common factor returns.
4. Compute all of the pair-wise correlations and volatilities of the common factor returns. These are estimated over rolling windows (e.g., using the last 60 months with a specified half-life). This generates the necessary inputs for the F matrix defined above.
5. The residuals from the regressions described in stage 2 are the specific returns. The specific risk is computed using time series variation in the specific returns (e.g., a rolling 24 month standard deviation of the regression residuals). This generates the diagonal elements of the Δ matrix defined above.

This exercise is repeated every period (e.g., month) to obtain a set of exposures, X, and a forecast of risk (F and Δ). It is very important to note that the basis for this risk forecast is recent realizations of firm-level stock returns. It has a built-in time-varying component. Specifically, the correlations and volatilities are not static through time. But note that they change only to the extent that realized equity returns respond to these changing state variables: this approach is not an explicit state-dependent forecasting model.

How can we assess the quality of our risk forecast? Fortunately, there is a well established literature (see e.g., Connor, 2000). A necessary condition for including a common factor is that it helps explain cross-sectional variation in returns. But a sufficient condition for including a common factor is that it improves the ability of the set of common factors to forecast risk. A standard measure for assessing the quality of common factor risk models is the 'bias test.' This test evaluates the

[11] Companies like BARRA and Axioma provide this service commercially. Alternative approaches include statistically motivated principal component analysis.

ability of the model to forecast the active risk for a portfolio over a pre-specified period. The relevant measure (bias statistic) is the time series standard deviation of the ratio of the realized portfolio return to the forecast portfolio risk. In the bias test, the null hypothesis is that the active risk forecasts are unbiased estimates of the deviation of the active returns of the test portfolios. The expected value of the bias statistic is equal to one under the null hypothesis. If the bias statistic is greater (less) than one this indicates that the active risk has been under (over) estimated. Standard tests can be applied to assess whether the observed bias statistic deviates from one. The risk model we use (BARRA USE3) has been tested extensively with this bias statistic. MSCI/BARRA and other vendors find that the out-of-sample success of forecasting portfolio level risk is quite robust. The final set of included common factors is based on the relative improvement in the bias statistic from the included variables.

5.3. Forecasting transaction costs

Transaction costs are an important factor in determining whether an anomaly is implementable. Discriminating between anomalous relations that are within or beyond transaction cost bounds is an important exercise to help sharpen inferences on the relative inefficiencies with which various attributes are priced. We are able to address this directly by focusing only on the largest securities and also incorporating forecasts of transaction costs. Our objective in this subsection is to communicate the key features of a transaction cost forecast and how this impacts the construction of a characteristic portfolio. A complete treatment of the forecasting of transaction costs is beyond the scope of our paper, and we refer interested readers to an extensive discussion of trading costs in Keim and Madhavan (1997), Korajczyk and Sadka (2004), as well as practitioner summaries contained within Madhavan (2000) and Rakhlin and Sofianos (2006).

Trading costs are typically described in terms of direct and indirect costs. Direct costs include commissions, crossing the bid-ask spread and taxes. These tend to be readily observable and are easy to incorporate into a forecasting framework. Indirect costs are the market impact costs from trading moving prices. As an order is executed, the price typically moves: buying (selling) activity is associated with increasing (decreasing) prices. These moves are costly as they reduce returns. The two most relevant factors that are able to explain this impact are volatility and trading volume (e.g., Chapter 16 of Grinold and Kahn, 2000). Impact is an increasing (decreasing) function of volatility (volume). Bid-ask spreads are ignored in the forecasting of market impact, but are included in the fixed portion of transaction costs.

The precise functional form and sensitivity to these factors is an empirical question. To calibrate such models requires access to large amounts of order and trade execution data. Unfortunately such data is typically proprietary and not generally available. We are, however, able to use the transaction cost forecasts based on a comprehensive set of institutional trades from a large institutional asset manager. The following information is key to calibrating transaction cost models: what time the order to trade is placed, the magnitude of the total trade, the direction of the trade (i.e., buy or sell), and the executed price. A challenge with using standard data such as TAQ is that it is not possible to group together trades that are deliberately broken into smaller parcels via algorithmic engines, nor is it easy to sign the direction of these trades. We have access to actual trade data, which has been used to calibrate a transaction cost forecast model (i.e., we can observe the actual impact for a large set of institutional trades and are thus able to incorporate firm specific attributes such as volume and volatility to generate a forecasting model).[12] This model is piece-wise linear, where the expected transaction costs (i.e., the cost associated with changing portfolio weight, h, from h_t to h_{t+1}) are increasing in forecast volatility and decreasing in the square root of forecast trading volume. We use this model in our analysis of the accruals anomaly and PEAD later. This forecast of trading costs is imperfect, as final trading costs are not known until the trade is actually executed. Specifically, there could be a greater impact than the one forecasted, as the executed trade accounts for more of the actual traded volume than forecast, and there is the opportunity cost of not capturing the expected return from unfilled orders. For example, for a forecast market volume of 100 shares the model may suggest a buy order of 5 shares, to optimally trade off expected returns and transaction costs, but if only 10 shares are actually traded that day then the buy order will move the price more than what was forecasted. Nonetheless, an imperfect analysis of trading costs is still a useful guide to determine the implementability of a proposed trading strategy. We use these stock specific forecasts of transaction costs both ex ante (i.e., we optimally trade-off expected returns, risk and transaction costs when constructing our characteristic portfolios) and ex post (i.e., we subtract from realized returns the actual direct costs and estimated indirect costs based on stock specific attributes).

Further, because our portfolio will hold short positions, we incorporate cross-sectional and time series variation in borrowing costs associated with achieving the desired short positions. We capture differences in borrowing costs as part of the transaction-cost forecast model. We do so by adding the prevailing borrowing cost to the expected transaction cost for trades that create short positions. In most cases the borrowing cost is a flat 0.16%, but in some cases where there is limited supply of securities to be loaned or there is a lot of demand to borrow then the borrowing cost can exceed 5%. For the earlier part of our sample borrowing costs were typically higher as well. As with previous research that uses short portfolios, our short sales are not realistic in that they do not observe the "uptick rule," which prohibit short sales when the

[12] A disadvantage of our transaction cost forecasts is that they are 'black box,' in that they are based on proprietary trading data unavailable to other researchers. In our assessment, the models are standard to what is used in industry. For the academic researcher looking to study transactions costs, the approach in Korajczk and Sadka (2004) could be adopted.

price has decreased. The returns to our short positions are therefore overstated, as they can reflect prices that are not transactable. But note that for the larger securities that we trade in our portfolio executing on an 'uptick' is typically feasible during the day by closely monitoring trading activity.

Finally, note that the forecast and actual transaction cost for a given security is dependent upon the size of the portfolio as the amount of trade in a given security is directly proportional to the size of the portfolio and stock specific attributes such as volume and volatility. We assume an initial portfolio of $400 million at the start of 1979 (pre-leverage). Similar to Korajczyk and Sadka (2004), we assume that profits are reinvested in the portfolio, so for example the Δ*NOA* characteristic portfolio grows to $6.4 billion at the end of the period. Note that this assumption means that the trading impact, and hence transactions costs, increase over time. The return for each security is reduced using the same transaction cost model described above.

5.4. Putting it all together to build a portfolio

We use the forecasts of risk and transaction costs described above to reassess the strength of the relation between accruals and PEAD and future stock returns. This reassessment allows us to make stronger inferences about the implementability of the anomalies and provide robust evidence of their existence. We also supplement our ex ante portfolio tests with standard ex post analyses of risk and transaction costs.

Specifically, we use the forecasts of risk and transaction costs to solve a more general objective function of expected return maximization subject to a risk penalty and a trading cost penalty. We estimate the solution to this extended objective function numerically. We solve the objective function every month, for the 1979–2008 period. The solution to the optimization problem is subject to additional constraints. The relevant constraints that we examine are: the target risk of the final portfolio is 10% (annualized); the sum of the positions in the final portfolio is zero (fully invested); and the portfolio weights can be positive and negative, but no position can be greater than 5% of the over-all portfolio. There is no restriction on the leverage of the final portfolio. We define leverage to be the average of the sum of the long and short positions, respectively (i.e., a value of one means a self-financed zero ex ante beta portfolio). Across the time period examined, the leverage of the characteristic portfolio incorporating expectations on transaction costs is on average about 3.7 with an inter-quartile range of 3.3–4.2. This means that, on average, for a $100 investment, you have a $370 exposure on the long and short side of the portfolio.[13] McGuire et al. (2005) using Bank of International Settlement data, suggest that equity long/short hedge fund leverage was above 5 in the latter part of the 1990s and decreased to about 3 during 2000–2005. While the average leverage for our characteristic portfolio (3.5) fits within this range, it is important to note that risks associated with periods of deleveraging will not be reflected in the portfolio returns that we document. For example, forced selling of positions can be triggered by margin calls which could in turn feed into larger than expected market impact costs.

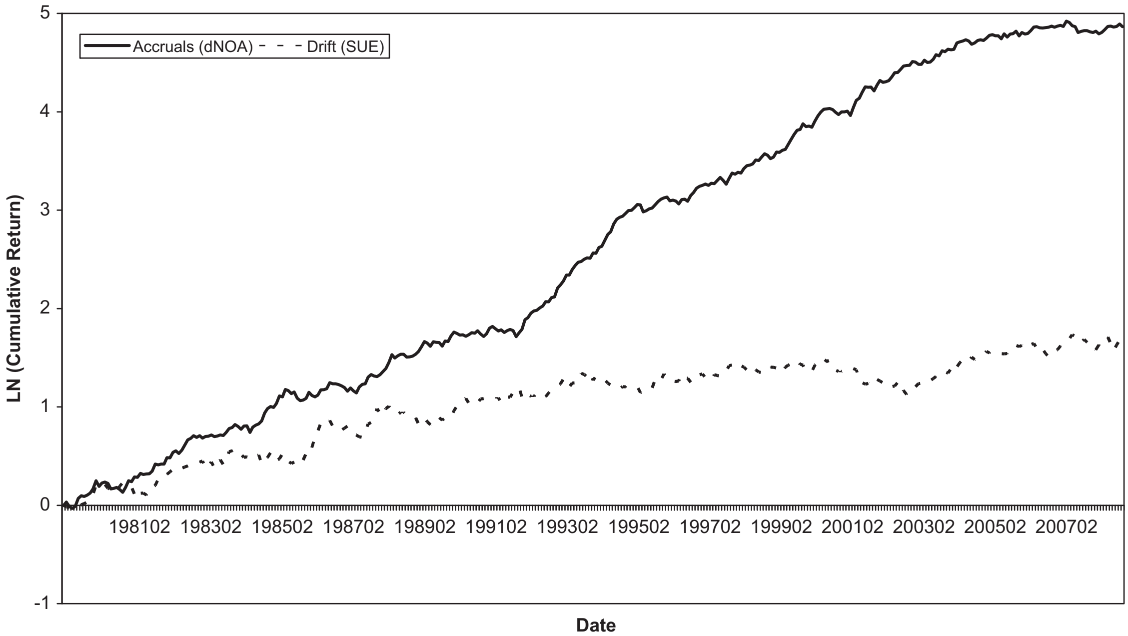
The 10% target risk constraint is worth further discussion. The optimization problem described above is solved numerically to identify a vector of portfolio weights. In expectation, the annualized volatility of the returns to this vector of portfolio weights is 10%. In other words, if our risk model is "good" then we should observe an ex post volatility of about 10% for the portfolio. For our empirical analysis the portfolio has a realized annual volatility of 9.7%, which suggests that our risk model is "good".

We present the results of our analyses graphically (Fig. 1a and b) and with standard statistical tests (Tables 2 and 3). The return to the portfolio for a given month is computed as the sum of the product of the active weight and the total return for each position at the start of that month. We use total returns because this is a fully invested long/short portfolio.

Fig. 1a (b) reports the natural logarithm of the cumulative returns to both the Δ*NOA* and *SUE* characteristic portfolios using realized returns without (with) a correction for ex post transaction costs. The bold (dashed) line in Fig. 1 shows the cumulative return of the Δ*NOA* (*SUE*) characteristic portfolio. The key inferences we make from Fig. 1a are as follows: a portfolio that is optimized for ex ante risk and transaction costs shows a relation between measures of accruals and drift and future stock returns, and these relations have attenuated substantially in recent years. It is important to note from Fig. 1b that the returns of the Δ*NOA* characteristic portfolio appear robust to ex post treatment of transaction costs. The returns to the *SUE* characteristic portfolio in contrast are much smaller than that for the Δ*NOA* characteristic portfolio, and they attenuate much earlier in the sample period.

[13] A simple example can illustrate how leverage is achieved in the portfolio. An investor gives $100 to an asset manager. Consistent with the optimization constraints used in our empirical analysis, assume that the asset manager has agreed to provide a target risk level of 10% (annualized) for this investment. In a given month, it may be the case that to achieve this level of risk the asset manager needs a portfolio with 3.7 times leverage (i.e., $370 long and $370 short). To do this, the asset manager will borrow $370 worth of securities from a prime broker and use the proceeds from the sale of these securities to purchase the $370 of long positions. In return for providing the equity lending facility, the prime broker will charge a lending fee (i.e., 'borrow cost' as described in the text). As Saffi and Sigurdsson (2007) note, the typical wholesale lending fee is about 10 basis points for the largest securities in the US in recent years (see Table 1 of Saffi and Sigurdsson (2007)). In our example, the explicit financing charge for this levered portfolio is $0.10\% \times \$370$ short (i.e., $0.37). These stock specific borrow costs are included in our portfolio simulations. There is no explicit margin interest for this levered portfolio as the long positions and the invested capital serve as collateral for the prime broker lending the securities. It is important to note that the selection of the risk level is somewhat arbitrary, but 10% is fairly standard for equity long/short portfolios. It may be possible to construct a portfolio with lower risk targets and hence lower leverage and generate higher risk adjusted returns.

a



b

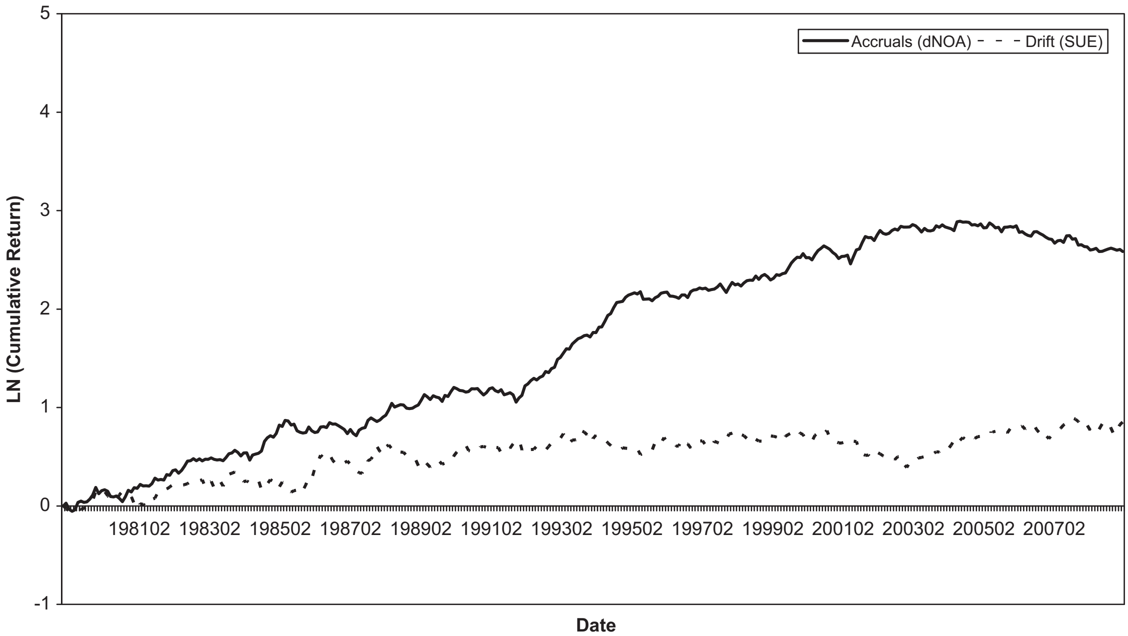


Fig. 1. (a) Cumulative log total returns to a Δ*NOA* (bold line) and *SUE* (dashed line) characteristic portfolio for U.S. data (1979–2008). Portfolios are formed using ex ante risk and transaction cost information. Each portfolio is (i) rebalanced monthly from the largest 1,000 US securities based on market capitalization, (ii) constructed to achieve a target annualized risk level of 10%, and (iii) subject to constraints that keep portfolio leverage less than five times, and individual security positions less than 5%. Returns are *before* actual transaction costs. (b) Cumulative log total returns to a Δ*NOA* (bold line) and *SUE* (dashed line) characteristic portfolio for U.S. data (1979–2008). Portfolios are formed using ex ante risk and transaction cost information. Each portfolio is (i) rebalanced monthly from the largest 1,000 US securities based on market capitalization, (ii) constructed to achieve a target annualized risk level of 10%, and (iii) subject to constraints that keep portfolio leverage less than five times, and individual security positions less than 5%. Returns are *after* actual transaction costs. Actual transaction costs are inferred using a simulated portfolio of $400 million at the start of 2009 and assumes that the forecasted transaction cost function reflects realized trading costs.

Table 2 reports formal statistical tests of the declining returns to the Δ*NOA* and *SUE* characteristic portfolios through time. Specifically, to test the significance of this temporal decline we conduct an ex post analysis of the returns to the Δ*NOA* and *SUE* characteristic portfolios using the standard Fama-French approach. To accommodate a test of the temporal decline

Table 2
Ex post return analysis (Fama-French) of accrual and post earnings announcement drift (PEAD) anomaly.

$$R_t^{ANOMALY} = \lambda_{7982} YR_{7982} + \lambda_{8387} YR_{8387} + \lambda_{8892} YR_{8892} + \lambda_{9397} YR_{9397} + \lambda_{9802} YR_{9802} + \lambda_{0308} YR_{0308} + \beta^{MKT} R_t^{MKT} + \beta^{SMB} SMB_t + \beta^{HML} HML_t + \varepsilon_t$$

	Before transaction costs		After transaction costs	
	$R^{\Delta NOA}$	R^{SUE}	$R^{\Delta NOA}$	R^{SUE}
λ_{7982}	0.0161 (3.55)	0.0111 (2.15)	0.0111 (2.34)	0.0071 (1.39)
λ_{8387}	0.0098 (2.45)	0.0108 (2.39)	0.0062 (1.49)	0.0076 (1.69)
λ_{8892}	0.0140 (3.52)	0.0043 (0.95)	0.0097 (2.36)	0.0016 (0.35)
λ_{9397}	0.0211 (5.27)	0.0050 (1.09)	0.0145 (3.49)	0.0025 (0.55)
λ_{9802}	0.0184 (4.65)	−0.0026 (−0.57)	0.0094 (2.27)	−0.0034 (−0.76)
λ_{0308}	0.0059 (1.62)	0.0084 (2.03)	−0.0032 (−0.85)	0.0068 (1.64)
β^{MKT}	−0.0025 (−0.06)	0.0073 (0.16)	−0.0221 (−0.52)	0.0092 (0.20)
β^{SMB}	−0.0337 (−0.61)	−0.1063 (−1.68)	−0.0204 (−0.35)	−0.1083 (−1.73)
β^{HML}	0.1226 (1.97)	−0.1636 (−2.31)	0.1359 (2.09)	−0.1702 (−2.42)
F-test: $\lambda_{7982}=\lambda_{8387}=\lambda_{8892}=\lambda_{9397}=\lambda_{9802}=\lambda_{0308}$	2.15 (0.059)	1.26 (0.279)	2.42 (0.036)	0.92 (0.465)

t-Statistics are reported in parentheses beneath regression coefficients. *p*-Values reported beneath *F*-statistics.
$R^{\Delta NOA}$ is the monthly return to the ΔNOA characteristic portfolio. ΔNOA is measured as defined in Section 5.1.
R^{SUE} is the monthly return to the post earnings announcement drift (PEAD) characteristic portfolio. *SUE* is measured as the ratio of seasonally differenced quarterly operating income deflated by average assets, to the standard deviation of this seasonally differenced profitability measure using the trailing 12 quarters.
We rebalance portfolios every month using ΔNOA or *SUE* information at the start of the month and returns for that month. The investment universe is the largest 1,000 securities based on market capitalization at the start of the month. Portfolios are rebalanced monthly to achieve a target annualized risk of 10%. Portfolios are fully invested with individual positions limited to be no more than 5% of the total portfolio.
R^{MKT} is the monthly excess (to risk free rate) market return.
SMB is the monthly mimicking factor portfolio return to the size factor. Data obtained from Ken French's website.
HML is the monthly mimicking factor portfolio return to the value factor. Data obtained from Ken French's website.
YR_{7982} is an indicator variable equal to one for months that fall within 1979 and 1982.
YR_{8387} is an indicator variable equal to one for months that fall within 1983 and 1987.
YR_{8892} is an indicator variable equal to one for months that fall within 1988 and 1992.
YR_{9397} is an indicator variable equal to one for months that fall within 1993 and 1997.
YR_{9802} is an indicator variable equal to one for months that fall within 1998 and 2002.
YR_{0308} is an indicator variable equal to one for months that fall within 2003 and 2008.
358 monthly observations from 1979 to 2008 are used for this time series regression. Each portfolio is formed for the same initial universe (the largest 1,000 US securities by market capitalization at the start of each month).

aspect we use multiple intercepts. We split the 30-year sample period into six periods, and include six time-fixed effects. Table 2 presents these results. First, the standard factors (*MKT*, *SMB*, *HML*) are unable to explain the returns to either the ΔNOA or *SUE* characteristic portfolio returns. Second, the strength of the negative (positive) relation between ΔNOA and future returns has weakened, especially in the most recent period (see also Green et al., 2009). It is interesting to note that while we are able to reject the null hypothesis of equal returns to ΔNOA across the six time periods, we are unable to do so at conventional levels for *SUE*. Our results in Table 2 indicate that PEAD got weaker until 2002; however, this trend did not continue in the 2003–2009 period. Closer inspection of the results (unreported) show that the most recent three-year period has generated insignificant returns for both ΔNOA and *SUE*, but that the 2003–2005 period produced a marginally positive return for *SUE* but not for ΔNOA.

To help get a sense for whether the returns to the ΔNOA and *SUE* characteristic portfolio are robust to an analysis of actual transaction costs, we include additional columns that are based on stock specific transaction costs. As described above, actual transaction costs are based on the trading impact, which is partly a function of portfolio size. We assume an initial portfolio of $400 million at the start of 1979 (pre-leverage) and assume that profits are reinvested in the portfolio, so for example the ΔNOA characteristic portfolio grows to $6.4 billion at the end of the period. Note that this assumption means that the trading impact, and hence transactions costs, increase over time. The return for each security is reduced using the same transaction cost model described in subsection 5.3, which is a direct function of portfolio size. Given that we start the initial portfolio at $400 million in 1979, we are subtracting larger transaction costs in the more recent time period. The returns after transaction costs in Table 2 provide even stronger evidence that the returns to the ΔNOA and *SUE* characteristic portfolios have attenuated in recent years.[14]

[14] In unreported tests we have replicated the analysis in Table 2 using equal-weighted, value-weighted and linear weight portfolios. Across all regression specifications, we find that the average return for the ΔNOA and *SUE* characteristic portfolios is not significantly different from zero in recent years, suggesting that the increased market impact associated with the growing size of the optimal portfolios reported in Table 2 is not driving the attenuation in returns.

Table 3
Ex post return analysis (Fama-French) of accrual anomaly.

Panel A: ΔNOA returns
$R_t^{\Delta NOA} = \alpha + \beta^{MKT} R_t^{MKT} + \beta^{SMB} SMB_t + \beta^{HML} HML_t + \varepsilon_t$

	Before transaction costs	After transaction costs	Linear weights	Equal weight (extreme deciles)	Value weight (extreme deciles)
α	0.0139 (8.26)	0.0074 (4.25)	0.0240 (3.09)	0.0151 (2.99)	0.0065 (2.93)
β^{MKT}	0.0016 (0.04)	−0.0136 (−0.32)	0.2174 (1.15)	0.1877 (1.53)	0.0336 (0.63)
β^{SMB}	−0.0341 (−0.61)	−0.0243 (−0.42)	0.2245 (0.87)	0.1402 (0.84)	−0.0157 (−0.21)
β^{HML}	0.1248 (1.99)	0.1397 (2.13)	0.1730 (0.59)	0.1427 (0.76)	0.0637 (0.77)
Sharpe ratio	1.51	0.78	0.57	0.55	0.54
Adjusted R^2	0.0111	0.0151	−0.0020	0.0008	−0.0060

Panel B: *SUE* returns
$R_t^{SUE} = \alpha + \beta^{MKT} R_t^{MKT} + \beta^{SMB} SMB_t + \beta^{HML} HML_t + \varepsilon_t$

	Before transaction costs	After transaction costs	Linear weights	Equal weight (extreme deciles)	Value weight (extreme deciles)
α	0.0060 (3.17)	0.0036 (1.93)	0.0075 (2.65)	0.0039 (2.77)	0.0032 (1.76)
β^{MKT}	0.0130 (0.28)	0.0131 (0.29)	−0.0844 (−1.23)	−0.0514 (−1.52)	−0.0398 (−0.89)
β^{SMB}	−0.1059 (−1.68)	−0.1076 (−1.73)	−0.0011 (−0.01)	0.0142 (0.31)	0.0824 (1.35)
β^{HML}	−0.1591 (−2.25)	−0.1665 (−2.38)	0.0176 (0.17)	0.0115 (0.22)	0.0252 (0.37)
Sharpe ratio	0.58	0.35	0.49	0.51	0.32
Adjusted R^2	0.0121	0.0142	−0.0022	0.0005	−0.0011

$R^{\Delta NOA}$ is the monthly return to the respective ΔNOA portfolio. ΔNOA is measured as defined in Section 5.1.
R^{SUE} is the monthly return to the respective post earnings announcement drift (PEAD) portfolio. *SUE* is measured as the ratio of seasonally differenced quarterly operating income deflated by average assets, to the standard deviation of this seasonally differenced profitability measure using the trailing 12 quarters.
For the before and after transaction cost portfolios, we rebalance portfolios every month using ΔNOA or *SUE* information at the start of the month and returns for that month. The investment universe is the largest 1,000 securities based on market capitalization at the start of the month. Portfolios are rebalanced monthly to achieve a target annualized risk of 10%. Portfolios are fully invested with individual positions limited to be no more than 5% of the total portfolio. Both the before and after transaction cost portfolios are identical, the difference is the inclusion of actual trading costs from the latter.
The linear weight portfolio contains every security with weights directly proportional to the magnitude of the respective measure. These portfolios are evaluated only on a before transaction cost basis.
The equal and value weighted extreme decile portfolios contain only those securities in the top and bottom 10% of each monthly cross-section based on the respective measure. These portfolios differ only in terms of the weights assigned to the constituents of the extreme deciles. These portfolios are evaluated only on a before transaction cost basis.
R^{MKT} is the monthly excess (to risk free rate) market return.
SMB is the monthly mimicking factor portfolio return to the size factor. Data obtained from Ken French's website.
HML is the monthly mimicking factor portfolio return to the value factor. Data obtained from Ken French's website.
The Sharpe ratio is calculated as the ratio of the annualized return (as measured by the intercept) relative to the annualized standard deviation. As Lewellen (2010) notes this is a simple transformation of the Fama-Macbeth test statistic and is computed as $\sqrt{12}/\sqrt{358}$ multiplied by the respective Fama-Macbeth test statistic, where 358 reflects the number of months used in the Fama-Macbeth regression.
Our ΔNOA characteristic portfolio is formed with a 10% annualized risk target.
358 monthly observations from 1979 to 2008 are used for this time series regression. Each portfolio is formed the same initial universe (the largest 1,000 US securities by market capitalization at the start of each month).

There are many reasons as to why the relation between anomaly variables and future returns has attenuated over time. The explanation we find most appealing is "adaptive" market efficiency (e.g., Grossman and Stiglitz, 1980), where capital market participants learn about the relevance of information for security prices, and prices adjust accordingly. Additional empirical analysis such as the following could strengthen this claim: tracking time series variation in buy- and sell-driven volume at the time that financial statement information is released to the market (increases in sell-driven volume contemporaneous with increases in ΔNOA in more recent years is consistent with the market responding more quickly to this information); tracking aggregate capital flows associated with investors who are known to exploit these types of anomalies (returns to these anomalies should decrease as such flows increase); and exploiting cross country variation in the strength of the relation between measures of accruals and future returns and the covariates described above. Green et al. (2009) also note the attenuation of the relation between a measure of current accruals (e.g., the change in non-cash working capital construct in Sloan, 1996) and future stock returns. They find this attenuation to be coincident with an increase in capital allocation to that strategy, a finding that they argue is consistent with adaptive market efficiency. As noted above there are additional analyses to strengthen this assertion, and we leave this more comprehensive analysis to future research. Further, it is important to note the possibility that time varying expected returns could explain the attenuation in the return profile of the Δ*NOA* and *SUE* characteristic portfolios (e.g., Chen et al., 1986; Wu et al., 2010).

In summary, we find that the negative relation between accruals (and drift) and future returns is evident in portfolios that are constructed to optimally trade off expected returns and risk; is robust to a more comprehensive, ex ante and ex post, treatment of transaction costs; and there is a substantial deterioration in this relation in the last five years which is consistent with an adaptively efficient market (e.g., Grossman and Stiglitz, 1980; Lo, 2004).

5.5. *Is all this extra effort worth it?*

Up to this point, we have replicated the negative relation between accruals and future returns and PEAD with a portfolio that is optimized over forecasts of risk and transaction costs. These risk forecasts and transaction cost forecasts are used in practice, and it is important that academics understand them and why they matter. The academic hurdle of abnormal performance is often higher than that in practice because academics do not optimize (much) on risk. In contrast, in practice, the optimization approach chooses low risk, low transaction cost stocks from among those with similar alphas. Academics often ignore this last step except in some approaches like a weighted least squares regression where weighting is on the basis of volatility. On the other hand, practitioners must weigh the benefits of the additional complexity from including forecasts of risk and transaction costs against the costs of such effort.[15] In this subsection, we illustrate the benefit from improved forecasts of risk in the context of examining the Δ*NOA* and *SUE* characteristic portfolios.

The typical academic anomaly paper sorts each cross-section into deciles or quintiles based on the variable of interest (e.g., accruals) and takes a long (short) position in the extreme deciles. The equal- or value-weighted difference of these extremes is termed as a zero-cost investment strategy. In contrast, the approach described in Section 5.4 takes the sorting variable (accruals) and combines it with forecasts of risk and transaction costs to derive an optimized set of portfolio weights. We term the resulting portfolio the "optimized portfolio" for our discussion here. So we are comparing the zero-cost investment strategy with the optimized portfolio.

Table 3 shows the ability of the standard Fama-French factors (*MKT*, *HML* and *SMB*) to explain five sets of portfolio returns for both the Δ*NOA* and *SUE* measures: (1) optimized portfolios not accounting for actual transaction costs; (2) optimized portfolios accounting for actual transaction costs; (3) portfolios whose weights are directly proportional to the relevant measure (e.g., every security is included in the portfolio with its weight determined solely by the magnitude of the Δ*NOA* or *SUE* measure; (4) equal-weighted returns of a zero-cost investment portfolio that is long (short) the bottom (top) 10% of firms based on the relevant measure; and (5) value-weighted returns of a zero-cost investment portfolio that is long (short) the bottom (top) 10% based on the relevant measure.[16]

There is a very noticeable difference in the risk profiles across these sets of returns. In all cases the ability of the standard Fama-French factors to explain the returns are similar (i.e., all have very low R^2), and most portfolio returns have statistically significant intercepts suggesting an anomalous return relation. It is important to note that the statistical significance is much weaker for the latter three simpler portfolio construction approaches. This is particularly true for the Δ*NOA* portfolio returns. Annualized Sharpe ratios from the 358 months of data support this inference: the Sharpe ratio for the optimized portfolio before (after) transaction costs is 1.51 (0.78) and that for the various before transaction cost simpler approaches are about 0.55.[17] While this difference in Sharpe ratio is impressive, it is not that surprising as the risk forecast is calibrated to do precisely the following: build a portfolio that not only captures one's expected return but also minimizes risk at the portfolio level. The simpler approaches, including the linear-weight portfolio, do not make any explicit attempt to control for cross-sectional differences in expected risk.

Perhaps a reason why this optimized portfolio-level analysis has not been performed in the past is a lack of ready access to standard common factor models. Future research could either seek to build/refine such common factor models from first principles as described in Section 5.4., or could directly use common factor models from providers such as BARRA and Axioma. By using optimized portfolios it will be easier for researchers to make stronger inferences about the implementability of anomalous return patterns. Of course, such an analysis should also try to incorporate an ex post analysis of transaction costs as discussed above in Section 5.4. While this ex post treatment of transaction costs can never be complete, it is important for researchers to understand the impact of portfolio turnover and security characteristics, to be sure that the anomalous returns are at least plausibly greater than expected transaction costs.

[15] Obviously, investors' utility functions would incorporate these costs and benefits. Moreover, Grinold and Kahn (2000) show how utility functions are monotonically related to statistics such as the Sharpe ratio (or information ratio).

[16] We did not have an easy way to modify the transaction costs for the linear, equal and value weighted portfolios primarily due to the file structure on the optimization software we were using. This is a limitation from the analysis, but the point of the empirical exercise is served via the before and after transaction cases with the fully optimized portfolios. The reduction in Sharpe ratios would be similar for the other three cases as they exhibit similar levels of portfolio turnover.

[17] One approach to testing the relative attractiveness of the two series of portfolio returns is to treat them as asset returns and run standard tests for identifying efficient portfolio weights (e.g., Britten-Jones, 1999). This test simply regresses a vector of 1 s against the time series of the relevant asset returns and the coefficients from the regression provide the optimal in-sample weight to achieve the best (i.e., closest to an arbitrage opportunity) returns for an investor. Comparing the returns to the before transaction cost optimized Δ*NOA* characteristic portfolio and the three simpler Δ*NOA* portfolios suggests that the optimal weight on the optimized portfolio is greater than 80% (and significantly different) in all three cases.

For future research looking to study anomalous relations and attempt to assess whether documented returns exceed plausible transaction costs, we would recommend the approach in Korajczk and Sadka (2004). In addition researchers could try weighted least squares regressions in addition to standard OLS regression. The weights in these cross-sectional regressions could be inversely related to volatility (risk and transaction costs are an increasing function of volatility) and/or positively related volume (transaction costs are inversely related to volume). These approaches will only give approximate solutions to the more general optimization as (i) they do not solve for the precise form of the weighting function, and (ii) they are not attempting to explicitly trade off returns, risk and transaction costs.

5.6. Discussion and caveats

Our goal in this section was to illustrate the effect of a more comprehensive treatment of forecasting risk and transaction costs. A primary motivation for this analysis is to help shed light on the risk versus mispricing debate that permeates a significant fraction of the academic literature devoted to 'anomalies.' Specifically, the association between a given attribute and future stock returns is always subject to the two competing explanations of risk and mispricing. Under the risk explanation, the relation between the attribute and future stock returns is explained by a risk premium for firms with that attribute. Under the mispricing explanation, the relation between the attribute and future stock returns is caused by capital market participants failing to incorporate the impact of the attribute for future prices (typically through changes in expectations about future earnings for the types of attributes that we discuss in this survey). Absent an agreed upon asset pricing model, it is difficult to distinguish between the two explanations. In summary, our analyses in Tables 2 and 3 suggest large returns that are difficult to explain using existing asset pricing models. The magnitude of these returns, while still statistically significant, has diminished substantially in economic magnitude in recent years.

For those who are still unconvinced about the risk/mispricing debate and argue that measures of accruals reflect differences in discount rates or time varying expected returns (e.g., Wu et al., 2010), there is a natural experiment ahead: as time moves forward will the negative relation between accruals and future stock returns re-appear? If it does not, then the claim that 'accruals' is a (time varying) risk factor is not valid. If it does, then the claim that it is a risk factor may be valid. To the extent that capital flows determine prices and there is time series variation in flows following certain attributes, then time series variation in associations between attributes and future returns could be attributable to these flows. To help disentangle these explanations, future research could measure aggregate flows and differentiate these flows from time varying risk characteristics (e.g., macro-economic state variables).

6. Suggestions for future research

In this section, we bring together the streams of research discussed in prior sections, the feedback from the academic and practitioner questionnaire, and our own insights to make suggestions for future research on the use of accounting information in forecasting both future firm fundamentals and future returns.

We first emphasize that research into accounting anomalies and fundamental analysis is far from dead. The analyses reported in Section 5 suggest that some well known anomalous relations have waned over time. This does not mean that the forecasting role of accounting information has disappeared. Indeed, as a profession, we may have barely touched the surface of this topic. To help illustrate the potential benefit from improved forecasts of future earnings, consider the returns to a perfect forecast earnings strategy. Even with perfect foresight of future fundamentals, there is still a large portion of return variation that is not known (e.g., Easton et al., 1992 show, at annual horizons, that earnings is only able to explain less than 10% of the variation in stock returns).

Perfect foresight in fundamentals has, unsurprisingly, very impressive returns. Specifically, for the 1998–2008 period, a portfolio that took long (short) positions based on future changes in earnings would have generated (on a pre-transaction cost basis) a Sharpe ratio of 3.56. This is substantially larger than the 1.51 Sharpe ratio for the pre-transaction cost ΔNOA optimized portfolio described in Section 5.5. This suggests a potential benefit from improved forecasts. Clearly, this is a high hurdle, but one that has considerable potential reward. It is, of course, an open empirical question as to the possible improvement from current forecasts embedded in price. It is conceivable that we are already forecasting earnings as well as possible. If so, there are no potential rewards to better forecasts, as we are already forecasting as well as possible. While it is certainly possible we have the best forecasts at present, future research can and should attempt to refute this assertion.

In the following subsections, we organize our suggestions of future research into areas where we see the greatest opportunity for interesting future work on forecasting firm earnings and returns. We try not to simply add to the laundry list of accounting attributes examined in the past. Rather, we encourage researchers to exploit the breadth of data about firms that are available to them as they start to build the framework alluded to above. Our suggestions for future research primarily stem from the perspective of an equity investor.

6.1. Improved forecasting frameworks

A striking feature of the current state of accounting anomalies and fundamental analysis is how knowledge of the accounting system itself is not fully exploited to link accounting information to stock prices and returns. Eq. (1) introduced in Section 4 is clearly a sound theoretical support for research into accounting anomalies and fundamental analysis, but it is tautological. Recent papers such as Fama and French (2006, 2008) and Penman and Zhang (2006) recognize this tautology and attempt to bring a number of forecasting variables together, and try to do so in a logically consistent manner. Future research needs to start from a sound appreciation of the accounting system that generates the primary inputs for forecasting (i.e., book value and earnings) and the process by which security prices are determined. There has been an enormous amount of work on the latter point as evidenced by the numerous papers on empirical asset pricing. However, what is missing is an appreciation of the accounting system that creates many of the inputs to those asset pricing models (e.g., B/P, investment growth, and profitability).

We believe there is a significant opportunity at present for accounting researchers to benefit from their knowledge of accounting systems to identify key interrelations between accounting data, start to build a cohesive forecasting framework, and to combine this accounting knowledge with work in the empirical asset pricing literature. While some recent research has started to do this (e.g., Penman and Reggiani, 2010), there is still a considerable amount of work to be done in this regard.

Ohlson (1995) is perhaps the most relevant framework for empirical research in accounting anomalies and fundamental analysis to start from. Recent research by Chee et al. (2010) attempts to enrich equation (1) above with known properties of the accounting system. Chee et al. use the linear information dynamics in Ohlson to additively decompose the ex post stock returns over a rolling five year period into a fundamental and speculative component. The fundamental component of stock returns is justified by the realized fundamentals over the five-year period (i.e., cum-dividend residual earnings), and the forecast of the persistence of this five-year residual income. This decomposition exploits the fact that earnings are more persistent when they are aggregated over longer horizons (e.g., Easton et al., 1992). Chee et al. find that the speculative component of returns exhibits the strongest mean reversion. They show that when returns over the last five years are not the result of past cumulative cum-dividend earnings and/or that past cumulative cum-dividend earnings is not expected to be persistent, then past stock returns are more likely to mean revert. We view Chee et al. as a good example of how research in accounting anomalies and fundamental analysis can better exploit knowledge of the accounting system to help generate superior forecasts of future earnings and returns. The framework in Chee et al. has extensions that include improved measures of expected returns and improved forecasts of persistence in residual income.

6.2. Using macroeconomic information

The majority of the surveyed literature examines the ability of accounting attributes in primary financial statements to help predict measures of future firm profitability and future stock returns. In the set of papers identified in our review, there is little use of macroeconomic information. However, there are a few exceptions, such as Basu et al. (2010) who find that analysts do not correctly account for inflation in their forecasts. More generally, incorporating macroeconomic information directly into the forecasting framework is likely to be a fruitful area for future research.

There is a wealth of macroeconomic information that can be used as part of the exercise to build forecasts of future firm fundamentals. Examples include industrial production, inflation expectations, aggregate risk premia, term structure, commodity prices, currency movements, etc. Given the large set of candidate macroeconomic information that can be used, the associated risk of in-sample data over-fitting is large. Furthermore, these macro variables are interdependent and one needs to impose some structure on this exercise to ensure that the problem is tractable, yet still retains sufficient interdependencies to be useful for forecasting. To date, academic research has tended to use macroeconomic information primarily in the context of ex post analysis of returns (e.g., Chen et al., 1986). We would like to see more use of this kind of information, ex ante, to help condition the relevant set of forecasting variables for future earnings and returns. We would expect the selection of the macro variables to be based on sound economic reasoning. A simple framework could work as follows: identification of income sensitivity to various macroeconomic state variables (e.g., interest rates, consumer sentiment, currency movements), and then incorporation of a forecast of the relevant macroeconomic state variables into forecasts of company-level earnings and possibly returns. For example, the knowledge that the income of Hennes and Mauritz (a Swedish-based retailer) has a significantly negative sensitivity to movements in the U.S. dollar, primarily due to contractual commitments in U.S. dollars, can be used in combination with information on how the U.S. dollar has (or even is likely to) moved in relation to H&M's reporting currency to forecast future earnings. Specifically, changes in exchange rates lead to a direct translational impact on reported earnings as well as an arguably longer term transactional effect where end consumers alter their consumption patterns in response to currency movements. Together these effects affect reported earnings. While this approach certainly brings additional complexity to the forecasting exercise, it is an open empirical question as to whether it helps generate superior forecasts of firm earnings and firm value.

6.3. Using accounting information beyond what Is contained in the primary financial statements

The vast majority of the research examining accounting information in the context of security pricing emphasizes the primary financial statements. This is not an arbitrary research design choice. The primary financial statements provide an articulated view of the firm's ability to generate future earnings and associated free cash flow to capital providers. But there is clearly a large amount of contextual information beyond that contained in the primary financial statements, which is still relevant for forecasting future earnings and returns. There are numerous industry specific metrics that are relevant for forecasting future earnings. Examples include same-store sales metrics for retailers, load factors for airlines, capacity utilization for manufacturers, etc. Such metrics are often available in financial reports and other times will be collected by other third party data providers. Academic research in accounting and finance has typically not made use of this information explicitly or to help condition standard models of earnings persistence. When teaching financial statement analysis, we typically seek to understand the relevant key success and risk factors for relatively homogenous firms (e.g., industries). We conjecture that if we incorporate this improved understanding in our research, it will result in superior forecasts of earnings and stock returns. A good example of research that makes thoughtful use of this kind of information is Amir and Lev (1996), who examine industry-specific metrics to help forecast profitability in a technology-intensive industry.

Another source of additional information is the notes to the financial statements. Examples include the ongoing debate on the differential value relevance of information disclosed in the financial statements relative to that disclosed in the footnotes and the more general value relevance study of pension related items, fair value disclosures for banks, etc. These papers (e.g., Davis-Friday et al., 1999) mostly document contemporaneous relations between footnote items from general purpose financial reports and stock returns. Our focus is on the ability to forecast future earnings and stock returns.

Recent research that uses additional information to forecast earnings and stock returns include the use of valuation assumptions related to the expensing of stock options and option exercise decisions (e.g., Bartov and Mohanram, 2004; Bartov et al., 2007). Another example is Li (2008) who computes measures of 'readability' of the annual report and documents that firms with easier to read financial reports have more persistent earnings. Several recent papers also examine footnote disclosures of fair-value, level 1, 2, and 3, financial assets to condition measures of book value for the purposes of equity valuation (e.g., Goh et al., 2009). Likewise, some recent research has explored the information contained in detailed pension and tax footnotes to help improve forecasts of future earnings and stock returns (e.g., Franzoni and Marin (2006) for pension funding status; Hanlon (2005); Thomas and Zhang (2008) for tax footnote related information).

There is much information contained in the general purpose financial reports and it is becoming increasingly easy for users to access this information through the tagging of tables and text that accompany the primary financial statements. The development and U.S. adoption of eXtensible Business Reporting Language (XBRL) and the increasing sophistication of natural language processing machinery (e.g., Manning and Schutze, 1999) means that users now have substantially more information in machine readable form to conduct large-scale archival analyses for the usefulness of that information for forecasting purposes. The set of information contained in financial reports is too detailed to list, but we expect to see research efforts utilizing this information to be worthwhile.

6.4. Using information from (and for) credit markets

Accounting information is useful to all investors, not just equity investors. For example, creditors are interested in protecting their principal and ensuring the ability of the firm to service their interest obligations, and outstanding debt. An example of the potential use of accounting information from the perspective of a creditor is in the context of default. Accounting information can be used on a standalone basis (e.g., Altman *Z*-Score (1968) and Ohlson *O*-Score (1980) type discriminant models) or in conjunction with structural models (e.g., Moody's/KMV Expected Default Frequency, EDF) to build forecasts of expected default. These default forecasts can in turn be used to assess the relative quality of prices in credit markets. The potential for extending the use of accounting information for forecasting aspects of future firm performance and the related pricing of securities is significant. A primary reason for this is the recent development of credit-default-swap (CDS) contracts and the significant increase in the CDS market for publicly traded companies.

Perhaps one of the most exciting aspects of credit market data is that researchers can track prices of multiple securities for a given firm, and each of these securities differs in its earnings (cash flow) participation. This richness in capital structure creates unique opportunities to combine information across segmented capital markets (the marginal investor is likely to be different across these markets) for the purposes of forecasting, to examine whether the entire capital structure is efficiently priced, and to examine different aspects of the accounting information that are relevant across the capital structure. Financial economics theory suggests that there exist certain agency costs associated with having both equity and debt financing in the capital structure. These theories, such as debt over-hang, over-investment, asset substitution, have implications for future firm profitability, and are now testable with the rich credit market data, which is only recently available.

6.5. Lessons from the 'crowded' market of August 2007

One of the key challenges in making suggestions for future research is that it is difficult to extend a relatively mature field. The case of identifying accounting variables that help predict future earnings and stock returns is no exception. Markets are competitive and incentives are such that inefficiencies should be quickly spotted and exploited. On average this is true. Indeed, the set of information on which investors base their decisions is increasingly similar. The market experience in August 2007 highlights this issue. The summer of 2007 was the start of unprecedented market volatility. As discussed in Lo and Khandani (2007), a large multi-strategy investment vehicle allegedly had to deleverage in the first week of August 2007. The more liquid securities in this multi-strategy investment portfolio were equity instruments that were then liquidated. This price pressure caused a significant feedback loop in the market. Systematic (or 'quant') investors discovered that they were holding correlated portfolios and additional investors were forced into closing out positions due to their leveraged portfolios and the need to meet margin calls. This natural experiment presents an opportunity to assess the relative 'uniqueness' of a given investment strategy. Future research could make use of this setting to help document whether a given accounting attribute used for forecasting is 'novel.' Specifically, if the characteristic portfolio of a given attribute does not experience a drop in the middle of August 2007, then it is less likely that this is a commonly used forecasting attribute. This is useful to know as it helps enrich our understanding of what is new and additive in forecasting future earnings and returns. Of course, the usefulness of this approach is limited as investors change their practices over time and thus the price pattern in August 2007 is no longer representative of the new conventional thinking. But it is, at least, a barometer for the uniqueness of the forecasting insight.

More generally, the event of August 2007 created awareness of additional dimensions that could and should be part of empirical research efforts examining accounting attributes and future returns. First, research could exploit information on trading volume to complement returns-based analyses. For example, tracking abnormal volume around the dates at which accounting information arrives at the market can help isolate how aggressively a given accounting attribute is traded upon. This empirical exercise has become easier for securities listed on the NYSE as that exchange now provides signed volume information, allowing for more precise inferences about trading aggressiveness on the direction of the accounting information. Second, the speed with which accounting information is incorporated into stock prices is typically given only a cursory treatment in academic research. This would necessitate looking at daily, weekly, or monthly returns and documenting the return relation for a given horizon (e.g., one or two weeks ahead). This type of analysis can help researchers understand time series changes in price discovery. Third, it is interesting to assess the influence of aggregate capital flows on the relation between a given accounting attribute and future returns. While we can debate the precise amount of capital necessary to ensure complete price discovery, it seems unambiguous that as more capital seeks to trade on a given attribute, then the relation between that attribute and future returns will diminish. Recent research by Green et al. (2009) is starting to examine these relations. As discussed in Section 5.5., they find that the relation between measures of accruals and future returns attenuated as significant amounts of capital were invested into quantitatively oriented strategies that focus on exploiting accounting information. This type of analysis can readily be extended to other accounting attributes and to other markets to help sharpen our understanding of price discovery.

6.6. Using alternative archival research techniques

The most common statistical technique used in the surveyed archival research papers is cross-sectional and/or panel linear regressions. The general linear model seems reasonable as a first approximation. But there are a variety of other approaches that could be used to help improve our ability to forecast future fundamentals and stock returns. In this subsection we make a few suggestions for future research along with some recent examples.

There is a substantial literature examining structural relationships within social networks. The field of social network analysis has its roots in sociology, social psychology, and anthropology with the development of graph theory and sociograms to capture the relationships between members of a network (e.g., Moreno, 1934). This research area has only recently received attention in the accounting and finance literatures (see, e.g., the analysis in Kuhnen, 2009), on the impact of mutual fund linkages and mutual fund performance). The techniques developed in social network analysis can be applied to any setting where there are relations between agents in the same network and there is reason to believe that these links impact their decision making (e.g., firms in the same industry). The structural linkages between firms implied by these networks could improve the forecasts of future firm profitability. Cohen and Frazzini's (2008) analysis of the links between customers and suppliers from supplemental financial statement disclosures is an example of how to use information about structural linkages between firms to generate improved forecasts of future firm performance. Cohen and Frazzini show that identification of customer-supplier relationships from required footnote disclosures about material customers is effective at capturing economically meaningful links. Specifically, they show a strong lead-lag relation between the fundamentals and stock returns of customers and suppliers: supplier's fundamentals and stock returns move, with a lag, to that of their key customers. A related body of literature is the intra-industry information transfer research, which documented spillover effects from one firm onto another (e.g., Baginski, 1987).

One aspect of these networks that is often over-looked in previous accounting and finance research is their density. As an example, Fig. 2 gives a graphical representation of the links between directors of public companies listed on the Australian Stock Exchange. Fig. 3 shows the linkages between Japanese firms in 2008 based on cross-holdings between companies: this is clearly a very dense network. We show these two graphs as examples of the types of links that exist between firms (e.g., over-lapping directors and cross-equity holdings), and to help visualize the richness of measures that can be extracted. There are many other ways in which firms can be linked and there are many measures that can be extracted from such graphs. It is not only the links between individual firms that matter for the purposes of capturing spillover effects, but also the overall inter-connectedness of the network (see, e.g., Scott, 2000).

The majority of empirical research on accounting anomalies and fundamental analysis assumes that the underlying data generating process is the same for all firms. This need not be true. For example, the persistence of abnormal earnings

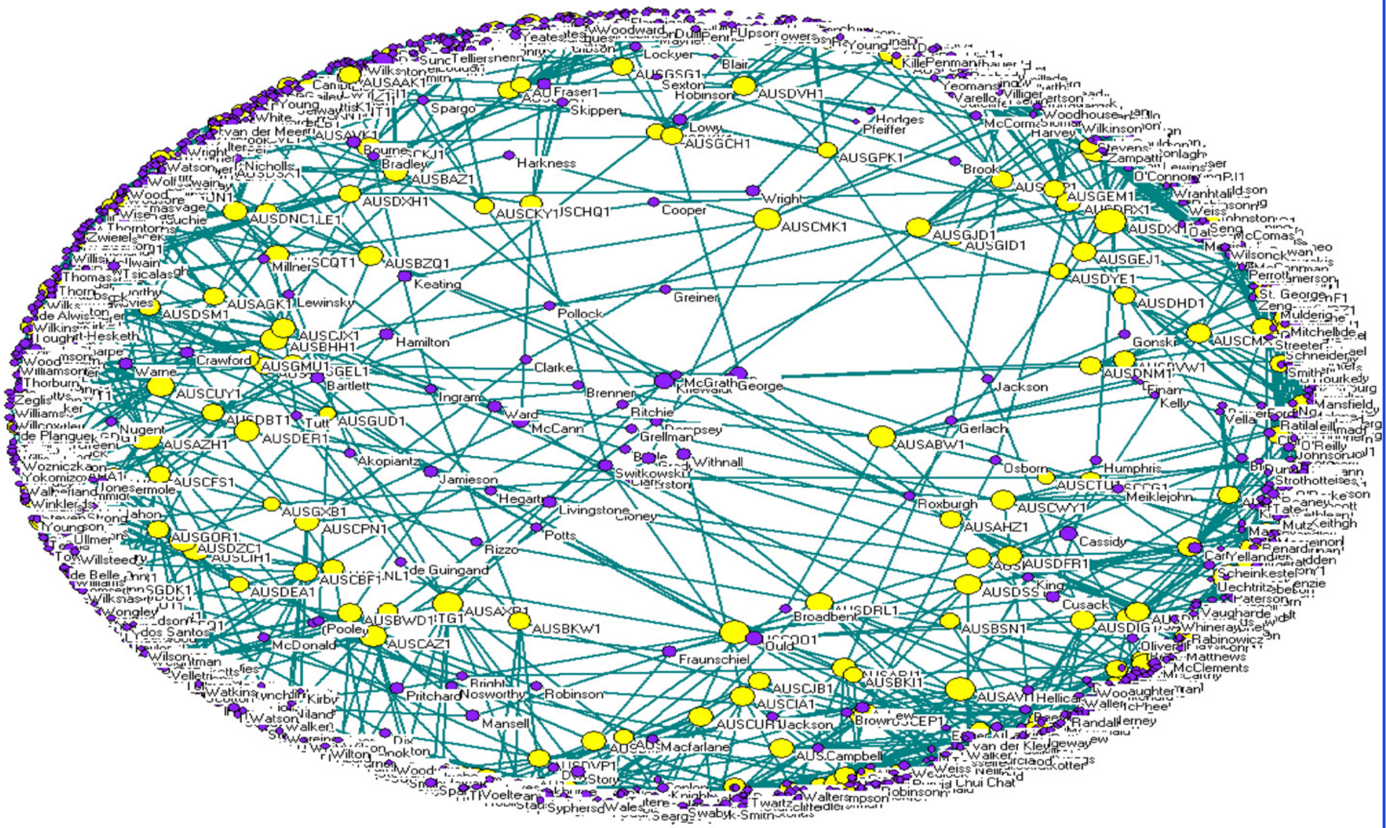


Fig. 2. Graphical representation of linkages between board director members in Australia (ASX 200 companies).

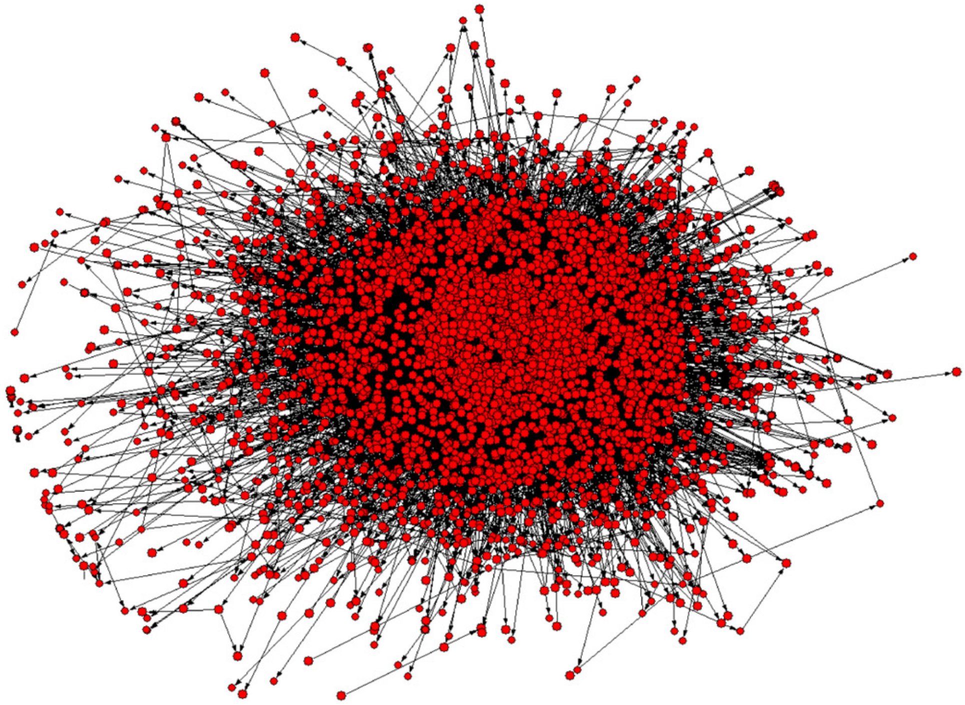


Fig. 3. Graphical representation of linkages between Japanese firms as of 2008 based on cross-equity ownership.

may not vary solely based on industry membership: it may vary on other difficult to observe characteristics. The traditional research paper would suggest candidate conditioning variables and then progressively add interaction effects to test for their significance. Alternative approaches to adding progressively more interaction variables include Bayesian hierarchical linear modeling, where the strength of an attribute on future earnings or stock returns is directly a function of firm characteristics; and the cluster-wise regression and recursive partitioning, where the researcher allows the relation between an attribute and future earnings and/or returns to be non-linear and to have complicated interaction effects. Research in areas other than fundamental analysis has made some use of these techniques (see e.g., Bushee and Goodman, 2007; Larcker and Richardson, 2004; Larcker et al., 2007). Valid criticisms of these approaches are that they are less theoretically motivated and are at risk of in-sample data fitting. However, this latter concern can be mitigated through the use of out-of-sample cross validation techniques, which researchers can then use to build superior forecasting models.

7. Conclusion

In this survey, we highlight recent advances in accounting anomalies and fundamental analysis. A key theme to our survey is that information contained in general purpose financial reports helps facilitate better decision making about the allocation of scarce economic resources from an investor's perspective. We focus our attention on research whose primary aim is to forecast earnings and stock returns.

In conclusion, we offer a few philosophical comments about the entire literature we review. The debate about market efficiency, which underpins a large portion of the literature on the use of accounting information for security pricing, has moderated substantially over the years. Grossman and Stiglitz (1980) make the pertinent observation that security prices need to become efficient and this can only happen if capital market participants actively trade on useful information driving security prices toward a 'true' price. In this sense the capital market is adaptive in its efficiency (see e.g., Lee (2001) and Lo (2004) on market efficiency from an evolutionary perspective). The analysis that we provide in Section 5 speaks to this issue directly: markets adapt over time and what was once mispriced now appears to be correctly priced. This field of research is coming full circle: by documenting robust relations between a given accounting attribute and future stock returns; the research process helps improve market efficiency.

Much prior research has attempted to 'explain away' anomalous return patterns by showing that the association between a given attribute and future stock returns is concentrated in a subset of firms. These subsets tend to contain smaller, less liquid securities where transaction costs and/or idiosyncratic risk are greater (e.g., Fama and French, 2008). This is a useful and informative literature, but there is a risk of misinterpreting the results. Market (in)efficiency is clearly related to these partitioning variables. When securities are more liquid and information is more readily available, we would expect security prices to be more efficient. Thus, finding that a relation between an attribute and future stock returns is concentrated in a subset of less liquid securities is not prima facie evidence in support of market efficiency. It may well still be possible to successfully exploit an anomaly in this subset of securities, and, in Grossman-Stiglitz terms, receive an adequate compensation for that effort, but of course, only to the extent that the additional transaction costs incurred from trading in smaller, less liquid securities is compensated by higher levels of returns.

With the wealth of information available to investors today, and the computational power available for empirical archival analysis, there is a risk of information overload, which could exacerbate frictions in the market and impede the price discovery process. There has been considerable research on information over-load and the impact that this could have on the price discovery process (see e.g., Daniel, Hirshleifer and Teoh (2002), and Libby et al. (2002) for surveys of this literature). Going forward, we expect the quantity of information, as well as the ease with which researchers can access it (i.e., machine readability), to increase. The joint impact of increased information, and an increasing ease for investors to process and manipulate this information, on the ability of investors to forecast earnings and stock returns will continue to be a productive research field.

Our ability to conduct archival analysis has increased through time both in terms of research design and in terms of computing power to manipulate large data sets. This increased ability creates a significant 'inefficiency bias' in research that uses long time series of data. The further one goes back in time to examine associations between an attribute and future stock returns, the greater this risk. In some sense, it is relatively 'easy' to find an 'anomaly' in the 1960s, 1970s, and even in the 1980s. It is much harder to do so in the last ten years. Part of this is attributable to advances in computing ability, but part is surely attributable to the increase in capital invested on the basis of many of the insights discussed in this review.

A common thread that we weaved throughout our survey is the ability of accounting information to help forecast future earnings and future stock returns. This is a necessary condition for the usefulness of the research effort (i.e., are we able to improve our forecasts?). It is a separate question as to whether security prices reflect that information on a timely basis. For example, the question of whether an attribute is associated with future stock returns is the focus of much of the literature that we have surveyed. We would like to re-emphasize that this understates the potential usefulness of this field of research. Given the multiple other users of general purpose financial reports (e.g., customers, suppliers, competitors, management, etc.) that make financial decisions, analysis to improve forecasting models of future earnings is invaluable regardless of the answer to the risk vs. mispricing debate.

Finally, we believe that the accounting anomaly and fundamental analysis literatures have provided considerable influence to academics, standard setters, and practitioners by demonstrating the usefulness of accounting information to forecast future earnings and stock returns. This is an area that is at the core of the accounting profession. We are hopeful that future research will benefit from the suggestions offered in this paper and capitalize on the wealth of accounting information that is available for forecasting future earnings and stock returns. We would like to remind researchers of the opportunities to be gained from improved forecasts of future earnings. It is still the case that perfect foresight of future earnings would generate a very profitable investment strategy. So, while it may be the case that forecasting has become an increasingly competitive activity, the rewards from undertaking this activity are potentially still substantial.

Appendix A. Summary of related survey papers

See Table A1.

Appendix B. Linkages between measures of accruals, investing and financing

Sloan (1996)

$$Accruals = (\Delta Current\ Assets - \Delta Cash) - (\Delta Current\ Liabilities - \Delta Short\ Term\ Debt - \Delta Taxes\ Payable) - Depreciation$$

Richardson, Sloan, Soliman and Richardson (2005)

$$\Delta Assets = \Delta Liabilities + \Delta Book$$

$$\Delta Operating\ Assets + \Delta Financial\ Assets = \Delta Operating\ Liabilities + \Delta FinancialLiabilities + \Delta Book$$

Table A1

Authors	Publication outlet	Year published	No. of papers surveyed	Years covered	No. of accounting journal citations
Bauman	Journal of Accounting Literature	1996	66	1938–1997	40
Hirshleifer	Journal of Finance	2001	543	up to 2001	< 10
Schwert	Handbook of Financial Economics	2003	107	1933–2003	1
Subrahmanyam	European Financial Management	2007	155	1979–2007	1
Byrne and Brooks	CFA Monograph	2008	79	1979–2008	1

$$\Delta Operating\ Assets - \Delta Operating\ Liabilities = \Delta Financial\ Liabilities - \Delta Financial\ Assets + \Delta Book$$

$$\Delta Net\ Operating\ Assets = \Delta Net\ Financial\ Obligations + \Delta Book$$

Link between Sloan (1996) and Richardson, Sloan, Soliman and Richardson (2005)

$$\Delta Net\ Operating\ Assets = \Delta Net\ Current\ Operating\ Assets + \Delta Net\ Non\text{-}Current\ Operating\ Assets$$

$$\Delta Net\ Operating\ Assets = Accruals - \Delta Taxes\ Payable + Depreciation + \Delta Net\ Non\text{-}Current\ Operating\ Assets$$

Link between Δ*NOA* and investing

$$\Delta Net\ Operating\ Assets = \Delta Operating\ Assets - \Delta Operating\ Liabilities$$

$$\Delta Net\ Operating\ Assets = Investing - \Delta Operating\ Liabilities + Items\ in\ \Delta Operating\ Assets\ not\ classified\ as\ `Investing'$$

Link between Δ*NOA* and financing

$$\Delta Net\ Operating\ Assets = \Delta Financial\ Liabilities - \Delta Financial\ Assets + \Delta Book$$

$$\Delta Net\ Operating\ Assets = \Delta Financial\ Liabilities - \Delta Financial\ Assets + \Delta Equity + Income$$

Link between Δ*NOA* and balance sheet bloat

$$\frac{NOA_t}{TA_{t-1}} = \frac{\Delta NOA_t}{TA_{t-1}} + 1 - \frac{FA_{t-1}}{TA_{t-1}} - \frac{OL_{t-1}}{TA_{t-1}}$$

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Accounting Information and Cost of Capital: A Theoretical Approach

Nicholas Apergis[1*], George Artikis[2], Sofia Eleftheriou[2], John Sorros[2]
[1]*Department of Banking & Financial Management, University of Piraeus, Piraeus, Greece*
[2]*Department of Business Administration, University of Piraeus, Piraeus, Greece*
E-mail: {*napergis, gartik, sofelef, sorros}@unipi.gr
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Abstract

The primary goal of this study is to provide a theoretical model that shows explicit solutions for equilibrium prices and derives the equilibrium required return for the firm's stock price. In other words, this theoretical study provides a direct link between accounting information, related to the firm's reports, and the cost of capital within an equilibrium setting. Accounting information is judged to be of high value because it affects the market's ability to direct firms' capital allocation choices. The findings showed that an increase in expected cash flows, coming from improvements in the quality of accounting information, leads to a reduction in the firm's cost of capital.

Keywords: Theoretical Model, Accounting Information, Cost of Capital, Stock Returns

1. Introduction and Literature

One of the key decisions a firm has to reach is the fundamental determination of its cost of capital. This has a substantial impact on both the composition of the firm's operations and its profitability, since shocks onto anticipated cash flows are reflected in the firm's cost of capital. Many studies have spent tons of ink coming up with proposals leading to a lower cost of capital. [1] argue that it is the environment of a firm, which is described by many parameters, such as accounting standards, market microstructure and information coming from the firm's reports, that really influences the accounting type of information that determines the firm's cost of capital and, consequently, its stock price.

Accounting information reduces information asymmetries, which lead to adverse selection in transaction activities in the stock market ([2]) as well as to enhanced liquidity, which lowers the discounts at which firms must issue capital ([3]). [4] argue that accounting information tends to compensate shareholders through stock returns by reducing their exposure to investment risks. Research in asset-pricing models has not, so far, modelled explicitly the accounting information environment in determining the firm's required return, though [5] argue that more factors other than market risk could be equally responsible for determining a firm's financial aggregates, such as stock returns. Neglecting such a factor, however, places the concept of market efficiency in serious dispute, a fact that played a prominent role in the recent global financial crisis. According to [6], although theoretical arguments support the view that new accounting information leads to changes not only in firm's stock prices, but also in the traded volume due to the enhanced effect of informed traders, the empirical evidence does not seem supportive to the above argument. [6] finds that excess returns do change upon the arrival of new accounting information, but only if the new information set can impact the trading activity, the firm's ownership characteristics, and the family-firm status.

This study is an extension of two empirical works by [7,8] that investigate empirically the impact of accounting information on the firm's cost of capital and, then, on firm's stock returns. Their result present that certain accounting information variables, directly related to the firm's operation and originated from the firm's financial reports, exert a true impact on the cost of capital and, thus, on firm's stock returns. While the empirical analysis provides some important results in the relevant literature, a theoretical model is needed to support those empirical findings. Thus, the primary goal, and the novelty as well, of this study is to provide a theoretical model that shows explicit solutions for equilibrium prices and also derives the equilibrium required return for the firm's stock. In other words, it attempts to investigate the link between accounting information and the firm's cost of capital. To the extent that accounting information affects expected cash flows, it also affects the firm's costs of capital. Therefore, this theoretical study will provide a direct link between accounting information related to the firm's reports and the cost of capital (so as between the cost of capital and firm's stock returns) within an equilibrium setting. Accounting information is judged to be of high value because it affects the market's ability to direct firms' capital allocation choices. Moreover, higher accounting information improves the coordination between firms and investors with respect to capital investment decisions, resulting in an increase in expected cash flows without a commensurate increase in the firm's covariance with the market, which is expected to have a negative effect on the firm's cost of capital.

At this point we will attempt to connect the derived equilibrium stock price to the pieces of accounting information used in the empirical studies by [7,8] and to justify their empirical findings. At this point, we explicitly mention that emphasis is given on the disclosure of public information. [9] investigate the separation between public and private information and their role for the firm's cost of capital. They find that private information increases the risk to uninformed investors of holding the firm's stock, once informed investors are more capable of shifting their portfolio weights to incorporate new information. They also determine how in equilibrium the quantity and quality of information affects asset prices, leading to cross-sectional differences in firm's required returns. In such a framework, an individual firm can influence its cost of capital by choosing features like its accounting treatments and market microstructure. Their explicit suggestion is that more information is better than no information at all.

Overall, a firm's information structure affects its stock return. This dictates that a firm's cost of capital is influenced by information, providing an important linkage between asset pricing and the information structure of corporate securities.

Certain studies have attempted in the past to determine the role of accounting information. Empirical studies in the issue suggest that accounting information is negatively associated with the firm's cost of capital ([10-12]).

One main stream of related literature exemplifies the role of incomplete information. [13] investigates how the uncertainty, surrounding the presence of certain assets, influences capital market equilibrium conditions. Here the term incomplete is defined in a sense that not all potential investors know about every asset. His results display that in equilibrium the value of the firm is always lower under incomplete information conditions, while better information reduces the rate of return demanded by investors by improving risk sharing. The same results are also displayed by [14] through a reduction in estimation risk. However, [15] dispute the mechanism of estimation risk on the grounds that the effect of the investor base is susceptible to arbitrage, while there is much debate about the diversifiability and pricing of such risk, while [11] find a negative impact running from accounting information and the cost of capital. They find, however, that the association turns positive if higher levels of accounting information are caused by higher stock price volatility. [16] explore the relationship between the role of strategic disclosures and the cost of equity capital. Based on theoretical arguments, the association is expected to be negative, though the empirical analysis is mixed. Their empirical findings, however, confirm the above mentioned negative relationship due to the fact that their innovative model considers explicitly the role of timely strategic disclosure drawing on standardised Regulatory News Service (RNS) headings. [17] investigate how new accounting information, concerning the firm's leverage level, influences firm's stock prices. They find that the impact of such information is an increasing function of debt levels.

An alternative stream of research gives emphasis on the role of information disclosure by firms. Accounting information is the key turning private into public information. This is the framework in which our study belongs. [18], through an equilibrium model, shows that information production is costly, implying the need for each investor to expend resources to collect the needed information. [3] analyze how disclosure affects the willingness of market makers to provide liquidity by investing in a particular stock. They also show that disclosure changes the risks to market makers, which in turn induces entry or exit by dealers. [1,19] show that disclosure is affected by insiders and strategic issues, while [20] use a structural microstructure model, which provides estimates information-based trading for a large cross section of stocks. [21] reaches the same conclusions only if the accounting practices, *i.e.* those that contribute to accounting information, are characterized as aggressive. [22] investigate the influence of accounting information on individual giving decisions through its impact on market liquidity and the cost of capital for business entities. However, their experimental empirical results display a minimal of such impact. Finally, [23] find that higher levels of accounting information and disclosure due to the adoption of IAS lead to higher excess returns, results that are consistent with the negative impact accounting information exerts on the cost of capital.

Finally, there are liquidity-based models that indirectly link accounting information and firm's expected stock returns. [24] make use of a model in which investors with different expecting holding periods prefer to trade assets with different relative spreads since they demand compensation for those spreads. As a result, expected stock returns are increasing with spreads. [9] show a model in which investors demand lower stock returns if such stocks have greater public and less private information.

The remainder of this paper is organized as follows. Section 2 presents the theoretical model and provides certain comparative static's. Finally, Section 3 concludes the paper.

2. The Model

2.1. The Firm's Environment

The equilibrium model we employ is a variation of [18]'s model and captures the interaction between firms and investors in equity markets as well as the fundamental role of accounting information in improving the efficiency of firms' investment decisions. In such a way, reporting accounting information has real effects that determine the firms' cost of capital. Poor accounting information leads to misaligned investments, which rational investors anticipate and price in equilibrium by discounting firms' expected cash flows at a higher rate of return.

Our model deals with an economy with M_j firms, $j = 1, 2, \cdots, M$ and a risk-free rate. Let c_j and P_j be the uncertain cash flows of firm j and the market equilibrium price of firm j, respectively. We define the firm's j cost of capital as the rate of return R_j obtained from equating the price of firm j to its expected cash flows:

$$p_j = E(c_j)/(1+R_j) \quad \text{or} \quad R_j = E(c_j)/P_j - 1$$

Next, we assume that n_j shows a measure of accounting information which is disclosed by firm j to the firm's investors and the market. Our goal, as it was set above, is to determine whether an increase or decrease in firm's j accounting information leads to a corresponding decrease or increase in the firm's j cost of capital.

In the following step, we introduce a perfectly competitive market for firm's j stocks comprised of N_i investors, $i = 1, 2, \cdots, N$. Our investors are risk-averse. Without the hypothesis of risk aversion, the cost of capital turns out to be zero. Let also introduce an investor's utility function, represented by $U(c)$, where c denotes an amount of cash. Each investor has a negative exponential utility function, yielding:

$$U(c) = \alpha\left(1 - \exp\left[-c/\alpha\right]\right)$$

where α > 0 and describes the investor's tolerance for risk. This particular utility function has the characteristic that as risk tolerance becomes unbounded, the utility function converges asymptotically to risk neutrality, *i.e.* lim $U(c) = c$.

$$\alpha \to \infty$$

In a perfectly competitive market the market price for firm j we define the vector $D_i = \{D_{i1}, \cdots, D_{iM}\}$ as the 1xM vector of investor's demand for ownership in M firms. In other words, D_{ij} displays investor's i demand for firm j expressed as a percentage of the total firms. If now $D_i^* = \{D_{i1}^*, \cdots, D_{iM}^*\}$ displays the vector of endowed ownership in firms, *i.e.* D_{ij}^* displays the investor's i endowment in firm j expressed as a percentage of the total firms. Next, we define $P = \{P_1, \cdots, P_M\}$ the vector of firm prices, *i.e.* P_j displays the price of firm j. Finally, let B_i and B_i^* be investor i's demand for a risk-free bond and his endowment in bonds, respectively. The problem we are called to solve yields:

$$\max E\left[\alpha\left(1 - \exp\left[-1/\alpha\left(D_i\{c_1, \cdots, c_M\}' + B_i\right)\right]\right)\right] \quad (1)$$

w.t.r.t. D_i, B_i

or (see Equation (2))

w.t.r.t. D_i, B_i

where V is an MxM covariance matrix with the t-thy term defined as: $Cov(c_s, c_t)$ and D_i and B_i are the control variables of the system, subject to the following budget constraint:

$$D_i P' + B_i = D_i^* P' + B_i^*$$

The first order condition with respect to the variable D_i yields:

$$0 = E(c_j) - P_j - 1/\alpha \sum_{s=1}^{M} D_{is} Cov(c_j, c_s) \quad (3)$$

Since in the aggregate investors have claims to the cash flows of the entire firm, for each s it must be the case that:

$$\sum_{i=1}^{N} D_{is} = 1$$

Therefore, summing both sides of (3) with respect to i yields:

$$0 = N\left[E(c_j) - P_j\right] - 1/\alpha \sum_{i=1}^{N}\sum_{s=1}^{M} D_{is} Cov(c_j, c_s)$$

$$\max \alpha\left(1 - \exp\left[-1/\alpha\left(D_i\{E(c_1) - P_1, E(c_2) - P_2, \cdots, E(c_M) - P_M\}' + D_i^* P' + B_i^*\right) + 1/2\ 1/\alpha^2\ D_i V D_i'\right]\right) \quad (2)$$

or

$$0 = N\left[E\left(c_j\right) - P_j\right] - 1/\alpha \sum_{s=1}^{M} Cov\left(c_j, c_s\right)$$

The last expression implies that the stock price for firm j is defined as:

$$P_j = E\left(c_j\right) - 1/N\alpha \sum_{s=1}^{M} Cov\left(c_j, c_s\right) \quad (4)$$

According to (4), the price for firm j is equivalent to the one derived from the Capital Asset Pricing Model (CAPM). According to [25] and assuming that the risk free rate is zero, the CAPM is a market equilibrium pricing equation that yields the following association between firm's stock price and firm's cash flows:

$$P_j = E\left(c_j\right) - \left[\left(E\left(c_0\right) - P_0\right)/\sigma_0^2\right] Cov\left(c_j, c_0\right)$$

where c_0 represents the sum of cash flows coming from all firms in the economy, *i.e.* the market portfolio, σ_0^2 represents the variance of the sum of all cash flows, while P_0 is the sum of the stock price of all firms. Equation (4) and the above expression together yield:

$$P_0 = E\left(c_0\right) - 1/N\alpha\ \sigma_0^2$$

which, in turn, implies:

$$\left[E\left(c_0\right) - P_0\right]/\sigma_0^2 = 1/N\alpha$$

The above expression constitutes the price of covariance (or non-diversifiable) risk in the economy. According to the above setting, the price of firm j turns to be:

$$P_j = E\left(c_j\right) - 1/N\alpha\ Cov\left(c_j, c_0\right) \quad (5)$$

Equation (5) is equivalent to Fama's CAPM model as a market equilibrium pricing equation.

2.2. Cost of Capital

In this section we will attempt to figure out what factors can influence the firm's j cost of capital. Our analysis is totally based on Equation (5) that describes the evolution of the firm's j price of stock. To this end, we assume that firm's j cash flows are described by:

$c_j = a_j + b_j\theta + d_j\pi_j$

where θ denotes a random variable with mean zero and finite precision of q, π is also a random variable with mean zero and finite precision of h_j, a is an intercept term, b and d are coefficients associated with the variables θ and π, respectively. We also assume that the π_j's are uncorrelated across firms. In addition, we assume that firm's j cash flows have an element of common variation across firms through θ and an element of idiosyncratic variation through π_j. This issue captures that industry- or economy-wide events affect the cash flows of virtually all firms, while firm-specific or idiosyncratic events only affect the cash flows of firm j. The latter events are considered diversifiable and not priced through a CAPM framework. Within such a setting we get:

$$\begin{aligned} Cov\left(c_j, c_0\right) &= Cov\left(c_j, \sum_{s=1}^{M} c_s\right) \\ &= b_j \sum_{s=1}^{M} b_s E\left(\theta^2\right) + d_j^2 E\left(\pi_j^2\right) \\ &= b_j \sum_{s=1}^{M} b_s\, 1/q + d_j^2\, 1/h_j \end{aligned}$$

The term $b_j \sum_{s=1}^{M} b_s\, 1/q$ is considered to be the element of common variation in firm's j cash flows with the market, while the term $d_j^2\, 1/h_j$ is considered to be the element of idiosyncratic variation. If we substitute the whole expression into Equation (5), it yields:

$$P_j = E\left(c_j\right) - 1/N\alpha\, b_j \sum_{s=1}^{M} b_s\, 1/q + d_j^2\, 1/h_j$$

while the expression for R_j yields as the Equation (6).

According to Equation (6), there are certain factors leading to the reduction of the firm's cost of capital:

- The decline of the variance in the idiosyncratic variation in firm's cash flows, $1/h_j$,
- The decline of the variance in the common variation in firm's cash flows with the market, $1/q$,
- The increase in the shareholder's base of the economy or alternatively the increase in the number of investors who participate in the market, N,
- The increase in the risk tolerance of the market, α, and most crucially,
- The increase in the firm's j expected cash flows.

For satisfying the goal of this research paper, we focus on the last factor. More specifically, we saw that an increase in expected cash flows affected the firm's cost of capital R_j. This occurs because as long as expected cash flows increase, the price P_j at which the market values the firm's stocks increases at a different rate. In other words, the effect on R_j depends on how fast stock prices increase relative to expected cash flows, which, in turn, depends on the remaining parameters of the relevant expression, *i.e.* the covariance of the cash flows with the market or the degree of risk aversion.

$$R_j = E\left(c_j\right)/P_j - 1 = 1/N\alpha\left[b_j \sum_{s=1}^{M} b_s\, 1/q + d_j^2\, 1/h_j\right] \Bigg/ \left[E\left(c_j\right) - b_j \sum_{s=1}^{M} b_s\, 1/q + d_j^2\, 1/h_j\right] \quad (6)$$

Our next step involves us to determine when and how an increase or decrease in firm's accounting information leads to a corresponding decrease or increase in the firm's cost of capital. From the above we yield that an increase in firm's accounting information reduces either the variance in the idiosyncratic variation in firm's cash flows or investor's anticipations about that variance; in both cases the cost of capital decreases. In other words, an increase in disclosure of accounting information leads to lower investor's uncertainty about the parameters that matter for a secure pricing of the firm. Thus, in order to be consistent with the approach followed in [8], we must identify how the variables used there to proxy accounting information are related to the firm's cost of capital. In particular:

Cost of capital and leverage = according to pecking order behaviour, there exists a negative relationship between a firm's financial leverage and its cash flows. In particular, firms with higher internally generated cash flows require less debt. Firms with productive investment opportunities rely first on available cash flows to meet these financing needs. When such cash flows are depleted, the firm issues debt. This setting implies that debt acts as a residual of cash flows. Cross-sectional leverage studies that focus on the above mentioned contemporaneous relationship find extremely high support for such behaviour ([26-29]). Once we get a negative association between leverage and cash flows, Equation (6) predicts that there also exists a negative relationship between cash flows and cost of capital and thus we get a positive association between leverage and cost of capital as [8] find.

Cost of capital and interest coverage = [30-32] focus on the 'balance-sheet effects' of cash flow shocks and argue that investment projects do not absorb a firm's entire cash-flow shock and that several competing allocations, such as cash saving and debt reduction, expand or contract a firm's potential for investment expenses. They display that high interest coverage indicates an inability to obtain debt financing, signalling relatively severe financial constraints. As a result, high interest coverage motivates firms to look for alternative financial sources. Depending on the availability of such alternative sources, the association between cash flows and interest coverage is blurred, while [33,34] argue that lower expected cash flows imply that firms have used those cash flows to finance their investment projects and are not motivated to turn to debt issues, thus, experiencing lower interest coverage. But, through Equation (6), lower cash flows are associated with a higher cost of capital, implying that interest coverage and cost of capital are both negatively associated, as [8] find.

Cost of capital and book values = the association between cash flows and book values depends heavily on the size of firms. In particular, [35,36] argue that there exists a positive association between cash flows and book values for small firms, while the opposite is true for large firms.

Cost of capital and price-earnings ratio = in case when the price-earnings ratio is positively driven by the future growth of firm's opportunities ([37,38]), then higher expected growth implies higher price-earnings ratios and higher expected cash flows, which, through Equation (6), lead to lower cost of capital, giving result to a negative association between price-earnings ratios and cost of capital as [8] find.

Cost of capital and betas = certain empirical studies have focused on how cash flows affect the firm's level of systematic risk or beta. In studies by [39,40], a negative relationship is found. The rationale stems from how variances in dividends affect the timing of a firm's cash flows and, therefore, the level of systematic risk obtained by firm's potential investors, which, in turn, will affect the firm's cost of capital. Recently, [41] show that even by separating the motivation for paying a dividend from the immediate impact the dividend itself has on the firm, there is a clear negative relationship between cash flows and the systematic risk of the firm. Thus, this negative relationship, through Equation (6), implies that there also exists a positive relationship between betas and the cost of capital as [8] show.

2.3. Earnings Quality and the Cost of Capital

Finally, in this section we will extend the above model to account for the role of earnings quality. [42] documents a negative relationship between accruals and financial aggregates, such as stock returns. [43] investigate whether a higher level of quality for audit disclosures is used as a signalling mechanism about the future course of stock prices. Their results display that such higher quality levels of accounting disclosures have a substantial impact on firms' expected earnings and, thus, on their stock market returns. This empirical evidence provides strong support to the signalling value of audit quality levels. [44] also confirm that lower quality accounting information about certain accounting variables, such as accruals and earnings, undermines market efficiency and generates asset pricing anomalies. [45] investigate whether improvements in accounting information through a higher quality of announcements regarding accruals can be affected following regulatory interventions targeting the enhancement of accounting information for the case of the UK. They find that such an improvement does exist following the adoption of the FRS3 regulatory framework.

Thus, to display how earnings quality can affect the firm's expected cash flows, we will present a case where each firm j reports on its investment opportunities to the market. We also assume that investors provide managers with incentives to maximize the firm's market value. Therefore, managers select projects that maximize the market price, given the firm's report to the market. In other words, the quality of earnings affects investment choice, which, in turn, affects expected cash flows.

The effect of higher earnings quality is to improve the investment efficiency of the firm, without altering the firm's covariance with the market. The idea is that the firm's technology determines the covariance of the firm's cash flows with the market. Earnings quality simply affects the efficiency with which the investment project is implemented. In other words, what we want to show is that even when earnings quality is firm specific and has no effect on the covariance of the firm's cash flows, is expected to affect the cost of capital through its impact on expected cash flows.

In this setting, we assume that the firm's j cash flows arise from a process in which an investment of an amount k_j results in cash flow of $c_j = b_j\theta + k_j\pi_i - 1/2\,k_j^2$, where θ and π_j are independent, normally distributed random variables with a mean 0 and precisions of q and h_j, respectively, while b_j is a positive, fixed coefficient. k_j is firm's j investment choice. The term $-1/2\,k_j^2$ captures that there are diminishing returns to investment ([46]). We also assume that the π_j's are uncorrelated across firms.

We define π_j as firm's j earnings per unit of investment. It is an unknown variable to the market. However, each firm provides the market with a report, say r_j, of its earnings per unit of investment with some noise. That is:

$$r_j = \pi_j - \varepsilon_j$$

where the noise ε_j has a normal distribution with mean 0 and precision n_j. Once again, noises across firms are assumed to be uncorrelated.

Let now $P_j\left(r_j\right)$ represent the price of firm j conditional on a report about earnings: $P_j = E\left[P_j\left(r_j\right)\right]$. From Equation (6) we express $P_j\left(r_j\right)$ as:

$$\begin{aligned} P_j\left(r_j\right) &= E\left(c_j \middle| r_j\right) - b_j b_0\,1/\alpha q \\ &= k_j E\left(\pi_j \middle| r_j\right) - 1/2k_j^2 - b_j b_0\,1/\alpha q \\ &= k_j n_j \Big/ \left(h_j + n_j\right) r_j - 1/2\,k_j^2 - b_j b_0\,1/\alpha q \end{aligned}$$

Next, we assume that firm's j investment choice is to maximize the firm's market price conditional on an earnings report. This particular assumption implies that the manager's information about π plays no role; what really matters is the report to the market. More specifically, firms' investment opportunities are not observable to investors and not contractible. Thus, to overcome possible agency problems, stockholders provide incentives to maximize market values. Stock-based compensation is very common in practice and is widely suggested as a way to align the interests of managers and stockholders ([47]). To this end, we assume that incentives are a monotonically increasing function of the firm's market price.

Let now assume that kk_j represents the investment choice that maximizes market prices conditional on the firm's report. The first order condition of maximizing $P_j\left(r_j\right)$ with respect to k_j yields:

$$kk_j = n_j \Big/ \left(h_j + n_j\right) r_j$$

If we substitute the expression for kk_j back into the expression for $P_j\left(r_j\right)$ yields:

$$P_j = E\left[P_j\left(r_j\right)\right] = 1/2\,n_j \Big/ \left[\left(h_j + n_j\right) h_j\right] - b_j b_0\,1/\alpha q$$

Next, let $c_j(r_j)$ represent the firm's j cash flows conditional on the firm's earnings report and an investment choice kk_j, where $E\left(c_j\right) = E\left[c_j\left(r_j\right)\right]$. Then:

$$c_j\left(r_j\right) = kk_j\, n_j \Big/ \left(h_j + n_j\right) r_j - 1/2\,kk_j^2$$

As a result:

$$E\left(c_j\right) = E\left[c_j\left(r_j\right)\right] = 1/2\,n_j \Big/ \left[\left(h_j + n_j\right) h_j\right]$$

In the last step, the expression for the firm's stock price and its expected cash flows implies the following for the firm's cost of capital:

$$R_j = b_j b_0\,1/\alpha q \Big/ \left[1/2\,n_j \Big/ \left\{\left(h_j + n_j\right) h_j\right\} - b_j b_0\,1/\alpha q\right] \quad (7)$$

Next, through expression (7) we will determine how changes in earnings quality are associated with changes in R_j, which is, of course, our last goal here. We consider an increase in earnings quality of firm j, *i.e.* an increase in n_j. By taking the derivative of R_j with respect to n_j from expression (7) we yield:

$$d\left(R_j\right) \big/ \mathrm{d}n_j =$$
$$-\left[2h_j^2 b_j b_0\,1/\alpha q\right] \Big/ \left[n_j - 2h_j\left(h_j + n_j\right) b_j b_0\,1/\alpha q\right]^2 < 0$$

According to the above derivative, an increase in earnings quality leads to the reduction of cost of capital, which verifies the findings by Apergis *et al.* (2010b). In other words, an increase in earnings quality increases investment alignment, which, in turn, increases expected cash flows, while has no effect on the covariance of these cash flows with the market. Thus, the market equilibrium price of those cash flows rises faster than the expectation of those cash flows, and the cost of capital declines.

3. Conclusions

This theoretical study developed a simple equilibrium model to analyze the association between accounting information and firm's cost of capital and to verify or not previous empirical findings by the authors. We characterize asset prices in a market equilibrium setting with risk-averse investors. The findings showed that, even in a CAPM world, an increase in expected cash flows, coming from improvements in the quality of accounting information, leads to a reduction in the firm's cost of capital. Overall, the study provides a direct link between accounting information and the cost of capital that does rely on the fact that accounting information along with improvements in its quality has real effects on capital allocation that governs firm's cost of capital.

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Market Efficiency and the Post-Earnings Announcement Drift*

DENNIS Y. CHUNG, *Simon Fraser University*

KAREL HRAZDIL, *Simon Fraser University*

1. Introduction

The literature on post-earnings announcement drift (PEAD) provides extensive evidence that firms with better (worse) than expected earnings experience significantly positive (negative) abnormal stock-price performance during weeks or even months following the earnings announcements (e.g., Ball and Brown 1968; Bernard and Thomas 1989; Freeman and Tse 1989). Fama (1998: 286) refers to the predictability of returns after earnings announcements as the ''granddaddy of all underreaction events'' resulting from investors' underestimation to value relevant earnings information. The underreaction explanation, however, raises the question of why arbitrageurs do not take advantage of the mispricing opportunities thereby eliminating the drift and reinforcing market efficiency.

In support of the underreaction story, previous studies have examined specific factors that affect arbitrage activities and provided bases for making inferences about market efficiency, that is, transaction costs (Ng, Rusticus, and Verdi 2008), investor sophistication (Bartov, Radhakrishnan, and Krinsky 2000), liquidity risk (Sadka 2006), and arbitrage risk (Mendenhall 2004).[1] However, these individual factors are unlikely to broadly capture the overall degree of frictions in the market. The key contribution of our study is the use of an innovative and more comprehensive measure of limits to arbitrage in the context of PEAD. We analyze how previously documented specific determinants of the drift relate to the overall degree of market frictions and examine whether the existence and persistence of the PEAD are directly associated with the extent to which information is efficiently impounded in prices.

We view the market from a microstructure perspective and use the short-horizon return predictability approach of Chordia, Roll, and Subrahmanyam 2008 (hereafter CRS) to measure market efficiency. CRS conclude that short-horizon return predictability from historical order flows is an inverse indicator of market efficiency. Because information is impounded in stock prices through trades (Kyle 1985), the CRS estimation of return predictability is a more direct approach for assessing the efficiency of market makers, specialists, and arbitrageurs in processing current earnings information. Using a sample from the 500 largest New York Stock Exchange (NYSE) firms, CRS examine two exogenous events that have decreased minimum bid-ask spreads and test the corresponding impact of changes in liquidity on return predictability over time. CRS are among the first to confirm

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1. For instance, Bartov et al. (2000) demonstrate that traditional proxies for transaction costs as well as firm size add little incremental power in explaining the PEAD when institutional holdings are considered. Their results suggest a connection between the existence of PEAD and the trading activities of unsophisticated investors. Mendenhall (2004) supports the underreaction explanation by reporting evidence that the magnitude of PEAD is significantly associated with arbitrage risk after controlling for a wide range of explanatory variables used in prior research.

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that liquidity stimulates arbitrage activity, which, in turn, enhances the degree of intraday market efficiency, as evidenced by a reduction in short-horizon return predictability. Overall, the short-horizon return predictability characterizes the information environment and reflects the extent to which information is impounded in prices. Consistent with CRS, we refer to the inverse of short-horizon return predictability from order flows as market efficiency.[2] This innovative approach based on market microstructure allows us to study the nature of the information environment in which the PEAD originates.[3]

We first contribute to the literature on order flows and short-horizon return predictability in connection with the measurement of market efficiency. CRS argue that liquidity is a reason to expect improvement in market efficiency. Chung and Hrazdil (2010a, b) validate the lack of short-horizon return predictability as an indication of market efficiency for all NYSE and NASDAQ Stock Market (NASDAQ) firms and examine the dynamics between liquidity and market efficiency during informational periods (after controlling for various proxies for trading activity and information asymmetry). We extend CRS and Chung and Hrazdil (2010a, b) and provide further empirical evidence that short-horizon return predictability captures other factors, such as volatility, information asymmetry, investor sophistication, volume, size, and trading costs that affect arbitrage activities and the extent to which information is impounded in prices. These results support our motivation to use short-horizon return predictability as a broader measure of market efficiency in the context of PEAD.

We utilize the CRS estimate of short-horizon return predictability as an inverse measure of market efficiency and our prediction is that the abnormal returns subsequent to earnings announcements are negatively associated with market efficiency. To test this prediction, we first document a significant difference in post-announcement returns for firms in the highest and lowest unexpected earnings deciles. We further document a reversed U-shaped pattern in market efficiency across firms with increasing earnings surprises. In other words, firms with the extreme earnings surprises that experience most significant drifts are least efficient in incorporating information into prices. Consistent with Ng et al. 2008 we also document that, while the average transaction costs of all firms are relatively low, the transaction costs of the shares of the firms in the extreme earnings surprises portfolios are high.

In the multivariate regression setting, we present evidence that it is the market efficiency variable that is significantly and negatively associated with the long-window post-announcement abnormal returns. After controlling for a wide range of explanatory variables that are associated with barriers to arbitrage, we find that firms in the highest market efficiency decile experience, on average, a 2.5 percent smaller difference in PEAD between extreme unexpected earnings deciles than firms in the lowest efficiency decile. One interpretation of this result is that the market efficiency measure is an important proxy for the extent of arbitrage activities that are instrumental in making prices converge to fundamental value and that the importance of this market efficiency measure is not subsumed by any proxy for barriers to arbitrage used in prior literature.

2. The short-horizon return predictability effectively captures the degree of market inefficiency (frictions). However, for consistency of interpretation with prior studies (i.e., Boehmer and Kelley 2009; Chung and Hrazdil 2010a; Visaltanachoti and Yang 2010), we refer to the lack of short-horizon return predictability as an estimate of the extent to which information is efficiently impounded in prices (i.e., market efficiency).
3. Research utilizing this methodology is also beginning to appear in the literature. For instance, Aktas, de Bodt, and Van Oppens (2008) use the order imbalance and return predictability relation to examine the effects of insider trading on market efficiency. Others, such as Visaltanachoti and Yang 2010, analyze the speed of convergence to market efficiency for foreign stocks listed on the NYSE. Further review of the market efficiency estimations is provided in the next section.

We further contribute to the recent literature that examines the effects of transaction costs on the PEAD. Ng et al. (2008) find evidence that firms with higher transaction costs also provide the higher abnormal returns under the PEAD trading strategy and conclude that transaction costs can provide an explanation not only for the persistence but also for the existence of PEAD. In a related study, Chordia, Goyal, Sadka, Sadka, and Shivakumar (2009) report that transaction costs account for 70–100 percent of the paper profits from a long-short strategy designed to exploit the earnings momentum anomaly. CRS's estimate of short-horizon return predictability incorporates other factors that affect arbitrage activities and provides the basis for us to extend our analysis to the PEAD trading strategy with the market efficiency focus.

Using portfolio analyses, we follow prior literature (e.g., Korajczyk and Sadka 2004) and use relative bid-ask spreads as direct estimates of the transaction costs of making roundtrip marginal trades. We also apply the estimation approach developed by Lesmond, Ogden, and Trzcinka 1999 to derive an alternate and more comprehensive estimate of transaction costs (including price impact and opportunity costs). Consistent with prior literature, we find that taking into account these transaction costs significantly reduces the profitability of trading on the PEAD portfolios. We further confirm that transaction costs are responsible for the existence of the drift; however, this applies only to stocks for which information is efficiently impounded in prices. In other words, for firms in the highest market efficiency decile arbitrage activities help reduce the effect of underreaction to earnings news; all transaction-cost-adjusted estimated profits are statistically insignificant and sometimes negative across different periods. On the other hand, we extend prior literature by documenting increasing drift for stocks with overall high barriers to arbitrage (even after we incorporate the effect of transaction costs). These profits reach several percentage points and remain statistically significant. Thus, it is not just transaction costs that are responsible for the magnitude and existence of the PEAD; rather, there are other factors (that the market efficiency measure captures more fully) that prevent arbitrageurs from eliminating the drift.

Our findings support the theory that the PEAD results from investors' underreaction to earnings news, which raises the question of why informed investors do not fully price the news in quarterly earnings announcements and take advantage of the mispricing. Our results can be interpreted along the lines of Hou and Moskowitz 2005 who find that price response delay to information is a powerful predictor of cross-sectional average returns. Under the assumption that the short-horizon return predictability is a valid proxy for inefficient environment with high barriers to arbitrage and the consequent extent to which information is impounded in prices, our results show that this measure performs better than proxies used in prior literature in predicting and explaining stock returns after earnings announcements.

The rest of this paper is organized as follows. We summarize the PEAD along with the liquidity literature and propose our empirical predictions in section 2. Section 3 develops measures for market efficiency, defines remaining variables, outlines the sample selection procedure, and describes the data. We discuss the main empirical results and cover robustness tests in section 4. The final section concludes and offers opportunities for future research.

2. Background and hypothesis development

Potential explanations for the drift

In the most-often-cited evidence in favor of the underreaction explanation, Bernard and Thomas (1990) were able to predict, for up to four quarters ahead, the future abnormal reaction to earnings announcements based on the current and historical time-series patterns of earnings. The presence of significant autocorrelation patterns for seasonally differenced earnings suggests that investors underreact to value relevant earnings information and significantly underestimate (or are unaware of) the current earnings and their implications for future earnings. The existence of predictable abnormal returns over a prolonged period is inconsistent with the semi-strong form of market efficiency with respect to earnings information.

Among the earlier studies that have examined price continuation in the direction of earnings surprises are Ball and Brown 1968, who documented the return predictability for up to two months after the annual earnings announcements, and Foster, Olsen, and Shevlin 1984, who confirmed the existence of 60 trading days of return predictability using quarterly earnings announcements. This PEAD anomaly survived countless batteries of tests over the past 40 years by being exposed to various risk-based asset pricing models, different exchanges and countries, and numerous estimation models for quarterly earnings expectations.

The underlying reason for the PEAD anomaly has not been uniformly supported, given the evidence for several competing theories. Some market efficiency proponents argue that the PEAD stems from systematic misrepresentation of abnormal returns after the earnings announcements. For example, Ball, Kothari, and Watts (1993) argue and provide evidence that systematic risk is positively related to the earnings news, and therefore expected returns are likely misestimated following earnings surprises. Others point to methodological shortcomings such as actual versus assumed earnings announcement dates, calendar versus fiscal quarter classification, or specific earnings methodology that existing studies use to estimate unexpected earnings (e.g., Jacob, Lys, and Sabino 2000; Kim and Kim 2003). Finally, limits to arbitrage have been supported as an important factor driving the existence and persistence of PEAD. These studies argue that PEAD continues to be observable because of frictions in the market that impede an informed investor to arbitrage away the market underreaction to earnings news. For example, Bhushan (1994) concludes that the PEAD is inversely related to both direct (share price) and indirect (dollar trading volume) costs of trading and these relations subsume the previously documented inverse relation between the drift and firm size. Mendenhall (2004) finds that the drift is strongly related to the arbitrage risk measure developed by Wurgler and Zhuravskaya 2002. Bartov et al. (2000) argue that trading activity of sophisticated investors quickly corrects the mispricing that arises from the trades of unsophisticated investors. Others, such as Ng et al. 2008 and Chordia et al. 2009, document that the drift is most pronounced in highly illiquid stocks, with high trading and market impact costs.

Given that the profitability of the PEAD strategy is strongly related to transactions costs, others propose that, if unexpected variations in liquidity have a systematic component, then the PEAD could be viewed as compensation for liquidity risk provided it is sensitive to unexpected changes in systematic liquidity. For instance, Sadka and Sadka (2004) find that systematic liquidity risk is an important determinant in explaining the cross-sectional variation of expected returns among unexpected earnings-sorted portfolios. They conclude that it is not the liquidity spread that explains the drift; rather the substantial part of the PEAD can be viewed as compensation for risk associated with shocks to the information environment in the economy (systematic liquidity). Others such as Sadka 2006 decompose firm-level liquidity into variable (typically associated with private information) and fixed price effects and conclude that a significant part of the PEAD returns can be viewed as compensation for the unexpected variations in the aggregate ratio of informed traders to noise traders.

In our paper, we utilize the short-horizon return predictability approach developed by CRS to estimate the firm-specific levels of market frictions prior to earnings announcements and examine their association with the consequent post-earnings announcement abnormal returns. We are not the first to relate proxies for efficient processing of information in quarterly earnings to the PEAD. For instance, Bartov et al. (2000) investigate whether drift is a manifestation of inefficient processing of quarterly earnings by examining the relation between drift and investor sophistication.[4] Other studies, such as Hou and Moskowitz 2005, go one step further and assess the impact of aggregate market frictions for cross-sectional return predictability using a parsimonious measure based on the price delay in response to information.[5] Given the recent advances in the microstructure literature on short-horizon return predictability, we are first to utilize high-frequency data in a direct approach to assess the efficiency of market makers, traders, and arbitrageurs in their processing of current earnings information. With this approach, we can better interpret market efficiency in the context of PEAD.

Market efficiency: Return predictability from historical order flows

Research on market microstructure gives us a basis to explore the price formation process and study how information is incorporated into security prices. O'Hara (1997: 1) suggests that, "as microstructure research is set in the markets for financial assets, this enhances our ability to understand both the returns to financial assets and the process by which markets become efficient." Recent empirical studies in the market microstructure literature also show increasing interest in the relation between order flows and stock returns (e.g., Chordia, Roll, and Subrahmanyam 2005, 2008; Chordia and Subrahmanyam 2004; Chung and Hrazdil 2010a, b). These studies generally analyze the determinants and properties of market-wide order imbalances in connection with future short-horizon returns and provide evidence that return predictability from past order imbalances is eliminated through the trading activities of specialists and arbitrageurs (floor traders), who have the advantage of immediately observing order flows.

Recent research on order flow and return predictability has expanded its scope and made connections to the concepts of liquidity and market efficiency. CRS are among the first to analyze return predictability in connection with liquidity and interpret their findings from a market efficiency perspective. CRS suggest two possibilities of how liquidity can be related to short-horizon return predictability. First, due to limited risk-bearing capacity and/or facing inventory financial constraints, if market makers cannot absorb the impact of price pressures from imbalances in buy and sell orders, temporary price deviations arise which induce return predictability and create arbitrage profit potential. Higher liquidity resulting from exogenous decreases in bid-ask spreads allows the market makers to reduce their excess inventories, facilitates arbitrage, and encourages trading on private information, which leads to lower return predictability and higher market efficiency. In this case, liquidity is positively associated with market efficiency. Second, if market makers fail to utilize the information in order flows and eliminate return predictability, other market participants have incentives to gather new information about order flows and trade on such information. While the consequent increased adverse selection faced by market makers lowers liquidity, the market is more efficient as more information is incorporated in

4. Bartov et al. (2000) find that the degree of inefficient pricing of abnormal returns subsequent to quarterly earnings announcements is negatively correlated with the proportion of a firm's stock held by institutions. Their results suggest that trading activities of institutional investors improve on the earnings-processing problems that cause PEAD and increase the degree to which earnings information is efficiently priced.

5. Hou and Moskowitz (2005) find that firms with delayed price response to information are small, volatile, and neglected by most market participants; these are also firms that experience high PEAD. Hou and Moskowitz use weekly returns data instead of high-frequency data in their study to estimate price delay because of their concern about potentially confounding microstructure influences such as bid-ask bounce and nonsynchronous trading. They point out that using high frequencies data may provide more precision and perhaps more dispersion in the price delay measure.

prices (Barberis, Shleifer, and Vishny 1998). In this case, liquidity is negatively associated with market efficiency. A third possibility also exists, as CRS point out: if market makers can fully absorb the price pressure from imbalances in buy and sell orders and utilize all information in the order flows, then there should be no relation between liquidity and market efficiency. CRS are among the first to confirm that improved liquidity associated with exogenous decrease in bid-ask spreads stimulates arbitrage activity, which reduces short-horizon return predictability, an inverse indicator of market efficiency. The results by CRS therefore effectively reject the other competing explanations that liquidity would be accompanied by greater return predictability (based on Barberis et al. 1998) and that liquidity would bear no relation to market efficiency.

In addition to liquidity, Chung and Hrazdil (2010a, b) further validate the short-horizon return predictability as a proxy for market efficiency and analyze several of its determinants: size, volume, trading frequency, and information asymmetry (proxied by the high adverse selection component of the bid-ask spread). They not only document a positive association between a continuous measure of liquidity and market efficiency but also show that this effect is amplified during periods that contain new information. Their results are consistent with the theoretical framework that public information about future returns is contained in past order flows and that it may take some time for prices to reflect fully the new information that is available in the market (Chordia et al. 2005). During periods with a high level of new information (e.g., around earnings announcements), the market tends to be less efficient in incorporating the information into prices, suggesting that stock prices incorporate information slowly, which in turn leads to trends in returns over short horizons (i.e., consistent with the underreaction hypothesis). Overall, Chung and Hrazdil (2010a, b) find that, over the period January 1, 1993 to June 30, 2004, their explanatory variables account for about 50 percent of the variation in return predictability for NYSE firms and about 30 percent of the variation for NASDAQ firms.

Apart from liquidity and information asymmetry effects, the financial literature has identified additional proxies for information flow, arbitrage risk, investor sophistication, volume, size, and trading costs that are expected to influence arbitrage trading activity, which in turn affects market efficiency (e.g., Ross 1989; Bhushan 1994; Bartov et al. 2000; Mendenhall 2004; Hou and Moskowitz 2005; Pontiff 2006; Ng et al. 2008). Consistent with the arguments developed in these studies, we posit that short-horizon return predictability captures the impact of volatility, number of analysts following, institutional ownership, information asymmetry, and various transaction costs that impact on the extent to which information is impounded in prices. Provided that these variables are associated with market efficiency, the CRS measure of short-horizon return predictability becomes a useful measure as it aims to capture parsimoniously the aggregate impact of all potential frictions that operate during the price formation process in the trading of a stock.

In this paper, we rely on the CRS measure and use it as a direct proxy to broadly capture the overall degree of frictions in the market. We apply this measure of market efficiency to the information environment in which the PEAD originates. Unlike Lee 1992, who only examines intraday order imbalances around earnings announcements, we analyze this aggregate measure of market frictions and its direct relation to the PEAD.[6] Consistent with CRS, we derive this measure as the negative of the adjusted R^2 from the predictive regressions of five-minute returns on lagged order imbalances and lagged order imbalances interacted with a dummy variable for illiquidity regimes. Accordingly, we

6. Lee (1992) provides a detailed intra-day analysis of returns and directional volumes around earnings announcements during 1988 for 230 firms listed on NYSE; we provide a more comprehensive analysis linking the return predictability from order flows to the PEAD anomaly.

hypothesize a negative association between the market efficiency measure and abnormal returns subsequent to earnings announcements (PEAD), which would indicate a faster incorporation of earnings information into prices. More formally, our hypothesis can be stated as:

HYPOTHESIS: *Market efficiency is negatively associated with abnormal returns subsequent to earnings announcements.*

In the capital market research framework that links accounting earnings to stock returns, market efficiency is only one of several factors that helps us understand how earnings news is reflected in share prices. As noted by Nichols and Wahlen (2004: 269), market efficiency "is a matter of degree, which describes how much information prices reflect and how quickly prices react and reach new equilibrium levels. A highly efficient market with respect to accounting earnings numbers would react quickly and completely when new earnings-related information becomes available." The PEAD, as evidence of market efficiency violation, assumes further that earnings numbers reflect reliable and relevant information, that market correctly forms expectations about new information in earnings (proxied by analysts' forecast consensus), and that asset pricing models correctly incorporate sufficient rate of return necessary to compensate consumption and bearing risk of holding a security.[7] We therefore evaluate and confirm whether, and to what extent, market efficiency plays a role in explaining the PEAD magnitude and persistence, holding the other assumptions (value relevance, earnings expectations, and asset pricing methodology) constant.

3. Research design and data

Order imbalances and liquidity: Estimation of market efficiency

Previous research on the PEAD typically considers all traded firms on various exchanges and selects the final samples based on data availability of the PEAD and its determinants. Consistent with the literature, we collect intraday trade and quote data from the Trade and Quote (TAQ) database for all NYSE, American Stock Exchange (AMEX) and NASDAQ firms over the period January 1, 1993 to June 30, 2004.[8] Following CRS, we compute stock returns over five-minute intervals using the midpoints of bid and ask prices quoted at the end of the intervals. For order imbalance, we compute two measures for each five-minute interval t: the number of trades $OIB\#_t$ and the dollar trades $OIB\$_t$, defined as:

$$OIB\#_t = \{[(Number\ of\ buyer\ initiated\ trades_t) - (Number\ of\ seller\ initiated\ trades_t)]/ (Total\ number\ of\ trades_t)\} \quad (1),$$

7. We acknowledge that, given the dynamic nature of these assumptions, it is difficult to control for them individually. As a consequence, the investors' underreaction (and the PEAD) is often problematic to interpret from the market efficiency point of view.
8. All three exchanges experienced the same exogenous shocks to their minimum trading tick sizes during similar time periods. Before mid-1997, firms on all three exchanges (AMEX, NASDAQ, and NYSE) traded in increments of eighths of a dollar. On May 7, 1997, the AMEX became the first of the three U.S. exchanges to adopt the minimum tick of sixteenths. The NASDAQ followed next, and began its new quotation system on June 2, 1997. Lastly, the NYSE officially changed to same lower ticks on June 24, 1997. With regard to the change to a decimal regime, the NYSE and the AMEX adopted the minimum decimal tick size on January 29, 2001; the NASDAQ immediately followed with a pilot project of changing the minimum tick size for some companies with a full adoption for remaining constituents on April 9, 2001.

$$OIB\$_t = \{[(Dollar\ traded\ from\ buyer\ initiated\ trades_t) - (Dollar\ traded\ from\ seller\ initiated\ trades_t)]/(Total\ dollar\ traded_t)\} \quad (2)$$

Each trade is classified as either a buyer-initiated or seller-initiated trade using the well-established Lee and Ready 1991 algorithm with the same modification as implemented by CRS; each transaction is matched to a bid-ask quote, which is the first quote immediately prior to the trade for years after 1998 and at least five seconds prior to the trade for years before 1999. In order to analyze the informational efficiency in connection with the PEAD, we use the same approach as Chung and Hrazdil 2010a and estimate the market efficiency measure from the following time-series regression on a firm-level basis:[9]

$$Return_t = \alpha + \beta_1 OrderImbalance_{t-1} + \beta_2(OrderImbalance_{t-1} * Illiquidity_t) + \varepsilon_t \quad (3),$$

where $Return_t$ is the value-weighted return over a five-minute interval t (computed using the midpoints of the first and last quotes within each trading interval) for each firms listed on an exchange, $OrderImbalance_t$ is either $OIB\#_t$ or $OIB\$_t$, and $Illiquidity_t$ is a dummy variable that is coded one if the daily average effective spread for the firms is at least one standard deviation above the de-trended expected effective spread for the trading day, and zero otherwise. We include the interaction variable of $OrderImbalance_t$ and $Illiquidity_t$ to account for the effect of liquidity changes on market efficiency. The negative of the adjusted R^2 from (3) utilizing dollar trades order imbalances ($OIB\$_t$) represents our market efficiency measure (hereafter ME).[10] For these time-series regressions, we require firms to have at least 30 observations within a calendar month. The corresponding ME for firm i that we analyze in connection with the post-earnings announcement returns is estimated over the month prior to the month during which the earnings were announced. We verify that this measure of efficiency is comparable across several months surrounding the earnings announcement month, which suggests that variations in the speed of price adjustments are minimal from month to month. Defining the ME measure over the month prior to earnings announcements has further implications to practitioners and researchers who wish to estimate, ex ante, the degree of ME and utilize the information about the speed of adjustment in connection with various informational events.

Variable definition

Traditionally, the PEAD has been documented subsequent to unexpected earnings measured as seasonal changes in quarterly earnings. However, more recent studies argue and provide evidence that earnings expectations based on analysts' forecasts from the I/B/E/S provide a more precise measure of earnings surprise than previously employed time-series methodology based on the COMPUSTAT quarterly data. Doyle, Lundholm, and Soliman (2006) and Livnat and Mendenhall (2006) document economically larger abnormal returns when unexpected earnings are defined based on I/B/E/S analysts forecasts and I/B/E/S actual earnings, thus providing a greater hurdle for market efficiency proponents to

9. Similar to CRS, we also analyze the portfolio regressions for the 500 largest NYSE firms, from which 193 are continuously traded, and replicate their results. As our final tables are virtually identical to those reported by CRS in their Table 5, we only report the firm-level changes in market efficiency and transaction costs for our sample of firms over time. For detailed empirical evidence on the differences in market efficiency for portfolios of all publicly traded firms on NYSE and NASDAQ formed on the basis of trading frequency, market capitalization, and trading volume, and for validating the return predictability as measure for market efficiency on a firm-level basis, see Chung and Hrazdil 2010a, b.

10. In cases where the adjusted R^2 is negative, we assign it a value of zero. The results are almost identical when we use ordinary R^2 as a measure of market efficiency. When we use $OIB\#$ as an explanatory variable in regression (3), results are very similar to those reported in section 4.

explain this phenomenon. Ng et al. (2008) show that, unlike the PEAD strategy with earnings surprises measured as seasonal changes in quarterly earnings, economically significant profits remain for the PEAD strategy with earnings surprises measured using I/B/E/S analyst numbers. We thus follow prior literature and define unexpected earnings ($UE_{i,t}$) for firm i in fiscal quarter q as:

$$UE_{i,q} = (E_{i,q} - \bar{\hat{E}}_{i,q})/P_{i,q} \quad (4),$$

where $E_{i,q}$ is the most recent reported quarterly earnings per share (EPS) from the I/B/E/S Detail file, $\bar{\hat{E}}_{i,q}$ is the median of analysts' forecasts of EPS from I/B/E/S during the month prior to the earnings announcement, and $P_{i,q}$ is the price per share from COMPUSTAT for firm i at the end of quarter q.[11] Consistent with prior literature, we group firms within each fiscal quarter into ten deciles based on their unexpected earnings; lowest decile firms experience most negative earnings surprises whereas highest decile firms experience most positive unexpected earnings.

Following the tradition in the PEAD literature (e.g., Livnat and Mendenhall 2006), we define the size-adjusted and book-to-market (B/M)-adjusted abnormal return ($AR_{i,t}$) as the raw daily return ($R_{i,t}$) from the Center for Research in Security Pricing (CRSP) less the daily equal-weighted return on the portfolio p of firms with approximately the same size and book-to market ($R_{p,t}$). The daily returns for the six (two size and three B/M) portfolios along with the cutoff points can be obtained from Kenneth French's data library.[12] The corresponding cumulative abnormal returns ($CAR_{i,t}$) for firm i on day t during the 60-day interval (starting one day after earnings announcement) can be expressed as follows:

$$CAR_{i,t} = \sum_{t=1}^{60} AR_{i,t} = \sum_{t=1}^{60} (R_{i,t} - R_{p,t}) \quad (5).$$

For each firm-quarter, we also collect and estimate control variables such as: residual (idiosyncratic) volatility as a proxy for risk; institutional ownership and analysts following to proxy for the investor sophistication; and price, volume, and various proxies for transaction costs. These variables have been previously analyzed in connection with the drift as its main determinants.

One implication of the semi-strong form of the efficient market hypothesis is that prices should respond swiftly and in an unbiased manner to new information. To provide further insight into how new information affects the market efficiency, we follow prior literature (e.g., Visaltanachoti and Yang 2010; Chung and Hrazdil 2010a) and include historical return volatility and measures of adverse selection to control for the information flow and information asymmetry effects, respectively. First, we compute annualized historical volatility ($VOLAT_{i,t}$) as the standard deviation of daily returns over a period of 12 months prior to the earnings announcement date, multiplied by the square root of 252 (minimum number of valid daily returns required is 24). Second, we define $ADV\_LSB_{i,t}$ and $ADV\_HS_{i,t}$ that represent the average adverse selection component of the bid-ask spread for the quarter estimated on a firm-by-firm basis for each month using the decomposition models of Lin, Sanger, and Booth 1995 (hereafter LSB) and Huang and Stoll 1997 (hereafter HS), respectively (a further discussion of the estimation of the ADV_LSB and ADV_HS measures is provided in Appendix 1). Both models have been shown to capture different aspects of adverse selection (Van Ness, Van Ness, and Warr 2001) and adverse

11. We only analyze firms with the same earnings report date from both I/B/E/S and COMPUSTAT.
12. Data are available from: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

selection has been shown to be negatively associated with market efficiency (Chung and Hrazdil 2010a). Lastly, $SIZE_{i,q}$, is proxied by the total assets (COMPUSTAT AT) in the quarter prior to the earnings announcement. Ross (1989) finds that volatility is directly related to the rate of the flow of information in the market and that larger companies are usually considered to have a better information environment and less information asymmetry. In a later study, Visaltanachoti and Yang (2010) further document that higher volatility significantly increases the speed of convergence to market efficiency. Therefore, we expect volatility and size to be positively related to market efficiency.

Hou and Moskowitz (2005) examine price delay in connection with cross-sectional returns and their results show that residual volatility, as opposed to covariance with the market, is a better measure of risk for firms with high market frictions. In light of Hou and Moskowitz's findings, we use residual volatility ($RVOLAT_{i,t}$) as another proxy for risk and we compute this measure as the standard deviation of residuals from the market model regression of daily returns on the Standard & Poor's (S&P) 500 index over the 12-month period ending in the announcement month. Using daily returns to derive this measure is consistent with Ng et al. 2008, who find that the ability of volatility to explain the magnitude of the PEAD is stronger when daily returns is used as opposed to monthly returns. Prior research has, however, provided mixed results on the pricing role of residual volatility.[13] Hou and Moskowitz (2005) argue that one possible reason for the disparity of results is that most studies examine the relation between idiosyncratic risk and average returns for average firms that may be widely held and recognized and that may not face significant frictions. Therefore, the average firm should not be expected to have priced idiosyncratic risk. Indeed, Hou and Moskowitz (2005) document that idiosyncratic risk is priced only among the most constrained and severely price delayed firms. Therefore, we do not form an expectation for idiosyncratic volatility in connection with post-earnings announcement returns and predict that idiosyncratic volatility is related to the PEAD only for the low efficient firms.[14]

To control for investor sophistication, we follow Bartov et al. 2000 who show that the percentage of ownership of institutional investors is the variable most significantly (negatively) related to the PEAD. The intuition behind this result is based on the model in Hand 1990, which shows that the likelihood that prices properly reflect a type of information depends on whether or not the marginal investor is sophisticated (proxied by institutional ownership). We use the CDA/Spectrum Institutional (13f) Holdings database and compute the institutional ownership ($INSOWN_{i,q}$) variable for firm i in quarter q as the fraction of shares held by institutions in the calendar quarter prior to the earnings announcement quarter.[15] In addition to the institutional ownership percentage of a firm, Walther (1997) and Bhushan (1994) also used the number of analysts and firm size as alternative proxies for the likelihood that the marginal investor is sophisticated. We define $NUMEST_{i,q}$, obtained from the I/B/E/S, as the number of analysts following firm i in quarter q prior to the earnings announcement month. To better isolate the effect of investor sophistication on market efficiency, we also capture the effect of those analysts who are actively following a firm and actually making changes to the forecasts that they provide. We include $ACTIVE_{i,q}$ (active analysts) as an additional variable to measure the proportion of analysts who have revised their one-year-ahead EPS forecasts for firm i,

13. Fama and MacBeth (1973) and Tinic and West (1986) find no association between idiosyncratic risk and average returns, whereas Malkiel and Xu (2003) find some cross-sectional predictability.

14. Given the findings of Hou and Moskowitz 2005, we refrain from using residual volatility as a proxy for arbitrage risk (unlike Mendenhall 2004 and Ng et al. 2008).

15. Data for this variable are available for institutions required by the Securities and Exchange Commission to file Form 13f.

either up or down, during the quarter q. Boehmer and Kelley (2009) provide evidence that stocks with greater institutional ownership are priced more efficiently and that variation in liquidity does not drive this result. Consistent with prior literature, we therefore expect the proxies for investor sophistication to be positively related to market efficiency and negatively associated with the PEAD.

Finally, to proxy for transactions costs, we control for recent stock price and recent dollar trading volume, which have been shown to be significantly associated with the cost of trading and the PEAD (e.g., Bhushan 1994; Stoll 2000). We measure $PRICE_{i,q}$ as a closing monthly price of firm i in quarter q during the month prior to the earnings announcement month. The dollar trading volume ($VOL_{i,q}$) is then obtained by multiplying the price by the number of common shares of firm i in quarter q traded during the pre-earnings announcement month. In terms of more direct measures of trading costs, we follow Korajczyk and Sadka 2004 and use proportional quoted bid-ask spread ($QSPR_{i,q}$) and proportional effective bid-ask spread ($ESPR_{i,q}$). Both computations for firm i are averaged first across all trades during a day and then across all trading days over each quarter q during our sample period.

$$QSPR_{i,q} = \frac{(Ask - Bid)}{\left[\frac{(Ask+Bid)}{2}\right]} \quad (6),$$

$$ESPR_{i,q} = \frac{\left\{\left(\left[TradePrice - \frac{(Ask+Bid)}{2}\right]\right) * 2\right\}}{\left[\frac{(Ask+Bid)}{2}\right]} \quad (7).$$

As an alternate proxy for transaction costs, we further estimate the limited dependent variable ($LDV_{i,q}$) measure, developed by Lesmond et al. 1999, for each firm i for each quarter q, which is based on the transaction costs implied by the trading behavior of investors. The measure has two main advantages. First, when the model's assumptions are satisfied, the measure incorporates all costs that are important to traders and that are reflected in their trading behavior. This is important because several aspects of transaction costs are hard to estimate directly. Second, Lesmond et al. (1999) find that the measure is highly correlated with directly observable measures of transaction costs, is relatively easy to compute, and is available for any period for which daily stock returns from CRSP are available. A further discussion of the estimation of the LDV measure is provided in Appendix 2. Market microstructure literature establishes a negative relation between price and trading costs and between volume and trading costs (e.g., Stoll 2003). Because higher trading costs adversely affect market efficiency (based on CRS), we expect the trading costs (except $PRICE$ and VOL) to be negatively associated with market efficiency and positively related to the PEAD.

Variable transformation

Most PEAD studies classify firms into ten groups based on their earnings surprises in order to control for outliers and nonlinearities in the earnings–return relation. We follow this traditional approach and present our univariate results of PEAD in connection with market efficiency for individual UE decile firms. For the regression analysis where cumulative abnormal returns are regressed on a set of variables, further transformation of UE and all other control variables is often performed in order to facilitate the interpretation of the coefficients. For instance, Bernard and Thomas (1990) further reassign the UE deciles into scores ranging from 0 to 1, which allows the slope coefficient to be interpreted as the difference in cumulative abnormal returns between the lowest and the highest UE

deciles. A common modification implemented by others further subtracts 0.5 from the coded *UE* scores in order to assign a score of zero to a mythical median observation (e.g., Affleck-Graves and Mendenhall 1992; Mendenhall 2004; Livnat and Mendenhall 2006). When the cumulative abnormal returns are regressed on the *UE*, the intercept can be interpreted as the abnormal return for a hypothetical median observation between the two middle *UE* deciles.[16] Similar to Mendenhall 2004, for every quarter we rank each variable into ten deciles from lowest to highest and transform these ranks into values ranging between −0.5 to +0.5. We interpret our multivariate results based on the transformed ranks toward the end of the next section.

Sample selection

We analyze 61,526 firm-quarter (4,649 firms) observations, for which we have our dependent and control variable data available from the COMPUSTAT, CRSP, I/B/E/S, TAQ, and CDA Spectrum databases. Our initial sample selection procedure covers the period between January 1993 and June 2004, during which we require the firms to: (a) have identical earnings report dates on the COMPUSTAT quarterly and the I/B/E/S; (b) have actual EPS, average and median of EPS forecasts data available from the I/B/E/S; (c) have price (unadjusted for stock splits) from the COMPUSTAT quarterly; (d) have daily returns data available from the CRSP daily; and (e) be actively traded companies that belong to the NYSE, NASDAQ, or AMEX exchanges.[17] This initial sample identification procedure yields 77,514 firm-quarter (5,458 firms) observations. We lose about 15 percent of the firms due to control variable data requirements. Specifically, we require our final sample firms to have market efficiency measures available based on more than 30 time-series observations within each calendar month, have institutional common stock ownership data from the CDA Spectrum database, and have average daily dollar trading volume from the CRSP.[18] All variables are winsorised at the 1 percent levels for the correlation and the analysis of market efficiency determinants. Table 1 summarizes the sample selection procedure.

We provide detailed descriptive statistics of the PEAD and various proxies for transaction costs in Table 2. Table 2, panel A summarizes an average PEAD for the period January 1, 1993 to June 30, 2004 across ten *UE* deciles. Confirming findings of previous studies, the top *UE* (good news, Decile 10) firms experience significant positive 60-day drift compared to the bottom *UE* (bad news, Decile 1) firms. The profit from a strategy that shorts decile 1 firms and buys decile 10 firms would yield an average profit of 5.48 percent (4.90 percent median) during a 60-day period subsequent to an earnings announcement date. Worth noticing is the reversed U-shaped pattern of the *ME* measures (defined as negative of adjusted R^2 from (3)). Our results in panel A thus suggest that firms in the extreme *UE* deciles are in fact least efficient in incorporating earnings information into prices. Table 2, panel B also documents that, while the average transaction costs of all firms are comparable with previous studies, the transaction costs of the shares of the firms in the extreme earnings surprises portfolios are the highest.

16. Mendenhall (2004) points out that the resulting coefficient estimates may be biased without this adjustment.
17. Some authors, such as Nichols and Wahlen 2004, examine firms with December 31 fiscal year-end, for which the fiscal quarter corresponds to a calendar quarter. Our results are robust to this additional data requirement.
18. The maximum likelihood estimation of *LDV* produces some invalid estimates due to convergence problems and cases involving boundary or corner solutions, which reduces the number of observations to 55,286 for the *LDV* variable. Further, after excluding invalid estimates generated by the LSB and HS decomposition models, the numbers of observations for *ADV_LSB* and *ADV_HS* are reduced to 57,839 and 57,834, respectively.

TABLE 1
Sample selection

	Number of firms (percentage)	Number of observations (percentage)
Firms/observations with necessary quarterly data on COMPUSTAT and I/B/E/S[a]	5,458 (100)	77,514 (100)
No market efficiency measures data[b]	430 (8)	9,719 (12)
No institutional ownership data[c]	48 (1)	1,217 (2)
No CRSP data[d]	331 (6)	5,052 (7)
Final sample[e]	4,649 (85)	61,526 (79)

Notes:

[a] During January 1993 and June 2004, sample firms are required to: (a) have identical earnings report dates on the COMPUSTAT quarterly and the I/B/E/S; (b) have actual EPS, average and median of EPS forecasts data available from the I/B/E/S; (c) have price (unadjusted for stock splits) from the COMPUSTAT quarterly; (d) have daily returns data available from the CRSP daily; (e) be actively traded companies that belong to the NYSE, NASDAQ, or AMEX exchanges.

[b] Sample firms with no market efficiency measures available (based on the TAQ database) or sample firms with less than 30 time-series observations within a calendar month are eliminated.

[c] Sample firms without institutional common stock ownership data from the CDA Spectrum database are eliminated.

[d] Firms without dollar trading volume, residual return volatility, and transaction costs (proportional quoted bid-ask spread and proportional effective bid-ask spread) data available from the CRSP are eliminated.

[e] All variables are winsorised at the 1 percent level for analyses in Tables 2–5 and 7.

CRS report increasing market efficiency (decreasing return predictability) over three trading regimes, over which the three major U.S. exchanges experienced the same exogenous shocks to their minimum trading tick sizes. Although we rely on CRS and Chung and Hrazdil 2010a, b, we provide graphical illustration of transaction costs and return predictability changes over our sample period in Figure 1.

Several studies argue (e.g., Ng et al. 2008; Chordia et al. 2009) that transaction costs provide the most significant explanation for the existence and persistence of the drift. In the multivariate regression setting, we reexamine whether the trading and transaction costs continue to be significantly associated with the long-window post-announcement abnormal returns once we consider the impact of the aggregate level of barriers to arbitrage on the drift.

Descriptive statistics

Table 3 provides descriptive statistics for the sample of 61,526 firm-quarters before the explanatory variables are transformed and coded. The *UE* seems to be distributed evenly around zero (with mean and median of −0.002 and 0.000, respectively) with an approximately similar number of unexpected earnings deflated by low or high prices. The market efficiency (*ME*) measure (negative adjusted R^2 from (3) based on individual firm time-series regressions) also follows a normal distribution, which is proportionate to

TABLE 2
Post-earnings announcement drift (PEAD): Descriptive statistics

Panel A: PEAD and marker efficiency

	CAR [+1; +60]			*ME*			
Unexpected earnings	Mean	Median	St. dev.	Mean	Median	St. dev.	*n*
Decile 1	−0.0188	−0.0231	0.2806	−0.0633	−0.0400	0.0692	6,131
Decile 2	−0.0186	−0.0173	0.2156	−0.0635	−0.0370	0.0731	6,155
Decile 3	−0.0131	−0.0103	0.1842	−0.0630	−0.0369	0.0713	5,256
Decile 4	−0.0064	−0.0037	0.2094	−0.0471	−0.0241	0.0604	7,147
Decile 5	0.0004	0.0024	0.1997	−0.0559	−0.0300	0.0686	6,307
Decile 6	0.0198	0.0177	0.1915	−0.0481	−0.0246	0.0619	5,925
Decile 7	0.0074	0.0090	0.1994	−0.0562	−0.0320	0.0672	6,158
Decile 8	0.0088	0.0107	0.2147	−0.0609	−0.0339	0.0718	6,156
Decile 9	0.0179	0.0147	0.2241	−0.0627	−0.0378	0.0712	6,158
Decile 10	0.0360	0.0259	0.2729	−0.0668	−0.0405	0.0725	6,133
Total returns (Decile10 & Decile1)	0.0548	0.0490					

Panel B: Transaction costs

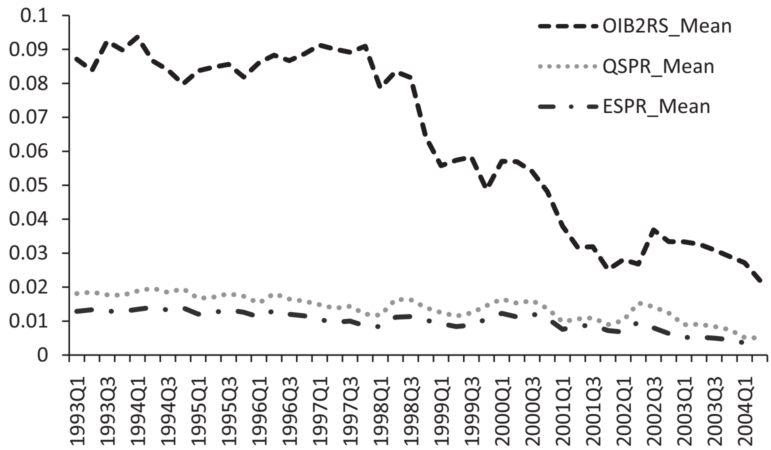
	QSPR			*ESPR*			
Unexpected earnings	Mean	Median	St. dev.	Mean	Median	St. dev.	*n*
Decile 1	0.0238	0.0185	0.0183	0.0177	0.0139	0.0138	6,131
Decile 2	0.0154	0.0106	0.0139	0.0106	0.0072	0.0099	6,155
Decile 3	0.0112	0.0078	0.0108	0.0076	0.0049	0.0079	5,256
Decile 4	0.0110	0.0069	0.0114	0.0074	0.0045	0.0080	7,147
Decile 5	0.0113	0.0072	0.0116	0.0079	0.0047	0.0089	6,307
Decile 6	0.0077	0.0051	0.0080	0.0050	0.0032	0.0055	5,925
Decile 7	0.0093	0.0067	0.0086	0.0062	0.0043	0.0060	6,158
Decile 8	0.0115	0.0082	0.0104	0.0079	0.0054	0.0075	6,156
Decile 9	0.0136	0.0096	0.0120	0.0095	0.0066	0.0087	6,158
Decile 10	0.0192	0.0144	0.0156	0.0144	0.0107	0.0119	6,133
Total costs (Decile10 & Decile1)	0.0430	0.0329		0.031	0.0246		

Notes:

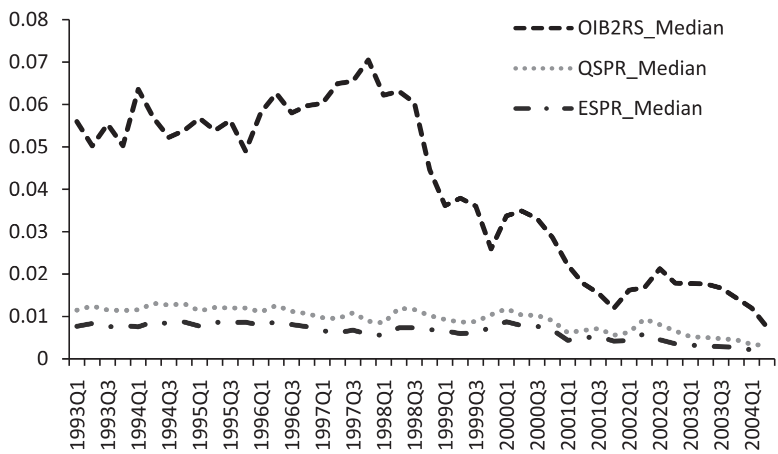
Each quarter, firms are sorted into deciles based on the magnitude of their unexpected earnings (*UE*) defined in (4) as a difference between the most recent reported quarterly earnings per share (EPS) (from the I/B/E/S Detail file) and the median of analysts' forecasts of EPS during the month prior to the earnings announcement, deflated by the price per share at the end of quarter. In panel A, firms in decile 1 (decile 10) experience most negative (positive) earnings surprises without considering transaction costs. The corresponding cumulative abnormal returns (*CAR*), defined in (5) and winsorised at 1 percent levels, are presented for a 60-trading-day interval starting one day following the quarterly earnings announcements. The last row presents the mean and median differences in *CAR* between the extreme deciles, which are all significant at 1 percent levels. Market efficiency (*ME*) is defined as a negative adjusted R^2 from (3). Panel B presents the proxies for transaction costs (*QSPR* and *ESPR*) defined in (6) and (7), respectively, for individual *UE* deciles. The last row presents combined transaction costs for the extreme *UE* deciles, which represents costs of hedge returns, which are all significant at 1 percent levels.

Figure 1 Graphical illustrations of transaction costs and return predictability over time.

A



B



Notes:

These figures depict the changes in transaction costs and short-horizon return predictability (an inverse indicator of market efficiency) over time. *OIB2RS* represents the adjusted R^2 from (3). *QSPR* and *ESPR* are used as proxies for transactions costs and are defined as (6) and (7), respectively. Mean and median values are presented in Figure 1A and Figure 1B, respectively. The sample period spans over January 1993 to June 2004 and consists of all stocks that we analyze in connection with the PEAD. The eighth regime ends on (a) June 23, 1997 for the NYSE firms; (b) June 2, 1997 for the NASDAQ firms; (c) May 7, 1997 for the AMEX firms. The sixteenth regime spans (a) June 24, 1997, to January 29, 2001 for the NYSE firms; (b) June 3, 1997, to January 29, 2001 for the NASDAQ firms; (c) May 8, 1997, to April 9, 2001 for the AMEX firms. The decimal regime begins on (a) January 30, 2001 for the NYSE firms; (b) June 3, 2001 for the NASDAQ firms; (c) April 10, 2001 for the AMEX firms.

TABLE 3
Descriptive statistics

Variable	Mean	Std. Dev.	Quartile 1	Median	Quartile 3
UE	−0.002	0.110	−0.001	0.000	0.001
ME	−0.059	0.069	−0.081	−0.033	−0.012
VOLAT	0.522	0.269	0.320	0.459	0.690
RVOLAT	0.031	0.017	0.019	0.027	0.040
ADV_LSB	0.306	0.241	0.097	0.233	0.488
ADV_HS	0.137	0.101	0.063	0.116	0.185
INSOWN	0.513	0.232	0.336	0.533	0.697
NUMEST	6.569	5.688	2.000	5.000	9.000
ACTIVE	0.285	0.162	0.167	0.281	0.371
*PRICE**	26.277	23.765	12.100	21.750	34.600
*VOL** ($bil.)	0.445	1.910	0.015	0.059	0.242
QSPR (x 10^2)	1.338	1.328	0.465	0.872	1.719
ESPR (x 10^2)	0.943	0.986	0.287	0.581	1.230
LDV (x 10^2)	0.826	0.998	0.177	0.457	1.056
*SIZE** ($bil.)	4.497	13.064	0.197	0.702	2.521

Notes:

This table provides descriptive statistics for the sample of 61,526 firm-quarters during the period January 1993–June 2004, before the explanatory variables are transformed and coded. *UE* is the actual quarterly EPS less the median of analysts' forecasts of EPS during the month prior to the earnings announcement (from I/B/E/S), divided by the price per share at the end of quarter. *ME* represents the market efficiency, measured as the negative of adjusted R^2 from (3). Annualized historical volatility (*VOLAT*) is calculated as the standard deviation of daily returns over a period of 12 months prior to the earnings announcement date, multiplied by the square root of 252; minimum number of valid daily returns required is 24. Residual volatility (*RVOLAT*) is the standard deviation of residuals from the market model regression of daily returns on the S&P 500 index over the 12-month period ending in the announcement month. *ADV_LSB* and *ADV_HS* (based on approach described in Appendix 1) represent the quarterly average of the adverse selection component of the bid-ask spread estimated on a firm-by-firm basis for each month using the decomposition models of Lin, Sanger, and Booth 1995 and Huang and Stoll 1997, respectively. We exclude invalid estimates generated by the decomposition models reducing the numbers of observations for *ADV_LSB* and *ADV_HS* to 57,839 and 57,834, respectively.

Proxies for investor sophistication are: *INSOWN* (institutional ownership) is defined as the fraction of shares held (from the CDA Spectrum database) by institutions in the calendar quarter prior to the earnings announcement quarter; *NUMEST*, obtained from the I/B/E/S, is the number of analysts following a firm during the quarter prior to the earnings announcement month; *ACTIVE* (active analysts) represents the proportion of analysts who have revised their one-year-ahead EPS forecasts, either up or down, during the quarter. *PRICE* is a closing monthly price during the month prior to the earnings announcement. The dollar trading volume (*VOL*) is then obtained by multiplying the price by the number of common shares traded during the pre-earnings announcement month. *QSPR* and *ESPR* are based on (6) and (7), respectively. *LDV* is based on the approach described in Appendix 2. The maximum likelihood estimation of *LDV* produces some invalid estimates due to reasons such as convergence problems and cases involving boundary or corner solutions. We exclude these invalid estimates from further analysis and the number of observations for *LDV* goes down to 55,286. *SIZE* is defined as the total assets (COMPUSTAT AT) in quarter prior to the earnings announcement. For the correlation analysis, and the analysis of determinants of market efficiency, all variables are winsorised at 1 percent levels, and variables denoted by * are log transformed.

results presented in Table 2. For the correlation and the analysis of market efficiency determinants, *PRICE*, *VOL*, and *SIZE* are further log transformed.

Table 4 reports the Pearson and Spearman correlations among various dependent and explanatory variables. Consistent with prior literature, certain variables are significantly correlated as expected. For example, the Pearson and Spearman correlations between the proxies for investor sophistication (*NUMEST*, *INSOWN*, and *ACTIVE*) are positive and significant at the 1 percent level. Proxies for transaction costs (*VOL* and *PRICE*) and (*QSPR*, *ESPR*, and *LDV*) are also positively correlated, given the nature of their definitions. With the near-perfect correlation between return volatility (*VOLAT*) and residual volatility (*RVOLAT*) close to 99 percent, we present results for only the residual volatility in subsequent multivariate tests.[19] The important result from Table 4 is the significant correlation between the *ME* and all explanatory variables. These correlations are further consistent with previous studies that examine transaction costs, information asymmetry, and investor sophistication in connection with the PEAD, and also with other studies that find supporting evidence for the manifestation of inefficient processing of quarterly earnings news into prices (e.g., Bartov et al. 2000).[20]

4. Tests and main empirical results

Determinants of market efficiency

Before we analyze whether short-horizon return predictability is significantly associated with the PEAD and whether it dominates other control variables previously analyzed in the literature, we provide further insight into the significance of various market efficiency determinants. Chung and Hrazdil (2010a, b) elaborate on CRS by documenting decreasing return predictability over time for all firms traded on NASDAQ and NYSE and validating the short-horizon return predictability as a proxy for market efficiency across portfolios of different sizes, volumes, and trading frequencies. Extending their analysis, we examine additional determinants of market efficiency and demonstrate that trading costs represent only a portion of return predictability. In Table 5, models I–VIII present individually the effects of residual volatility and information asymmetry, investor sophistication, trading costs, and size on market efficiency. Models IX–XII then combine various control variables together. In order to control for residual autocorrelation within firms over time (the firm effect) and residual correlation across firms in each time period (the time effect), we implement the two-way clustering approach proposed by Petersen 2009 and Thompson 2010. Below each coefficient presented in the regression analysis (Tables 5 and 6), we show the *t*-statistic of the double-clustered standard error.

Consistent with Chung and Hrazdil 2010a, b, we find that volume is most strongly associated with the market efficiency measure (adjusted R^2 is about 18 percent). The proxies for transaction costs explain about 2 percent of the variation, whereas proxies for risk along with information asymmetry and investor sophistication explain over 16 percent and 8 percent of the variation, respectively. The adjusted R^2 increases to almost 40 percent when we consider the combined effect of all variables on market efficiency. Consistent with Visaltanachoti and Yang 2010 and Chung and Hrazdil 2010a, volatility improves

19. Using return volatility (*VOLAT*) in the regression tests yields almost identical results.
20. Consistent with theoretical predictions, the correlations between return volatility (residual volatility) and post-earnings announcement returns (*CAR*) are close to zero (albeit significant). In further nontabulated analysis, we obtain results similar to Hou and Moskowitz 2005, consistent with the interpretation that idiosyncratic risk is priced only among the least efficient stocks. Our results show correlations between *RVOLAT* and *CAR* that are much larger (positive and significant) for firms in the lowest market efficiency decile (least efficient firms) compared to firms in the highest efficiency decile (where correlations are all insignificant). The difference in the correlations between *RVOLAT* and *CAR* based on market efficiency deciles is even more pronounced for the extreme *UE* deciles.

TABLE 4
Correlations

(n = 61,526)	CAR60	UE	ME	VOLAT	RVOLAT	ADV_LSB	ADV_HS	INSOWN
CAR60		−0.001	**0.022**	**0.022**	**0.019**	0.005	**−0.012**	**0.023**
UE	**0.075**		0.001	−0.037	−0.038	0.008	0.005	0.019
ME	**0.030**	**0.029**		**0.208**	**0.172**	**−0.239**	**−0.394**	**0.148**
VOLAT	**0.016**	**0.019**	**0.201**		**0.987**	**−0.415**	**−0.234**	**−0.247**
RVOLAT	**0.015**	**0.017**	**0.143**	**0.986**		**−0.430**	**−0.234**	**−0.282**
ADV_LSB	**0.013**	**0.033**	**−0.238**	**−0.461**	**−0.485**		**0.486**	**0.290**
ADV_HS	**−0.018**	**0.045**	**−0.351**	**−0.276**	**−0.277**	**0.521**		**0.134**
INSOWN	**0.037**	**0.056**	**0.194**	**−0.200**	**−0.234**	**0.308**	**0.143**	
NUMEST	**0.021**	**0.017**	**0.357**	**−0.213**	**−0.263**	**0.156**	−0.009	**0.453**
ACTIVE	0.002	**0.026**	**0.171**	**0.097**	**0.073**	**0.038**	**−0.026**	**0.156**
PRICE	−0.004	**0.035**	**0.111**	**−0.563**	**−0.590**	**0.283**	**0.116**	**0.414**
VOL	**0.015**	**0.045**	**0.521**	**−0.202**	**−0.265**	**0.147**	**−0.054**	**0.519**
QSPR	**−0.056**	**−0.077**	**−0.336**	**0.351**	**0.401**	**−0.256**	**−0.262**	**−0.446**
ESPR	**−0.045**	**−0.073**	**−0.303**	**0.453**	**0.510**	**−0.415**	**−0.270**	**−0.492**
LDV	**−0.059**	**−0.101**	**−0.269**	**0.316**	**0.364**	**−0.428**	**−0.221**	**−0.402**
SIZE	**0.031**	**0.018**	**0.195**	**−0.583**	**−0.632**	**0.480**	**0.167**	**0.353**

(n = 61,526)	NUMEST	ACTIVE	PRICE	VOL	QSPR	ESPR	LDV	SIZE
CAR60	0.011	−0.001	**−0.034**	−0.005	**−0.047**	**−0.041**	**−0.039**	**0.025**
UE	**0.015**	**0.014**	**0.048**	**0.025**	**−0.048**	**−0.048**	**−0.044**	**0.014**
ME	**0.286**	**0.136**	**0.043**	**0.427**	**−0.141**	**−0.105**	**−0.113**	**0.146**
VOLAT	**−0.164**	**0.058**	**−0.569**	**−0.187**	**0.317**	**0.410**	**0.343**	**−0.523**
RVOLAT	**−0.216**	**0.034**	**−0.593**	**−0.249**	**0.353**	**0.450**	**0.373**	**−0.569**
ADV_LSB	**0.096**	**0.048**	**0.268**	**0.122**	**−0.150**	**−0.313**	**−0.340**	**0.418**
ADV_HS	**−0.075**	**−0.022**	**0.101**	**−0.085**	**−0.208**	**−0.239**	**−0.219**	**0.130**
INSOWN	**0.373**	**0.158**	**0.433**	**0.500**	**−0.405**	**−0.460**	**−0.399**	**0.351**
NUMEST		**0.169**	**0.416**	**0.734**	**−0.400**	**−0.422**	**−0.312**	**0.577**
ACTIVE	**0.187**		**0.032**	**0.171**	**−0.081**	**−0.096**	**−0.078**	**0.076**
PRICE	**0.475**	**0.021**		**0.647**	**−0.573**	**−0.622**	**−0.554**	**0.555**
VOL	**0.738**	**0.172**	**0.648**		**−0.601**	**−0.627**	**−0.479**	**0.659**
QSPR	**−0.561**	**−0.112**	**−0.614**	**−0.723**		**0.926**	**0.675**	**−0.490**
ESPR	**−0.593**	**−0.117**	**−0.656**	**−0.747**	**0.940**		**0.732**	**−0.563**
LDV	**−0.380**	**−0.106**	**−0.534**	**−0.528**	**0.670**	**0.700**		**−0.459**
SIZE	**0.585**	**0.067**	**0.562**	**0.636**	**−0.589**	**−0.674**	**−0.505**	

Notes:

This table provides the Pearson (above the diagonal) and Spearman (below the diagonal) correlations. Bolded correlations are significantly different from zero at the 1 percent level (two-tailed test) or better. All variables are defined in the preceding tables. The number of observations for all variables is 61,526 with the exception of *ADV_LSB*, *ADV_HS*, and *LDV* (57,839, 57,834, and 55,286 observations, respectively).

market efficiency and proxies for information asymmetry (*ADV_LSB* and *ADV_HS*) have the expected significant signs across all models. The proxies for investor sophistication have the positive sign consistent with Bartov et al. 2000, who argue that sophisticated investors characterize correctly the process underlying earnings, and that the greater the

TABLE 5
Regression analysis: Determinants of market efficiency

Variable	Predicted sign	I	II	III	IV	V	VI	VII	VIII
Intercept		−0.039***	−0.087***	−0.095***	−0.069***	−0.263***	−0.049***	−0.052***	−0.056***
		(−5.34)	*(−30.36)*	*(−28.72)*	*(−15.01)*	*(−28.57)*	*(−8.68)*	*(−8.84)*	*(−12.63)*
RVOLAT	+	0.439***							
		(5.85)							
ADV_LSB	−	−0.005							
		(−0.42)							
ADV_HS	−	−0.249***							
		(−4.46)							
INSOWN	+		0.014**	0.011*					
			(1.87)	*(1.50)*					
NUMEST	+		0.003***	0.003***					
			(15.65)	*(15.10)*					
ACTIVE	+			0.037***					
				(8.72)					
Log PRICE	+				0.004**				
					(1.95)				
Log VOL	+					0.015***			
						(30.42)			
QSPR	−						−0.735***		
							(−3.75)		
ESPR	−							−0.737***	
								(−2.75)	
LDV	−								−0.799***
									(−4.54)
Adjusted R^2		16.67%	8.35%	9.08%	0.19%	18.19%	2.00%	1.11%	1.27%
n		57,832	61,526	61,526	61,526	61,526	61,526	61,526	55,286

(The table is continued on the next page.)

TABLE 5 (Continued)

Variable	Predicted sign	IX	X	XI	XII
Intercept		−0.289***	−0.285***	−0.294***	−0.246***
		(−20.08)	*(−13.14)*	*(−13.68)*	*(−16.23)*
RVOLAT	+	0.442***	0.445***	0.435***	0.456***
		(3.79)	*(3.78)*	*(3.72)*	*(4.53)*
ADV_LSB	−	−0.028**	−0.027**	−0.028**	−0.039***
		(−2.21)	*(−2.26)*	*(−2.21)*	*(−3.02)*
ADV_HS	−	−0.182***	−0.184***	−0.180***	−0.203***
		(−3.71)	*(−3.67)*	*(−3.65)*	*(−4.25)*
INSOWN	+	0.014***	0.014***	0.014***	0.009***
		(4.53)	*(4.66)*	*(4.84)*	*(3.16)*
NUMEST	+	−0.001***	−0.001***	−0.001***	−0.001***
		(−7.11)	*(−6.71)*	*(−6.95)*	*(−5.99)*
ACTIVE	+	0.017***	0.017***	0.017***	0.013***
		(4.05)	*(4.02)*	*(4.02)*	*(3.43)*
Log PRICE	+	−0.021***	−0.021***	−0.021***	−0.025***
		(−7.63)	*(−8.71)*	*(−8.08)*	*(−9.86)*
Log VOL	+	0.022***	0.022***	0.022***	0.021***
		(13.27)	*(11.20)*	*(11.58)*	*(13.19)*
QSPR	−		−0.062		
			(−0.43)		
ESPR	−			0.095	
				(0.56)	
LDV	−				−1.014***
					(−8.93)
Log SIZE	+	0.002*	0.002*	0.002*	0.001*
		(1.53)	*(1.54)*	*(1.59)*	*(1.31)*
Adjusted R^2		38.28%	38.28%	38.28%	39.92%
n		57,832	57,832	57,832	52,524

Notes:

This table is based on pooled panel data estimation. It summarizes the regression analysis of various determinants of market efficiency (the dependent variable). All variables are defined in Table 3. Brackets contain the t-statistic of standard errors derived using the two-way clustering approach proposed by Petersen 2009 and Thompson 2010 to correct for the effects of residual autocorrelation within firms over time and residual correlation across firms in each time period. ***, **, and * denote 1 percent, 5 percent, and 10 percent significance levels, respectively (one-tailed, when the coefficient sign is predicted). All variables are winsorised at the 1 percent levels.

TABLE 6
Regression analysis: Determinants of post-earnings announcement returns

Variable	Predicted sign	I	II	III	IV	V	VI
Intercept		0.329	0.346	0.348	0.331	0.338	0.224
		(0.84)	*(0.88)*	*(0.89)*	*(0.84)*	*(0.86)*	*(0.56)*
UE	+	4.725***	4.406***	4.367***	4.328***	4.311***	4.097***
		(8.98)	*(8.91)*	*(8.92)*	*(9.29)*	*(9.30)*	*(8.11)*
UE*ME	−	−3.119***					
		(−2.75)					
UE*RVOLAT	+/−		−0.566	0.708	0.176	−0.093	−0.338
			(−0.32)	*(0.45)*	*(0.11)*	*(−0.06)*	*(−0.22)*
UE*INSOWN	−		−0.189	0.174	−0.789	−0.561	−0.540
			(−0.15)	*(0.15)*	*(−0.63)*	*(−0.44)*	*(−0.42)*
UE*NUMEST	−		−2.303**	−1.153	−2.895***	−2.448**	−2.597**
			(−1.81)	*(−0.89)*	*(−2.40)*	*(−2.02)*	*(−1.94)*
UE*PRICE	−		−1.575				
			(−0.82)				
UE*VOL	−			−3.489**			
				(−1.99)			
UE*QSPR	+				−1.100		
					(−0.69)		
UE*ESPR	+					0.381	
						(0.21)	
UE*LDV	+						−0.261
							(−0.20)
UE*SIZE	+/−		−0.494	0.680	−0.735	−0.444	−0.780
			(−0.32)	*(0.39)*	*(−0.45)*	*(−0.27)*	*(−0.48)*
Main effect for determinant		Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2		0.53%	0.64%	0.71%	0.68%	0.64%	0.63%
n		61,526	61,526	61,526	61,526	61,526	55,286

(The table is continued on the next page.)

TABLE 6 (Continued)

Variable	Predicted sign	VII	VIII	IX	X	XI
Intercept		0.338	0.341	0.321	0.330	0.209
		(0.86)	*(0.87)*	*(0.82)*	*(0.84)*	*(0.53)*
UE	+	4.370***	4.389***	4.251***	4.240***	4.001***
		(8.80)	*(8.95)*	*(8.99)*	*(9.01)*	*(7.79)*
UE*ME	−	−2.493**	−1.915*	−2.921**	−2.720**	−2.885**
		(−2.07)	*(−1.35)*	*(−2.32)*	*(−2.17)*	*(−2.17)*
UE*RVOLAT	+/−	0.529	1.188	1.319	0.993	0.764
		(0.28)	*(0.75)*	*(0.81)*	*(0.59)*	*(0.48)*
UE*INSOWN	−	−0.324	−0.083	−0.942	−0.704	−0.633
		(−0.26)	*(−0.06)*	*(−0.74)*	*(−0.54)*	*(−0.49)*
UE*NUMEST	−	−1.584	−1.036	−2.141**	−1.719*	−1.745
		(−1.19)	*(−0.79)*	*(−1.70)*	*(−1.37)*	*(−1.23)*
UE*PRICE	−	−1.112				
		(−0.57)				
UE*VOL	−		−2.241			
			(−1.06)			
UE*QSPR	+			−1.642		
				(−0.99)		
UE*ESPR	+				−0.086	
					(−0.05)	
UE*LDV	+					−0.442
						(−0.33)
UE*SIZE	+/−	−0.127	0.498	−0.387	−0.141	−0.395
		(−0.08)	*(0.29)*	*(−0.24)*	*(−0.09)*	*(−0.25)*
Main effect for determinant		Yes	Yes	Yes	Yes	Yes
Adjusted R^2		0.66%	0.72%	0.71%	0.67%	0.65%
n		61,526	61,526	61,526	61,526	55,286

Notes:

This table is based on pooled panel data estimation. It summarizes the regression analysis of market efficiency in relation to the post-earnings announcement drift (the dependent variable). Cumulative abnormal returns (defined in 5) over the post-earnings announcement [+1; +60] period are regressed on various control variables (all defined in Table 3). All explanatory variables are converted to coded scores ranging from −0.5 to +0.5 based on their standing within each earnings announcement calendar quarter. All coefficients are multiplied by 100. Brackets contain the *t*-statistic of standard errors derived using the two-way clustering approach proposed by Petersen 2009 and Thompson 2010. ***, **, and * denote 1 percent, 5 percent, and 10 percent significant levels, respectively (one-tailed when the coefficient sign is predicted).

involvement of sophisticated investors in a stock, the greater their influence on its price. The number of analysts following the firm (*NUMEST*) is significantly positively associated with market efficiency in models II and III, and the proportion of active analysts (*ACTIVE*) has significant incremental effect in contributing to market efficiency. Lastly, all proxies for transaction costs in models IV–VIII are significantly related to market efficiency as expected. Because trading volume itself incorporates the impact of variables such as *NUMEST*, transaction costs, and other indirect trading costs, it is difficult to isolate the individual effect from each of these variables. We attempt to sort out these effects in models IX–XII and results from these models show that even after controlling for the volume and size effects, the major variables for information (*RVOLAT*, *ADV_LSB*, *ADV_HS*) and investor sophistication (*INSOWN* and *ACTIVE*) consistently remain significant and have the hypothesized sign.[21]

The important result from Table 5 is that, in addition to volume, other variables also explain significant variations in the market efficiency measure. Because all of our control variables characterize the information environment, which reflects the extent to which information is efficiently impounded in prices, it would be sufficient to analyze return predictability alone in connection with the PEAD. However, we are interested in whether the market efficiency measure dominates the other variables from prior research claimed to be responsible for the presence and magnitude of the drift. We turn to how the market efficiency measure compares with these other variables in the next section.

Determinants of the PEAD

We examine the coefficients from regressions of 60-day cumulative abnormal returns (*CAR*) on unexpected earnings (*UE*), a set of control variables and a set of control variables interacted with the *UE*. Table 6 reports the parameter estimates (all coefficients are multiplied by 100) and their significance levels from the following regression:

$$\begin{aligned} CAR = \alpha_0 &+ \beta_1 UE + \beta_2 UE * ME + \beta_3 UE * RVOLAT + \beta_4 UE * INSOWN \\ &+ \beta_5 UE * NUMEST + \beta_6 UE * PRICE + \beta_7 UE * VOL + \beta_8 UE * TC \\ &+ \beta_9 UE * SIZE + \sum \beta_k Control\,Variable_k + \varepsilon \end{aligned} \tag{8}$$

where *TC* represents various proxies for transaction costs and where all explanatory variables are defined in section 3 and transformed according to the previous discussion.[22] Consistent with Ng et al. 2008, we include the main effect for these variables as $Control\ Variable_k$ and focus on interpreting the interaction coefficients. Coding variables from −0.5 to +0.5 allows the coefficients to be interpreted in a more meaningful way: α_0 represents a hypothetical median observation between the two middle *UE* deciles and should be close to zero; β_1 coefficient can be interpreted as a difference in cumulative abnormal returns between the lowest and the highest *UE* decile; interaction coefficient (for instance, β_2) represents additional spreads in *CAR* between the extreme *UE* deciles for observations in the highest versus the lowest *ME* decile; we predict and test whether the slope coefficients on *UE***ME* are negative and significant. Further, consistent with predictions developed in prior studies, we expect the estimated coefficient of β_8 to be positive, and the coefficients of β_4 to β_7 to be negative. Model I in Table 6 shows an aggregate proxy for

21. With *VOL* in the same regression, the sign of *NUMEST* becomes negative. This is likely due to the high correlation between these two variables. Our result also suggests that, after controlling for the effects of trading volume and firm size, it is the effect of active analysts (*ACTIVE*) and not the total number of analysts that enhances market efficiency.
22. We are interested in analyzing variables that have been previously documented as significant determinants of the PEAD.

market efficiency in connection with the PEAD. Models II–VI then analyze proxies for information asymmetry, investor sophistication, and trading costs in connection with the drift, whereas models VII–XI provide a comprehensive evaluation of the combined determinants of the PEAD.[23]

During the 60 days after earnings announcements, model I indicates that the difference in abnormal returns between the lowest *UE* decile and the highest *UE* decile is about 4.7 percent and that this spread is about 3.1 percent, significantly lower for the highest *ME* decile firms than for the lowest *ME* decile firms. Further, the interaction coefficients in models II–VI indicate that the drift is more pronounced for firms with high transaction costs (coefficients are insignificant, except for *UE***VOLUME*) and low investor sophistication (coefficients are significant for *UE***NUMEST*). When we include the market efficiency measure as additional regressor in models VII–XI, the results suggest that, after controlling for other variables, the drift remains significantly lower for more efficient firms compared to less efficient firms. Even after including the effects of residual volatility, volume, transaction costs, and investor sophistication (previously documented as primary determinants of the drift), the *UE* interacted with the market efficiency (*UE***ME*) remains to be most significantly associated with the PEAD. Also worth noticing is the magnitude of this coefficient, which indicates its economic significance in explaining the drift. One interpretation of this result is that the market efficiency measure is an important proxy for the extent of arbitrage activities that make price converge to fundamental value and that it is not subsumed by any proxy for barriers to arbitrage used in prior literature. Provided that the lack of short-horizon return predictability is a valid characterization of efficiency in the market, these findings suggest that the PEADs result from investors' underreaction to earnings news, where price convergence to fundamental value after earnings announcements is constrained by high barriers to arbitrage.[24] Because short-horizon return predictability captures other factors that affect arbitrage activities, such as residual return volatility, adverse selection, investor sophistication, volume, size, and trading costs, we evaluate whether transaction costs alone can provide an explanation not only for the persistence but also for the existence of PEAD. We extend our analysis to the PEAD trading strategy with the market efficiency focus.

Analysis of profits

In Table 7, we present the profitability analyses of equal-weighted abnormal returns for the PEAD strategy after considering the effects of market efficiency (i.e., estimate short-horizon return predictability from historical order flows prior to earnings announcements and identify portfolio of lowest deciles and highest deciles efficient firms; observe news in earnings; buy high *UE* decile and short-sell low *UE* decile firms for three months). We compute profits by deducting various proxies for transaction costs from the abnormal returns. In particular, for firms in the top *UE* decile, we subtract the transaction costs from the returns (*CAR*); for firms in the bottom decile of unexpected earnings, we add the transaction costs to negative abnormal returns. We report the corresponding profits for each extreme *UE* and *ME* decile (determined each quarter) and compute various hedge profits by subtracting *UE* decile 1 returns from *UE* decile 10 returns. *Profit* is the difference between *UE* decile 1 returns and *UE* decile 10 returns. *QProfit*, *EProfit*, and *LProfit* are the profits after adjusting for quoted spreads, effective spreads, and *LDV*, respectively.

23. As in Table 5, we apply the conservative approach (Petersen 2009 and Thompson 2010) to compute all *t*-statistics in Table 6 using the double-clustered standard errors.
24. We associate low market efficiency with an underreaction, as opposed to an overreaction, to earnings news because investors are less likely to enter the market when transaction costs and arbitrage risk are high.

TABLE 7
Profitability analysis for PEAD strategy for low versus high market efficient firms

	All Periods		Period 1		Period 2		Period 3	
	ME	ME	ME	ME	ME	ME	ME	ME
	decile 10	decile 1	decile 10	decile 1	decile 10	decile 1	decile 10	decile 1
UE decile 10	2.38/2.08	4.65/3.50	2.18/1.87	3.15/2.34	−0.14/1.13	2.64/2.75	5.42/3.91	6.99/4.96
UE decile 1	−1.52/−2.81	−2.88/−3.53	−1.41/−4.54	−6.34/−5.51	−3.42/−4.29	−3.22/−3.29	1.62/−0.55	−1.52/−2.38
Hedge *Profit*	3.90/4.89	7.53/7.03	3.59/6.41	9.49/7.85	3.28/5.42	5.86/6.04	3.80/4.46	8.51/7.34
p-value	*(0.04/0.02)*	*(0.00/0.00)*	*(0.17/0.08)*	*(0.00/0.00)*	*(0.38/0.32)*	*(0.01/0.00)*	*(0.32/0.48)*	*(0.00/0.00)*
UE decile 10	0.23/0.43	2.42/1.73	−1.25/−0.52	1.83/0.60	−1.93/−0.04	−0.02/0.58	4.56/3.09	4.70/2.91
UE decile 1	1.14/−0.84	−0.03/−0.95	2.57/−0.85	−4.47/−4.29	−1.20/−2.51	0.19/−0.31	2.37/0.08	1.32/−0.08
Hedge *QProfit*	−0.21/1.27	2.45/2.68	−3.82/0.33	6.30/4.89	−0.73/2.47	−0.21/0.89	2.19/3.01	3.38/2.99
p-value	*(0.65/0.81)*	*(0.05/0.02)*	*(0.15/0.28)*	*(0.00/0.00)*	*(0.85/0.95)*	*(0.92/0.85)*	*(0.57/0.75)*	*(0.09/0.08)*
UE decile 10	0.75/0.87	3.09/2.29	−0.42/−0.35	2.25/1.34	−1.58/0.10	0.93/1.43	4.78/3.23	5.24/3.48
UE decile 1	0.54/−1.19	−0.88/−1.86	1.56/−1.90	−5.04/−4.66	−1.57/−2.69	−0.92/−1.29	2.20/−0.16	0.54/−0.72
Hedge *EProfit*	0.21/2.06	3.97/4.15	−1.90/1.55	7.29/6.00	−0.01/2.59	1.85/2.72	2.58/3.39	5.00/4.20
p-value	*(0.91/0.74)*	*(0.00/0.00)*	*(0.45/0.67)*	*(0.00/0.00)*	*(0.99/0.87)*	*(0.38/0.24)*	*(0.50/0.66)*	*(0.02/0.02)*
UE decile 10	0.94/0.81	3.40/2.41	−0.20/−0.50	1.83/0.80	−1.87/0.19	1.21/1.53	6.86/3.78	6.06/4.01
UE decile 1	1.39/−0.94	−1.49/−2.47	1.46/−1.80	−4.42/−4.06	−0.64/−2.66	−1.19/−1.53	5.51/3.22	−0.66/−1.82
Hedge *LProfit*	−0.45/1.75	4.89/4.88	−1.66/−1.30	6.25/4.86	−1.23/2.85	2.40/3.06	1.35/0.56	7.72/5.83
p-value	*(0.82/0.93)*	*(0.00/0.00)*	*(0.53/0.76)*	*(0.00/0.00)*	*(0.75/0.89)*	*(0.26/0.15)*	*(0.76/0.82)*	*(0.00/0.00)*

Notes:

This table presents the profitability analysis using equal-weighted size and book-to-market abnormal returns adjusted for various proxies for transaction costs. The original sample size is 61,526 quarterly earnings announcements of NYSE, NASDAQ, and AMEX firms from January 1993 and June 2004 (55,286 for the *LDV* profit analysis). Each quarter, firms are sorted into deciles based on the magnitude of their unexpected earnings (*UE*). *UE* is defined in (4). For parsimony, only the analyses for the extreme deciles are reported. The corresponding cumulative abnormal returns (*CAR*), defined in (5) and winsorised at 1 percent levels, are presented for a 60-trading-day interval starting one day following the quarterly earnings announcements. The hedge numbers reflect the profitability of buying stocks in the top *UE* decile and shorting stocks in the bottom *UE* decile. *Profit* is the difference between *UE* decile 1 returns and *UE* decile 10 returns. *QProfit*, *EProfit*, and *LProfit* are the profits after adjusting for quoted spreads, effective spreads, and *LDV*, respectively. The *p*-value of the hedge profit is based on analysis of variance for means and Wilcoxon two-sided test for medians. Period 1 corresponds to the eighth regime (January 1, 1993 to June 23, 1997); Period 2 corresponds to the sixteenth regime (June 24, 1997 to January 29, 2001); Period 3 corresponds to the decimal regime (January 30, 2001 to June 30, 2004).

We provide the abnormal return comparison during January 1993 and June 2004 for three periods characterized by different minimum tick sizes.[25]

Results in Table 7 indicate that both extreme *ME* decile firms experience significant PEAD. Not surprisingly, the PEAD is lower in magnitude for more efficient firms (3.90 percent mean, 4.89 percent median) than for low efficient firms (7.53 percent mean, 7.03 percent median). More importantly, after taking transaction costs into consideration, no significant hedge profits can be generated for high *ME* firms; all transaction-cost-adjusted estimated profits are statistically insignificant and sometimes negative (results are robust across three periods based on the minimum tick size regimes). Therefore, consistent with prior literature, we find that taking into account these transaction costs significantly reduces the profitability of the trades and that transaction costs are responsible for the existence of the drift; however, this applies only to stocks for which information is efficiently impounded in prices and where arbitrage activities are effective in reducing the effect of underreaction to earnings news. In contrast, we document increasing drift for stocks with overall high barriers to arbitrage (*ME* decile 1 firms), even after incorporating the effect of transaction costs. These profits reach several percentage points (2.45–4.89 percent depending on the magnitude of transaction costs) and remain statistically significant.[26] Hence, it is not just transaction costs that are responsible for the magnitude and existence of the PEAD; rather, there are other factors (that *ME* captures more fully) preventing arbitrageurs from taking advantage of the drift.

Overall, consistent with our predictions, the patterns of price movements shown in Table 7 suggest that the information content of earnings news is impounded in stock prices more completely for the more efficient firms than for the low *ME* firms and, as a result, high *ME* firms experience less significant long-term PEAD.

Sensitivity and robustness tests

In this section, we provide an overview of some important robustness tests that mitigate the criticism from the literature on methodological pitfalls and the existence of PEAD.

In terms of variations in methodology, our results are robust to different approaches of estimating abnormal returns, as well as alternative definitions of unexpected earnings and market efficiency estimation. First, in computing the daily abnormal returns in (2), we adjust the raw returns (inclusive of dividends and other distributions) by the daily return on the S&P 500 index, and CRSP value-weighted index. Instead of cumulating the abnormal returns, we also examine the buy-and-hold returns that are more applicable to investors (e.g., Doyle et al. 2006). Second, we measure the five-minute order imbalances and their lagged values by the number of transactions (*OIB#*), as opposed to by dollars (*OIB$*), and use the resulting negative adjusted R^2 from (3) as an alternative measure of market efficiency. Third, we also follow other studies (e.g., Mendenhall 2004) and divide the unexpected earnings in (4) by the cross-sectional standard deviation of the forecasts $SD(\hat{E}_{i,q})$ instead of price.[27] All these modifications do not significantly alter the results presented in Tables 5–7.

25. Period 1 corresponds to the eighth regime (January 1, 1993 to June 23, 1997); Period 2 corresponds to the sixteenth regime (June 24, 1997 to January 29, 2001); Period 3 corresponds to the decimal regime (January 30, 2001 to June 30, 2004).
26. When we partition the profitability analysis into three periods based on the minimum tick size regimes, the hedge return on the portfolio buying good-news firms and selling bad-news firms for low efficient firms generates statistically and economically significant 60-day abnormal returns in period 1 and period 3. In period 2, transaction adjusted profits are not statistically significant.
27. Observations are required to have at least two forecasts. In case where the standard deviation is equal to zero, we remove this observation. This definition results in losing an additional 30 percent of observations due to data availability.

In terms of smaller sample sizes, we further partition the full sample into several groups and confirm the robustness of our results to additional data restrictions. First, we examine only firms with December 31 fiscal year end (as in Nichols and Wahlen 2004) and find that the coefficient on *UE**ME* in Table 6 is even larger and more significant. Second, to confirm that our results are not driven by the newly listed or delisted companies (as in Beaver, McNichols, and Price 2007), we analyze firms listed throughout January 1993 and June 2004, as well as for continuously traded firms, for which all monthly estimations of market efficiency are available. Results remain significant. Lastly, we run (8) separately for the three exchanges. While results in Table 6 are robust to firms traded on the NYSE and NASDAQ, we do not find significant coefficients of *UE**ME* for a sample of firms traded on the AMEX. This inconsistency is likely due to the small sample size of AMEX firms (1,279 firm-quarters, compared to 31,026 firm-quarters on NYSE and 29,221 firm-quarters on NASDAQ). Overall, results in Table 6 are robust to a battery of tests, which strengthens the validity of the market efficiency measures and their implication for the earnings announcement returns and the PEAD.

5. Conclusion

The key innovation of this paper is the use of short-horizon return predictability (a recently established market microstructure proxy for market efficiency based on Chordia et al. 2008) to examine whether the PEAD is directly associated with market efficiency. Compared to specific proxies used in previous literature, the short-horizon return predictability measure is more effective in capturing broadly the overall degree of frictions in the market and provides a more comprehensive approach for assessing the efficiency of market makers, traders, and arbitrageurs in their processing of current earnings information. Our study contributes to the literature by demonstrating that the existence of a 60-day PEAD results from inefficient incorporation of information into prices, largely attributable to an environment with high barriers to arbitrage.

We compare abnormal returns between firms in extreme low and high unexpected earnings and present evidence that more efficient firms experience significantly lower post-earnings announcement abnormal returns. In multiple cross-sectional regressions, we confirm the significance of the market efficiency variable and find that market efficiency dominates the other variables (residual volatility, volume, trading costs, and investor sophistication) documented in previous literature as main determinants of the drift. In further portfolio analyses, we estimate various proxies for transaction costs and analyze whether abnormal profits can be generated using the PEAD strategy after taking these costs into consideration. Although we find that transaction costs significantly reduce the profitability of the trades made in these portfolios, we demonstrate that transaction-cost-adjusted profits continue to remain statistically and economically significant for less efficient firms. Lastly, our detailed sensitivity analysis suggests that other explanations for the PEAD, such as methodological limitations or misestimating of abnormal returns, are not responsible for a significant component of the drift.

These findings strengthen the theory that the PEADs result from investors' underreaction to earnings news and question the degree to which earnings information is efficiently priced. Given that short-horizon return predictability is a valid proxy for capturing inefficient environment with high barriers to arbitrage, our findings show that the CRS measure of market efficiency better predicts and explains stock returns after earnings announcements. Whether this and similar market microstructure measures of market efficiency can also help explain other financial anomalies (accrual, cash flow, or momentum), or whether portfolio managers can utilize these measures further in designing profitable trading strategies remains a subject for future research.

Appendix 1

To measure the adverse selection effect, we use the decomposition models of Lin, Sanger, and Booth 1995 and Huang and Stoll 1997. We estimate these models on a firm-by-firm basis for each month and average the estimates across all months in the quarter ending in the announcement month.

First, we implement the Lin et al. 1995 model using bid-ask spreads and transaction data from the TAQ database compiled at 30-second intervals:

$$\Delta M_{t+1} = \lambda(z_t) + e_{t+1}$$

where $\Delta M_{t+1} = M_{t+1} - M_t$; M_t is the quoted bid-ask spread midpoint at time t; $z_t = P_t - M_t$; P_t is the transaction price at time t; λ is the adverse selection component of the bid-ask spread (*ADV_LSB*); and e is a normally distributed error term.

Second, we follow Huang and Stoll 1997 and estimate the decomposition model:

$$\Delta M_t = \alpha(\frac{S_{t-1}}{2}Q_{t-1}) + \nu_t$$

where $\Delta M_{t+1} = M_{t+1} - M_t$; M_t is the quoted bid-ask spread midpoint at time t; $(S_{t-1})/2$ is the half spread which is half the difference between the quoted ask and bid prices; Q_t is the trade type at time t and takes a value of $+1$ if the trade is an investor purchase and -1 if the trade is an investor sale; α is the combined adverse selection and inventory holding cost component of the bid-ask spread (*ADV_HS*).

Appendix 2

Following Lesmond, Ogden, and Trzcinka 1999 (1122), we estimate the limited dependent variable (*LDV*) and use it as an alternate proxy for transaction costs. Lesmond et al. (1999) specify the relation between the true return and the market return using the standard market model:

$$R^*_{jt} = \beta_j * R_{mt} + \varepsilon_{jt}.$$

The relation between the measured return,R_{jt}, and the true return, R_{jt}on the security with the following system can then be described as:

$$R_{jt} = R^*_{jt} - \alpha_{1j}, \ ... \ if \ R^*_{jt} < \alpha_{1j}$$

$$R_{jt} = 0, \ .... \ if \ \alpha_{1j} < R^*_{jt} < \alpha_{2j}$$

$$R_{jt} = R^*_{jt} - \alpha_{2j}, \ldots if \ R^*_{jt} > \alpha_{2j}.$$

For firm j, the transaction cost threshold is α_{1j} for trades on negative information and α_{2j} for trades on positive information. The difference between the two thresholds, $\alpha_{2j} - \alpha_{1j}$, provides an estimate of the roundtrip transaction costs. Following standard finance literature, the model assumes daily returns are distributed normally. The limited dependent variable (*LDV*) is then estimated using the following log likelihood function:

$$\ln L = \sum_1 \ln \frac{1}{(2\pi\sigma_j^2)^{\frac{1}{2}}} - \sum_1 \ln \frac{1}{2\sigma_j^2}(R_{jt} + \alpha_{1j} - \beta * R_{mt})^2 + \sum_2 \ln \frac{1}{(2\pi\sigma_j^2)^{\frac{1}{2}}} - \sum_2 \ln \frac{1}{2\sigma_j^2}(R_{jt} + \alpha_{2j} - \beta * R_{mt})^2 + \sum_2 \ln \left[\phi_2\left(\frac{\alpha_{2j} - \beta_j * R_{mt}}{\sigma_j}\right) - \phi_1\left(\frac{\alpha_{1j} - \beta_j * R_{mt}}{\sigma_j}\right) \right]$$

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Ownership Concentration, Managerial Ownership and Firm Performance: Evidence from Turkey

Pınar Evrim Mandacı, Guluzar Kurt Gumus*

Abstract:

This study examines the effects of ownership concentration and managerial ownership on the profitability and the value of non-financial firms listed on the Istanbul Stock Exchange (ISE) in the context of an emerging market. We measure the firm's performance by Return on Assets (ROA) and Tobin's Q ratios, where the former measures profitability and the latter the value of the firm. In addition, we give detailed information on the main characteristics of the ownership structures of the firms in our sample and find that ownership of Turkish firms is highly concentrated. In addition, the unlisted holding companies have the highest average percentage of shares, which supports the belief that individuals or families establish the holding companies in order to control their listed firms. After controlling for investment intensity, leverage, growth and size, we find that ownership concentration has a significantly positive effect on both firm value and profitability, while managerial ownership has a significantly negative effect on firm value.

Keywords: Corporate governance, ownership concentration, managerial ownership, firm performance, Turkey

JEL: G34; G15

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1. Introduction

Good corporate governance depends on the combination of the protection of the rights of investors and proper ownership concentration. It has been observed that ownership concentration is high in less developed countries, where the rights of investors are not protected due to the outright lack of or insufficient regulation provided by the relevant laws (see Shleifer and Vishny, 1997 and La Porta et al., 1999). The relationship between ownership structure and firm performance provides an idea about the effectiveness of alternative corporate governance mechanisms.

Grossman and Hart (1986) argued that when the ownership structure of a firm is overly diffused, shareholders are not motivated to monitor management decisions closely, because the benefits that they can attain are mostly lower than the cost they would have to afford to control the managers. Yet, this setting may influence performance negatively. On the other side, Shleifer and Vishny (1986) argued that when the ownership structure is concentrated, shareholders will control the activities of the managers easily, thereby avoiding inefficiency in management, and improving firm performance. However, according to the agency theory, Jenson and Meckling (1976) argued that high concentration may simultaneously lead major shareholders to give priority to their own interests, and

* **Pınar Evrim Mandacı**
Dokuz Eylul University, Faculty of Business, Department of Accounting and Finance
e-mail: pinar.evrim@deu.edu.tr

Guluzar Kurt Gumus
Dokuz Eylul University, Faculty of Business, Department of Accounting and Finance
e-mail: guluzar.kurt@deu.edu.tr

subsequently agency problems[1] may occur between the shareholders and managers. In order to minimize agency problems, shareholders have to endure agency costs[2]. In addition, according to them, managerial ownership prevents conflicts of interest between the managers and owners and increases the value of the firm. Significant managerial ownership can align managers' interests with those of the outside shareholders so that managers can have strong incentive to pursue value-maximizing behavior (alignment effects). In contrast, Demsetz (1983) argued that too large an ownership stake by managers could potentially lead them to worry more about their own interests, not those of outside shareholders, hence decreasing the firm's value (entrenchment effects).

In this paper we aim to measure the effects of managerial ownership and ownership concentration on the profitability and value of Turkish non-financial firms listed on the Istanbul Stock Exchange (ISE). In Turkey, the listed corporations are mostly owned by families. Standards of corporate governance and investor protection are lower in Turkey than in the U.S. and other major countries. Hence, we hope that this study will add an interesting dimension to the relation between these variables and performance in a developing country under a poor governance system.

Our paper is organized as follows. The second part consists of a literature review. In the third part, data and summary statistics are presented. Methodology and empirical results are presented in the fourth part, and the final part offers concluding comments.

2. Literature Review

Although initially Berle and Means (1932) suggested a positive correlation between ownership concentration and performance, some of the following studies did not observe a relation between these two variables (see Demsetz, 1983; Demsetz and Lehn, 1985 and etc). The study by Demsetz and Lehn (1985) that examined the relationship between accounting profit rate and percentage of shares owned by the five and ten largest shareholders where ownership structure is treated as an endogenous variable found no evidence of a relation between these variables for U.S. companies. They argued that although greater ownership concentration results in stronger incentives to monitor, the expected gain from active monitoring and the cost of alternative ownership structures vary across firms. Morck et al. (1988) ignored the endogenous issue and similar to Demsetz and Lehn (1985) found no significant relation in the linear regressions they calculated by using accounting profits and Tobin's Q as an alternative measure of performance. Shleifer and Vishny (1997) argued that making the ownership structure relatively centralized could promote the shareholder's controlling ability and therefore the existence of the big shareholder was favorable to the growth of a company's value. Himmelberg et al. (1999) argued that the empirical findings might be the result of unobservable firm heterogeneity, which might affect both ownership concentration and performance. These unobserved exogenous firm characteristics might induce a spurious relationship between Tobin's Q and ownership concentration. They found no relation between these two variables after estimating firm fixed effects. Loderer and Martin (1997) and Demsetz and Villalonga (2001) found no influence of ownership concentration on performance for U.S. firms. Their finding is consistent with the view that while exacerbating some agency problems, diffuse ownership also yields compensating advantages that generally offset such problems. On the other hand, Morck et al. (1988) and Hiraki et al. (2003) for Japanese firms, and Gorton and Schmid (2000) for German companies, found a positive relation between ownership concentration and firm value.

In addition to studies on developed countries, most of the studies for developing countries found a positive relation between ownership concentration and performance. Claesses and Djankov (1999) examined Czech companies and argued that the more concentrated the ownership, the higher the firm's profitability; this finding signified the same positive relation as indicated in studies on Czech firms by Claessens (1997) and Weiss and Nikitin (1998). However, their findings were ambiguous when the type of ownership was taken as the control variable. Similar to their previous study in 1997, Xu and Wang (1999) examined Chinese listed firms and found a positive correlation between the shareholding ratio of the first five and ten big shareholders and performance. Sun et al. (2002) proved that relatively bigger holding companies and other big shareholders which had a certain concentration degree could help improve the performance of Chinese firms. Barberis et al. (1996) also found a positive relation for Russian firms. Joh (2003), who examined Korean firms, found that after controlling

[1] It is likely that managers may place personal goals ahead of corporate goals (Gitman, 2006: 20).

[2] The costs borne by stockholders to maintain a governance structure that minimizes agency problems and contributes to the maximization of owner wealth (Gitman, 2006: 20).

firm and industry characteristics, firms with low ownership concentration recorded low profitability. Yammeesri et al. (2006) examined Tai non-financial firms, and as the literature proved previously, found a positive association between concentrated ownership and performance. Similarly, Omran et al. (2008), in their studies on a group of Arab countries (Egypt, Jordan, Oman, Tunisia), found that ownership concentration was positively correlated with various performance measures, and that large-size firms were more likely to achieve better performance. However, parallel to the findings of Demsetz and Lehn (1985), and Himmelberg et al. (1999), Chen et al. (2005) found for Hong Kong firms that concentrated ownership was not associated with better operating performance or higher firm valuation. Comparably, Gunasekarage et al. (2007) proved that ownership concentration is negatively related to firm performance in China when market-to-book ratio is used as a performance indicator. Gursoy and Aydogan (2002) examined the impact of ownership concentration and ownership mix on firm performance of Turkish non-financial firms between 1992 and 1998 and found that higher concentration led to better market performance but lower accounting performance. They used price-to-earnings ratio and stock returns to measure market performance.

There are many studies with contending results on the relationship between managerial ownership and performance. Among them, Jensen and Meckling (1976) stated that when managerial ownership increased, conflict would decrease and performance would increase. In contrast, Fama and Jensen (1983) and Stulz (1988) argued that greater stock ownership by managers increased the power of the internal owners and decreased the power of the external owners in terms of influencing performance. Morck et al. (1988) found a significant non-monotonic relationship between Tobin's Q and board member ownership. Accordingly, the relation increases between 0% and 5%, decreases between 5% and 25%, and increases beyond 25%. Their outcomes were also significant when some control variables such as R&D and advertising ratios, leverage, size, growth and industry dummies were included in models. However, they were not significant when accounting profit rates were used as an alternative performance measure. Similar to the study of Morck et al. (1988), McConnel and Servaes (1990), Hermalin and Weisbach (1991), Cho (1998) and most recently Florackis et al. (2009) found a positive relation for low levels of ownership and a negative relation for high levels of ownership. Yet, unlike Morck et al. (1988), McConnel and Servaes (1990) found that this relationship was also significant when they used accounting profits instead of Tobin's Q. In contrast to other studies, Florackis et al. (2009) found a negative relationship by using a semi-parametric estimation approach. As in Morck et al. (1988), Holderness et al. (1999) found a significant positive relation between firm performance and managerial ownership within the 0% to 5% range of managerial shareholdings; but in contrast to Morck et al. (1988), they did not find a statistically significant relation beyond 5%. Demsetz and Lehn (1985), Loderer and Martin (1997), and Himmelberg et al. (1999) as well as Demsetz and Villalonga (2001) did not find a significant relation between managerial ownership and performance. Most of those studies examined the association between insider ownership and performance account for the endogeneity of ownership structure except Morck et al. (1988) and McConnell and Servaes (1990). Demsetz and Villalonga (2001) examined US firms and their evidence supported the belief that ownership structure was endogenous but belied the belief that ownership structure affected firm performance. They argued that if there were compensating advantages in a firm, there would be no systematic relation between managerial shareholdings and firm performance. In addition, they argued that it might indicate that this relationship depends on location, special local laws and governance practices. There is no study which examines the relationship between managerial ownership and the performance of Turkish firms.

As can be seen from the above, the empirical results on the effects of managerial ownership and ownership concentration on firm performance are conflicting. In addition, the previous studies focused mostly on large industrialized countries, which completed their institutionalization process; therefore, their outcomes might not be relevant for developing countries. In this study, we try to fill this gap by examining this issue for a developing country, namely Turkey.

3. Data and Summary Statistics

Our sample includes all non-financial firms listed on the ISE in the year 2005. The number of firms in our sample is 203. We excluded banks and leasing, investment, insurance and holding companies since their financial tables are different from non-financial firms. We collected data on market values of the sample firms from the Monthly (December) Bulletins of the ISE. We used annual company reports issued by the ISE to obtain data on ownership structure (ownership concentration, managerial ownership, etc.). We obtained the remaining data by using the balance sheets and income statements from the ISE's website.

In line with previous studies (such as Morck et al.,1988; McConnel and Servaes, 1990 and etc.), we also focused on one year of data by taking into consideration the fact that the ownership structure of the firm does not vary frequently. In addition, the International Financial Reporting Standards have been applied in Turkey since the beginning of 2005. The firms are required to incorporate the new standards and to prepare more detailed annual reports which provide more data to finance researchers and consequently facilitate the analysis of firms' ownership structures. Hence, this study takes 2005 to be the starting line.

Table 1 depicts the number of the different types of shareholders of the present study's sample firms operating in different industries. According to this table, individuals and families, unlisted holding companies and unlisted non-financial firms pre-dominate the ownership positions in the sample firms. Furthermore, this predominance is mostly seen in the textile industry. Additionally, most of the shareholders are foreign companies in the food industry, listed holding companies in the metal products industry and listed non-financial firms in the stone and soil industry. The ownership positions of the state, foundations and labor unions are very low compared to other parties.

Table 2 denotes the average percentage of shares held by the owners of the sample firms in different industries. The highest average percentage of shares is held by unlisted holding companies, which supports the belief that individuals or families establish the holding companies in order to control their listed firms. It is followed by the unlisted non-financial firms and individuals and families respectively.

Table 3 depicts the proportion of shares held by the Board members and managers as well as their relatives. In Turkey it is often observed that the family members are the CEOs, Boards of Directors or top managers of the firms. As a result, management control is in the hands of these family members (see Yurtoğlu, 1998 and Demirağ and Serter, 2003). Table 3 denotes that CEOs, Boards of directors and top managers have almost 8.38% of shares outstanding. And their relatives have almost 3% of the outstanding shares. Board members and general

Industries	**Individual**	**Holding Comp. (listed)**	**Holding Comp. (unlisted)**	**Non-financial (listed)**	**Non-financial (unlisted)**	**Financial (listed)**	**Financial (unlisted)**	**Foreign**	**State**	**Foundations/ Retirement Funds**	**Labor Unions**
Food	14	3	9	1	10	-	-	9	1	1	1
Textile	31	4	14	4	15	3	1	1	-	-	1
Wood and Paper	9	4	10	4	7	-	-	4	1	1	-
Chemical	7	3	8	1	9	-	-	5	1	5	1
Stone and Soil	7	6	5	6	10	2	3	6	3	7	1
Metal Main	7	3	5	1	3	-	1	1	2	1	1
Metal Products	13	9	13	1	10	-	-	8	1	1	-
Other Manufacturing Firms	1	-	2	-	-	-	-	1	-	-	-
Technology	4	-	2	-	-	-	-	3	1	1	-
Education, Sport and Health	3	-	-	-	4	-	-	1	-	-	1
Telecommunication	2	-	2	-	1	1	1	2	1	-	-
Wholesale and Retail	10	5	6	2	8	-	-	2	-	1	-
Electricity and Construction	4	-	2	2	5	1	1	2	-	1	-
Total	**112**	**37**	**78**	**22**	**82**	**7**	**7**	**45**	**11**	**19**	**6**

Table 1: The Number and Types of Shareholders of Non-financial Firms in Different Industries (Year 2005)

Industry	Number of Firms	Ind/Family	Holding			Non-financial firm			Financial Firm			Foreign	State	Foundations retirement funds	Labor unions/ Cooperatives
			Listed	Unlisted	Total	Listed	Unlisted	Total	Listed	Unlisted	Total				
Food	24	14.56	3.81	9.40	13.21	0.38	10.25	10.64	0.00	0.00	0.00	18.35	0.99	3.22	0.01
Textile	35	29.06	3.39	15.54	18.93	2.85	9.84	12.69	3.36	0.22	3.58	2.46	0.00	0.00	0.23
Wood and Paper	17	6.98	13.19	19.96	33.15	11.23	9.07	20.30	0.00	0.00	0.00	7.64	2.28	0.05	0.00
Chemical	22	6.74	7.45	19.27	26.72	3.65	10.87	14.52	0.00	0.00	0.00	11.44	2.36	2.87	3.65
Stone and Soil	26	8.03	7.98	6.71	14.69	12.77	7.38	20.15	0.37	2.95	3.32	14.42	0.66	8.62	0.01
Metal Main	13	5.95	11.21	20.11	31.32	4.41	9.63	14.04	0.00	0.24	0.24	0.40	1.32	0.10	1.62
Metal Products	25	5.97	14.04	24.20	38.23	0.89	8.94	9.83	0.00	0.00	0.00	15.72	0.01	0.18	0.00
Other Manufacturing Firms	3	9.44	0.00	31.73	31.73	0.00	0.00	0.00	0.00	0.00	0.00	5.13	0.00	0.00	0.00
Technology	8	24.77	0.00	13.66	13.66	0.00	0.00	0.00	0.00	0.00	0.00	19.21	10.57	1.88	0.00
Education, Sport and Health	6	15.58	0.00	0.00	0.00	0.00	54.81	54.81	0.00	0.00	0.00	2.36	0.00	0.00	0.00
Telecommunication	4	7.73	0.00	28.77	28.77	0.00	0.00	0.00	0.00	0.02	0.02	19.54	18.80	0.00	0.00
Wholesale and Retail	15	16.63	7.68	12.32	20.00	4.74	12.07	16.81	0.00	0.00	0.00	9.30	0.00	0.00	0.00
Electricity and Construction	5	10.78	0.00	14.25	14.25	6.76	27.64	34.40	5.08	0.22	5.30	2.27	0.00	1.24	0.00
Average		**13.53**	**7.07**	**15.64**	**22.71**	**4.43**	**10.60**	**15.02**	**0.75**	**0.44**	**1.19**	**10.40**	**1.49**	**1.92**	**0.54**

Table 2: Ownership Structure of Non- financial Firms in Different Industries (in %, Year 2005)

managers have a considerable share in the technology industry (24.05 percent). The average of openness-to-public is 33 percent within sample firms.

Table 4 gives the percentage of shares owned by the largest three, five and ten shareholders for the sample firms in different industries. It shows that the largest shareholder has around 48 percent of shares, which indicates that one person or an institution has almost half of a listed company. The averages for the largest three, five and ten are 61.27; 64.20 and 65.93 respectively. Moreover, the highest ownership concentration is in *education, sport and health* industry for the largest shareholder and in the telecommunication industry for the largest three, five and ten shareholders.

Industry	Share of Board Members and General Manager	Share of Family Members	Open-to-Public (%)
Food	9.70	1.70	38.16
Textile	15.87	7.76	33.35
Wood and Paper	4.54	3.16	29.65
Chemical	2.79	0.92	31.89
Stone and Soil	4.87	2.36	30.11
Metal Main	2.06	2.95	44.78
Metal Products	4.22	0.56	30.77
Other Manufacturing Firms	9.44	0	53.69
Technology	24.06	0.40	30.06
Education, Sport and Health	12.71	1.80	27.25
Telecommunication	7.73	0	25.15
Wholesale and Retail	11.35	3.38	37.21
Electricity and Construction	4.63	0.19	31.77
Average	**8.38**	**3.05**	**33.48**

Table 3: Managerial Ownership in Non-financial firms (in %, Year 2005)

Industry	Ownership Concentration			
	Top 1 Shareholder	Top 3 Shareholders	Top 5 Shareholders	Top 10 Shareholders
Food	40.48	56.75	58.57	59.77
Textile	38.00	54.76	60.25	65.74
Wood and Paper	49.20	65.19	67.96	69.87
Chemical	52.98	66.37	68.05	68.28
Stone and Soil	53.06	65.39	68.69	69.56
Metal Main	47.33	53.10	54.10	55.03
Metal Products	52.87	66.32	67.88	68.62
Other Manufacturing Firms	38.04	46.31	46.31	46.31
Technology	54.28	68.17	70.08	70.08
Education, Sport and Health	63.43	69.16	72.43	72.90
Telecommunication	59.01	69.35	74.39	80.63
Wholesale and Retail	42.12	60.46	62.20	62.47
Electricity and Construction	36.43	55.23	63.75	67.83
Average	**48.25**	**61.27**	**64.20**	**65.93**

Table 4: The Ownership Concentration Rates for Non-financial Firms (in %, Year 2005)

We used two measures of performance as dependent variables, Return on Assets (ROA) and Tobin's Q ratios, where the former measures profitability and the latter the value of the firm. We used two independent variables, the percentage of shares held by the largest three shareholders and the percentage of shares held by the managers. We observed that the studies on Turkish firms (such as Gursoy and Aydogan, 2002 and Demirağ and Serter, 2003) prefer using the share of the largest three shareholders to measure ownership concentration. Depending on these previous studies as well as our outcomes about the concentration rates presented in Table 4, we used the percentage of shares held by the largest three shareholders to measure ownership concentration. Our control variables are the investment intensity, leverage, growth and size which are assumed to have an effect on firm performance. In addition to these we employ industry dummy variables in order to point out whether the performance measures differ across industries. The study's variables and their definitions are presented in Table 5.

Dependent Variables	Definition
TOBIN'S Q	Market value of assets (total debt plus market value of equity)/ total assets
ROA	Net Income/Total Assets
Independent Variables	
CON3	Total share of the largest three shareholders in the firm
OWNER	Managerial Ownership: Percentage of Shares Owned by the managers
Control Variables	
CAPEXP	Capital Expenditures/Sales (investment intensity)
DEBTTA	Total Debt/Total Equity (Leverage)
GROWTH	Average growth in net sales over three-year period (2003-2005)
SIZE	Logarithm of total assets
INDUSTRY DUMMIES	Education-health; electricity; food-beverage; chemical-petroleum-plastic; metal products-machinery; wood-paper-printing; non-metal mineral products; technology; textile-leather; wholesale and retail trade; transportation.

Table 5: Variables and Definitions

	ROA	TOBIN'S Q	CAPEXP	DEBTTA	GROWTH
Mean	0.054	1.435	0.084	0.245	0.117
Maximum	0.592	5.842	3.602	0.775	2.451
Minimum	-0.388	0.360	-8.408	0.0001	-0.620
Std. Dev.	0.118	0.791	0.816	0.179	0.353

Table 6: Descriptive Statistics

	ROA	CON3	OWNER	CAPEXP	DEBTTA	GROWTH	SIZE
ROA	1						
CON3	0.223	1					
OWNER	0.083	-0.222	1				
CAPEXP	0.081	-0.077	-0.048	1			
DEBTTA	-0.277	-0.1624	0.094	0.030	1		
GROWTH	0.281	0.005	-0.095	0.108	-0.043	1	
SIZE	0.177	0.119	-0.163	-0.038	0.133	0.035	1

***, **, * indicate 1 %, 5 % and 10 % significance.

Table 7A. Correlation Matrix (between ROA and independent variables)

	TOBINSQ	CON3	OWNER	CAPEXP	DEBTTA	GROWTH	SIZE
TOBINSQ	1						
CON3	0.161	1					
OWNER	-0.085	-0.212	1				
CAPEXP	0.108	-0.076	-0.050	1			
DEBTTA	-0.364	-0.142	0.059	0.028	1		
GROWTH	0.180	0.003	-0.089	0.108	-0.028	1	
SIZE	-0.126	0.215	-0.302	-0.055	-0.046	0.083	1

***, **, * indicate 1 %, 5 % and 10 % significance.

Table 7B. Correlation Matrix (between Tobins Q and independent variables)

The descriptive statistics for variables are presented in Table 6. For the year 2005, the average ROA was 0.05 while the highest ROA was 0.59. Mean of Debt-to-Total Assets indicates that Turkish companies prefer financing their companies with capital instead of debt. The highest standard deviation belongs to capital expenditures and Tobin's Q, showing the highest variance among companies.

Tables 7 A and B show the correlation matrix for each dependent variable. The correlation coefficients among independent variables are low. Additionally, correlation coefficients between independent and dependent variables are consistent with the direction of the relation and coefficients found in the regressions analysis.

4. Methodology and Empirical Results

We applied multiple regression analysis to measure the effects of ownership concentration and managerial ownership on firm performance. We developed two different groups of hypotheses on the relationship of ownership concentration and managerial ownership with firm performance. In parallel to most of the previous studies on developing countries, we expected a positive relationship between ownership concentration and firm performance. Since the ownership concentration is high in Turkey, the shareholder can easily control the managers and force them to focus on the maximization of the shareholders' wealth. Agency theory suggests that when the managerial ownership increases, the conflict of interest between the managers and owners will decrease and firm performance will increase. Although most of the previous studies did not observe a relation between managerial ownership and firm performance, in line with the theory, we expected a positive relationship between them. The hypotheses of the study are stated below;

$H1_0$. The ownership concentration is not significantly related to firm performance.

$H1_1$. The ownership concentration is positively correlated to firm performance.

$H2_0$. The level of managerial ownership is not significantly related to firm performance.
$H2_1$. The level of managerial ownership is positively correlated to firm performance.

Different models were constructed to explore the effects of the independent variables. In models where the ROA and TOBINSQ are the dependent variables, first all variables other than industry dummies were included in the analysis, and then the industry dummies were included to investigate the industry effects on firm value and profitability. The four models of the study are presented below.

Model 1:

$$ROA_i = \beta_0 + \beta_1 CON3_i + \beta_2 OWNER_i + \beta_4 CAPEXP_i + \beta_5 DEBTTA_i + \beta_6 GROWTH_i + \beta_7 SIZE_i + \varepsilon_i$$

Model 2:

$$ROA_i = \beta_0 + \beta_1 CON3_i + \beta_2 OWNER_i + \beta_4 CAPEXP_i + \beta_5 DEBTTA_i + \beta_6 GROWTH_i + \beta_7 SIZE_i + D_i + \varepsilon_i$$

Model 3:

$$TOBINSQ_i = \beta_0 + \beta_1 CON3_i + \beta_2 OWNER_i + \beta_4 CAPEXP_i + \beta_5 DEBTTA_i + \beta_6 GROWTH_i + \beta_7 SIZE_i + \varepsilon_i$$

Model 4:

$$TOBINSQ_I = \beta_0 + \beta_1 CON3_i + \beta_2 OWNER_i + \beta_4 CAPEXP_i + \beta_5 DEBTTA_i + \beta_6 GROWTH_i + \beta_7 SIZE_i + D_i + \varepsilon_i$$

Table 7 presents the regression results for ROA and Tobin's Q. In Models 1 and 2, we used ROA as a measure of profitability and found a significant positive effect among the largest three shareholders on firm profitability in the models in which the dummies were excluded. Debt-to-total assets and growth variables also had significant effects in all models. Additionally, the dummy for the education industry has a significant effect, but managerial ownership and capital expenditures did not have an effect on profitability. When we added the dummy variables in the model, the adjusted R^2 increased to 0.276 from 0.182.

In Models 3 and 4, we used Tobin's Q as an indicator of firm value and found that the largest three shareholders had a significant positive effect, and that managerial ownership had a significant negative effect on firm value. When we included the dummy variables, we did not find a significant relationship between managerial ownership and firm value. In addition, Debt-to-total assets and size variables were the other factors that affected firm value negatively. Capital expenditure and growth did not have a significant effect on firm value. The model with dummy variables of industries pointed out the significant effects of education, food and beverage and wholesale industries on firm performance. After we included the industry dummies, the adjusted R^2 increased to 0.34 from 0.18.

The positive relationship between ownership concentration and performance supports the study of Shleifer and Vishny (1997) who state that since investor protection is low in developing countries, ownership concentration is accepted as an alternative corporate governance tool in these countries. Our findings are also parallel to previous studies on developing countries such as Barberis et al. (1996), Claesses and Djankov (1999), Joh (2002), Yammeesri et al. (2006). However, our result on the relationship between the ownership concentration and profitability is the opposite of that of Gursoy and Aydogan (2002) which found a negative relationship between ownership concentration and profitability. The findings on the effects of managerial ownership are much more conflicted in the literature. Our finding does not support the agency theory. The negative relation between managerial ownership and firm value might be explained by Demsetz (1983), who argued that too much managerial ownership could potentially lead managers to worry more about their own interests, and not those of outside shareholders, hence decreasing firm value.

5. Concluding Comments

The empirical results on the effects of managerial ownership and ownership concentration on firm performance are conflicting. Previous studies focused mostly on large industrialized countries, which completed their institutionalization process and therefore, their outcomes might not be relevant for developing countries. In this study, we try to fill this gap by examining the effects of ownership concentration and managerial

Regressor	ROA		TOBINSQ	
	Model 1	Model 2	Model 3	Model 4
CON3	0.001 *1.976***	0.001 *(1.546)*	0.006 *1.656**	0.007 *(2.056)**)*
OWNER	0.0002 *0.469*	-0.0002 *(-0.464)*	-0.003 *-0.844*	-0.007 *(-2.091)***
CAPEXP	0.011 *1.006*	0.011 *(1.053)*	0.082 *1.126*	0.067 *(1.019)*
DEBTTA	-0.169 *-3.194****	-0.121 *(-1.986)***	-1.504 *-4.074****	-1.003 *(-2.535)***
GROWTH	0.080 *3.086****	0.067 *(2.471)***	0.352 *1.991***	0.285 *(1.613)*
SIZE	0.037 *2.284***	0.034 *(1.930)**	-0.320 *-2.288***	-0.400 *(-2.833)****
Education-Health		0.158 *(2.304)***		2.214 *(4.977)****
Electricity		-0.089 *(-1.528)*		0.208 *(0.544)*
Food-Beverage		-0.004 *(-0.089)*		0.617 *(2.099)***
Chemical-Petroleum-Plastics		0.026 *(0.527)*		0.319 *(1.005)*
Metal Products-Machinery		0.004 *(0.106)*		0.059 *(0.205)*
Wood-Paper-Printing		-0.037 *(-0.824)*		0.103 *(0.351)*
Non-Metal Products		0.044 *(0.973)*		0.475 *(1.609)*
Technology		0.093 *(1.286)*		0.543 *(1.158)*
Textile-Leather		-0.037 *(-0.937)*		0.119 *(0.463)*
Wholesale And Retail Trade		0.012 *(0.257)*		0.541 *(1.731)**
Transportation		0.111 *(1.411)*		0.541 *(0.799)*
C	-0.281 *-2.145***	-0.248 *(-1.770)**	4.043 *3.522****	4.257 *(3.742)****
Adjusted R2	0.182	0.276	0.180	0.341

***, **, * indicate 1 %, 5 % and 10 % significance.
Table 7: Regression Results

ownership on the performance of Turkish firms listed on the ISE in the context of a developing country. We measured firm performance by ROA (Return on Assets) and Tobin's Q, where the former measures profitability and the latter firm value. We tried to test the relationships between these performance measures and the percentage of shares owned by the largest three shareholders, and the percentage of shares held by board members and general managers. In addition to these independent variables, we used control variables including investment intensity, leverage, growth and size and industry dummies, which are assumed to have an effect on firm performance.

In addition, we analyzed the ownership structure of the sample firms and found that the highest average percentage of shares was held by the unlisted holding companies, unlisted non-financial firms and individuals and families, respectively, which confirms the widespread belief that in Turkey individuals or families set up their unlisted firms in order to control their listed companies. Supporting the studies of Gursoy and Aydogan (2002) and Gönenç (2004), we found that the ownership of Turkish firms is highly concentrated. Our regression results show that ownership concentration has a significant positive effect on both firm value and profitability. This result may support the idea of Schleifer and Vishny (1997) who state that since investor protection is low in developing countries, ownership concentration is accepted as an alternative corporate governance mechanism in these countries. On the other hand, in contrast to the agency theory, we found a negative relation between managerial ownership and firm value, which might support the argument of Demsetz, who states that too much managerial ownership could potentially lead managers to worry more about their own interests and decrease firm value. The finding does not support the idea of Jensen and Meckling (1976), who argue that as managerial ownership increases, the conflict between the managers and owners will decrease and performance will increase. The results of the study suggest that Turkish firms can increase their performance by increasing their ownership concentration and by decreasing managerial ownership.

We believe, despite the uniqueness of the results, that this study proves that the subject deserves greater attention and more detailed analysis. We did not add other agency variables such as the number of independent directors, board composition, etc., since the full data is not available in annual reports. Future studies might collect this data by directly contacting the firms. In addition, future studies might include financial firms and holding companies.

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Accrual Anomaly in the Brazilian Capital Market

César Medeiros Cupertino *
E-mail address: cupertino.cmc@gmail.com
Universidade Federal de Santa Catarina - UFSC
Florianópolis, SC, Brazil.

Antônio Lopo Martinez
E-mail address: lopo@fucape.br
Fucape Business School
Vitória, ES, Brazil.

Newton Carneiro Affonso da Costa Jr.
E-mail address: ncacjr@gmail.com
Universidade Federal de Santa Catarina - UFSC
Florianópolis, SC, Brazil.

* Corresponding author: César Medeiros Cupertino
CPGA/UFSC, Campus Universitário Trindade, Florianópolis, SC, 88040-900, Brazil.

Abstract

This paper analyzes the phenomenon known as accrual anomaly in Brazil. In particular, we examine two hypotheses: (a) that the earnings expectation included in the stock price fails to reflect the difference in persistence of the earnings components (accruals and cash flows); and (b) that the construction of a hedge portfolio by taking a long (short) position in assets with low (high) accruals generates consistently abnormal returns. The data set includes nonfinancial firms listed on the BM&FBOVESPA between 1990 and 2008. The empirical tests required conducting panel data regressions to identify the persistence of earnings and their components; the Mishkin test to identify whether the market rationally prices earnings; and the composition of a zero-investment (hedge) portfolio to analyze whether a trading strategy based on accruals consistently provides abnormal positive returns. The results indicate that the accrual component is not mispriced by the Brazilian market, and that a trading strategy based on accruals does not provide consistently positive returns. Although this evidence does not encourage arbitrage, the results are relevant from various perspectives. The methodology applied permitted identifying the quality of earnings and of their components, as well as association between the components of earnings and returns.

Key words: accrual anomaly; earnings quality; persistence of accruals.

Introduction

This article investigates the relationship between accruals and stock returns in the Brazilian capital market. This topic is relevant for various users of financial statements. Investment analysts follow the reported results to support their estimates or revise their forecasts. Executives often have bonuses tied to earnings, being rewarded when performance expectations are attained (executive equity compensation). Creditors use earnings as a parameter in contractual debt covenants and to monitor the borrower's capacity to honor obligations (Smith & Warner, 1979). The focus on earnings is so intense that some authors believe the market neglects other performance measures (Chan, Chan, Jegadeesh, & Lakonishok, 2006). The **fixation on earnings** can carry some hidden pitfalls, mainly because of the often non-convergent interests concerning reported earnings (Jensen & Meckling, 1976).

The present article provides an expanded panorama of the relationship between accruals and stock returns in the Brazilian market. The analyses take into account specific firm characteristics (such as operational performance, risk factors and economic segment), the rationality of agents in pricing earnings and their components, and the implementation of investment strategies that seek to obtain abnormal gains from the level of accruals. The empirical tests applied to the sample permitted analyzing the phenomenon known as accrual anomaly, besides identifying the most important components of the formation, variability and persistence of the accruals of firms listed on the BMF&BOVESPA.

Our aim was to identify whether the market rationally prices earnings in the formation of expectations of future returns. The information available on the market price of assets was incorporated by applying the Mishkin test. This procedure is usually included in the studies of accrual anomaly and permits identifying possible bias between the intrinsic value of an asset and its market value. If there is asymmetry between rational valuation and market valuation, there will be an opportunity for abnormal gains by exploiting the persistence of earnings and their components.

For final verification of the occurrence of accrual anomaly in the Brazilian capital market, we constructed a zero-investment portfolio based on the magnitude of accruals. The occurrence of an anomaly is only confirmed if the zero-investment portfolio provides positive and consistent returns (Bernard, Thomas, & Wahlen, 1997). Sloan (1996) showed that a hedge strategy with a long position in assets of low accruals and a short position in assets of high accruals generates significant abnormal returns. The accrual anomaly has been intensely debated in recent international academic literature in finance (Desai, Rajgopal, & Venkatachalam, 2004; Dopuch, Seethamraju, & Xu, 2010).

However, more than a decade after publication of the seminal article by Sloan (1996), there has been no discussion of this anomaly in the Brazilian market, at least according to our search of the CAPES thesis database and Google Academic. This observation is strange since Brazil has some peculiar characteristics in relation to other countries, especially the USA. For example, Lopes and Galdi (2006, p. 28) points to the strong influence of tax rules in accounting statements in Brazil. Another aspect is international investors' strong interest in the Brazilian market.

This study is also relevant for identifying whether agents (such as portfolio managers) correctly price the components of earnings included in the market price of stocks to form their expectations of future dividends. Lack of knowledge of the components of earnings can increase information asymmetry and contribute to mispricing of assets, enabling wealth to be unduly transferred to companies with low earnings quality.

Literature Review

Accrual anomaly

Sloan (1996) empirically identified that investors tend to overvalue accruals in forming expectations about the future earnings of U.S. firms and are surprised when the persistence of this earnings component is shorter than predicted. In the view of Defond and Park (2001), the market exaggerates in measuring accruals because investors' expectations are biased in anticipating future reversal of this earnings component. As a consequence, companies with high (low) levels of accruals obtain negative (positive) abnormal returns, a phenomenon known as accrual anomaly. Since then, various works have examined this anomaly. Indeed, it is one of the most studied topics in recent studies of capital markets (Green, Hand, & Soliman, 2011).

This research basically has three categories of focus. One group of studies relates accrual anomaly with other anomalies, such as the works of Collins and Hribar (2000), Desai, Rajgopal and Venkatachalam (2004), and Fama and French (2008). The first work identified that accrual anomaly is different than post-earnings announcement drift (the tendency for the cumulative abnormal returns of an asset to accompany an earnings surprise for various days after its announcement, due to an overreaction of the market to the result disclosed). The second work examined accrual anomaly in the context of value glamour (the empirical regularity of firms [value companies] with low sales growth or high book-to-market, earnings-market price or cash flow-market price ratios to perform worse than firms [glamour companies] with contrary indicators). The third work found that, together with momentum (short-term returns tend to follow those observed in the recent past), accrual anomaly has the most evidence in the U.S. market.

A second group includes studies that relate abnormal returns to trading strategies based on accruals. Ali, Hwang and Trombley (2000) identified evidence contrary to the naive investor hypothesis in relation to large firms that are accompanied by analysts or held by institutional investors (the hypothesis postulates that the predictive capacity of accruals in relation to future earnings is small in these cases), and that asset price, trading volume and transaction costs do not condition the predictive capacity of accruals for future returns. Khan (2008), in turn, found that the difference in average returns of companies with very high or very low levels of accruals is explained by the difference in risk of the two types of assets.

The last category relates investors, analysts and other sophisticated users of financial statements with the properties of accruals. In this line, Bradshaw, Richardson and Sloan (2001) concluded that analysts overestimate the persistence of accruals, while Collins, Gong and Hribar (2003) found that the mispricing of accruals is reduced when there is strong institutional control. According to Lev and Nissim (2006), accrual anomaly is not eliminated in the function of systematic structural factors that prevent investors from consistently forming profitable strategies to exploit accrual anomaly, thus restricting the opportunity for arbitrage. Mashruwala, Rajgopal and Shevlin (2006) corroborated the work of Lev and Nissim (2006).

The findings of Sloan (1996) have been confirmed by other researchers, using different time periods and definitions of accruals. Among the relevant findings, there is evidence that the components of accruals, such as inventories and accounts receivable, are associated with the returns of hedge portfolios (Chan *et al.,* 2006; Hribar, 2000; Thomas & Zhang, 2002).

Accrual anomaly is an important discovery in the academic literature. Despite the evidence showing its presence in different markets and periods, the reasons for its occurrence are still an open question. Pincus, Rajgopal and Venkatachalam studied the phenomenon in various markets and identified mispricing of accruals and the existence of anomaly in countries like Australia, Canada, United Kingdom and United States. They indicate as a possible cause the divergence of institutional characteristics of the countries, such as the legal regime and protection of shareholders' rights. With respect to the legal regime, the authors argue that common law systems are more permissive (allow more flexibility) regarding accounting of accruals than are code law systems. Regarding shareholders' rights, in countries where legal protection is weak, there is more room for managerial discretion in detriment to the interests of the shareholders (mainly the minority ones).

Ball, Kothari and Robin (2000) support the idea that the legal regime, particularly regarding the type of governance implemented, impacts accrual anomaly. In common law countries, the corporate governance system tends to be aimed at all shareholders, by intense use of financial statements and other public disclosures to mitigate problems of asymmetric information, whereas in code law countries, the governance system is oriented to the interests of the main shareholders, in a relationship of private communication (insider information). The differences of the governance system can affect the relevance of accounting information, according to the intensity with which the opportunity and conservatism resulting from the adoption of a determined legal regime reduces/increases information asymmetry, encouraging or discouraging a setting propitious for the occurrence of accrual anomaly. But there is also evidence of the presence of mispricing of accruals in countries with different legal regimes, leading to the perception that the anomaly is more reasonably explained by some systematic risk or a behavioral bias of investors in the use of accruals (LaFond, 2005, p. 11).

Accruals in Brazil

Despite the growing number of empirical works on accruals in general, research on accrual anomaly is still incipient in Brazil. Of the clusters identified in the bibliometric analysis, the most common current of investigation in the Brazilian academic literature on accruals is "earnings management", in line with the international trend. Of the works researched on accruals, we gave greater emphasis to those listing the seminal article of Sloan in the references. When applying this criterion, it revealed another research line that relates accruals with their effect on the financial statements, particularly on distortions in the disclosed results (Colauto & Beuren, 2006, 2007).

There are also studies that examine the association of accruals and stock returns (Dantas, Medeiros, & Lustosa, 2006; Galdi & Lopes, 2009; Lopes & Galdi, 2006) and others covering the relationship between cash flows, accruals and earnings (Lustosa & Santos, 2007). In this work, the authors analyzed a sample of 92 Brazilian nonfinancial firms through time series data from 1996 to 2004 and concluded that cash flow alone is a better predictor of future flows than cash flow and accruals taken together. They also found that earnings have little informational value, a fact that urges the search for a new accounting model. Of the Brazilian works citing Sloan (1996), there are also works addressing the quality of earnings and accrual anomaly itself (Almeida, Lima, & Lima, 2009).

Methodology

Definition of variables

In this work, we used operating earnings as our earnings measure, defined as earnings before interest and taxes (EBIT). Accruals were calculated by balance sheet approach, according to Equation (1), and operating cash flows by the difference between earnings and accruals. Since accruals are calculated by the change observed between consecutive periods of the items making up working capital, there were no data available for 1990, the first year of the sample. The same situation applies to returns.

$$\mathrm{Acc} = (\Delta \mathrm{CA} - \Delta \mathrm{Cash}) - (\Delta \mathrm{CL} - \Delta \mathrm{Deb} - \Delta \mathrm{Tax}) - \mathrm{Dep} \quad (1)$$

where Δ represents the change in the observed variable, CA is Current Assets; Cash is cash and cash equivalents, CL is Current Liabilities; Deb is short-term debt; Tax is income taxes payable, and Dep is the depreciation and amortization expense.

The calculation of returns required some adjustments. The time window for its measurement is one year, starting four months after the end of the previous fiscal end. This procedure is employed in other works in the Brazilian literature, such as Lopes and Galdi (2006), and in most foreign studies (Francis, Lafond, Olsson, & Schipper, 2005; Sloan, 1996; Richardson, Sloan, Soliman, & Tuna, 2005, among others). This procedure is based on the fact there is a delay between the end of the year and the date when the financial statements are published. Obtaining stock prices only at the end of the fourth month of the next year aims to assure that all the necessary information is available to construct portfolios (Fama & French, 1995) and that investors make their trading decisions under an accruals strategy at the end of April of each year of the sample. The returns (Ret) are thus calculated by:

$$\mathrm{Ret}_t = \frac{(P_t - P_{t-1})}{P_{t-1}} \tag{2a}$$

where P is the closing price of the stock four months after the end of the fiscal year, based on the assumption that investors follow a buy-and-hold strategy until the next period.

Our definition of abnormal returns follows Sloan (1996, p. 294) and requires adjustment by the "size" variable to calculate the returns of the control portfolio. The explanatory power of the size variable for returns has been stressed in the literature (Bernard & Thomas, 1990). The returns scaled by size were calculated as the average of the excess return of individual assets over the return of a control portfolio, formed by assets of equivalent sizes, with the return given by applying a buy-and-hold strategy during the period. Specifically, the method consists of several steps. The first involves calculating the gross return of the individual assets. The next step is to identify to what control portfolio the individual asset belongs. For this, the distribution of the series is divided into quantiles by size, whose proxy is the natural logarithm of the company's market value. Next, the return of the control portfolio is identified by the average of the gross returns of the individual assets with equivalent sizes. Formally,

$$\mathrm{Ab\_Ret}_{i,t} = \mathrm{Ret}_{i,t} - \frac{1}{n}\sum_{i=1}^{n} \mathrm{Ret}_{i,t} \tag{2b}$$

where $\mathrm{Ab\_Ret}_{i,t}$ is the abnormal return of asset i in period t and $\frac{1}{n}\sum_{i=1}^{n} \mathrm{Ret}_{i,t}$ is the average of the returns of the assets that compose the control portfolio. The other definitions (time window and buy-and-hold returns) are identical to those used to calculate the gross returns.

This is the method of calculating abnormal returns not only in studies of accrual anomaly (Penman & Zhang, 2002; Sloan, 1996; Xie, 2001) but also in examinations of other anomalies in the financial literature (Bernard *et al.*, 1997).

Data and sample selection

The sample consists of all the firms listed for trading on the São Paulo Stock Exchange (BM&FBOVESPA) that are followed by Economatica. We excluded financial companies, as is common for studies in this area (Chan *et al.*, 2006; Sloan, 1996, among others). The main reason for excluding financial firms is that they are subject to specific regulation by the Brazilian Central Bank and have specific accounting rules (Richardson, Teoh, & Wysocki, 1999), notably on the treatment of accruals (LaFond, 2005).

The empirical tests relied on past accounting figures and share prices (on an annual basis) for the period between 1990 and 2008, besides time series and cross-sections of the earnings variable and its components (accruals and cash flow). All observations were adjusted for inflation. Since the magnitude of the balance sheet items varies by cross-section unit, all the variables were standardized to permit comparisons between firms, following practice widely employed in similar studies (Sloan, 1996). The standardization measure used was average total assets.

To avoid the influence of a small number of extreme observations (outliers), we excluded data above and below two standard deviations from the mean of the series. We also eliminated data without economic significance, probably generated by problems of the data gathered from the provider of financial information (*e.g.*, market value or total assets less than zero). Taken together, the adjustments reduced the sample by approximately 1.8%.

Hypothesis tests

Pricing of earnings and its components (first hypothesis)

In pricing by rational expectations, investors base their decisions on the information available about all the relevant variables that affect stock returns. Using the Mishkin test enabled verification of whether stock prices reflect the difference in the persistence of the components of earnings. Mishkin (1983) established a test of market rationality and efficiency that consists of a nonlinear estimation procedure by maximum likelihood. The test was initially conceived to test the rational expectations hypothesis in macroeconomics, to supply a statistical comparison between a measure of pricing by the market (valuation coefficient) and another of rational expectations (forecasting coefficient) given by a relevant variable.

In the Mishkin test as applied by Sloan (1996), the hypothesis to be tested is that the market's subjective expectation about stock returns is identical to the objective expectation, conditional on past information. Assuming that the model for expected return is adequately specified (*i.e.*, the equilibrium pricing equation is correct), the parameter estimated by the model is compared with the coefficient given by an earnings regression (dependent variable) and by lagged variables (explanatory variables). If the estimate of the parameters of the two equations is different, the conclusion is that the market is not rationally using past information (*i.e.*, the market is inefficient). For example, if the valuation coefficient is significantly higher than the forecasting coefficient, the Mishkin test indicates that the market overestimates the relevant variable (earnings and its components). The interpretation is the same (but with opposite effect) when the valuation coefficient is significantly lower than the forecasting coefficient. In this case, the market underestimates the respective variable.

The hypothesis inherent to rational expectation of future earnings states that the market's subjective estimation is equal to the objective estimation based on the available information:

$$E_{m_t}(\text{Earnings}_{t+1}|\emptyset_t) = E_t(\text{Earnings}_{t+1}|\emptyset_t) \tag{3}$$

where

. $\emptyset_t$ = set of information available in period *t*

. $E_{m_t}(\text{Earnings}_{t+1}|\emptyset_t)$ = subjective expectation of the market conditional on $\emptyset_t$

. $E_t(\text{Earnings}_{t+1}|\emptyset_t)$ = objective expectation conditional on $\emptyset_t$

The specification given in (3) implies that the market's expectation of earnings is equal to the true expectation conditional on all past information. Assuming the market is efficient,

$$E_t(Y_{t+1}) = \text{Ret}_{t+1} - E_{m_t}(\text{Ret}_{t+1}|\emptyset_t) \tag{4}$$

where

. Y_{t+1} = the abnormal return in period *t* + 1

. Ret_{t+1} = the return in period *t* + 1

. $E_{m_t}(\text{Ret}_{t+1}|\emptyset_t)$ = subjective expectation of the market of Ret_{t+1}, conditional on $\emptyset_t$

Equation (4) establishes that Y_{t+1} must not be correlated with past information. The empirical content of Equation (4) depends on a market equilibrium model, which will determine $\mathrm{E}_{\mathrm{m}_t}(\mathrm{Ret}_{t+1}|\emptyset_t)$. Abel and Mishkin (1983) provided a broad discussion of various equilibrium models for this purpose. The market efficiency condition is:

$$Y_{t+1} = \beta\big(Earnings_{t+1} - E_t(Earnings_{t+1}|\emptyset_t)\big) + \varepsilon_{t+1} \tag{5}$$

where ε_{t+1} is the error term, β is the coefficient of response of earnings and $E_t(\varepsilon_{t+1}|\emptyset_t) = 0$.

Based on the earnings forecast used in Sloan (1996), the test of market rationality is based on the pricing and forecasting equations of the following system:

$$\mathrm{Earnings}_{t+1} = \alpha_0 + \alpha_1 \mathrm{Earnings}_t + \upsilon_{t+1} \tag{6a}$$

$$\mathrm{Y}_{t+1} = \beta(\mathrm{Earnings}_{t+1} - \alpha_0 - \alpha_1^* \mathrm{Earnings}_t) + \varepsilon_{t+1} \tag{6b}$$

The forecasting Equation (6a) uses past information to predict future earnings. The weight given to past information, α_1, is an objective measure of how $\mathrm{Earnings}_t$ are related to future earnings. By nonlinear estimation of the system of equations (6a) and (6b), the information on returns can be used to infer how the market uses information on $\mathrm{Earnings}_t$ to predict $\mathrm{Earnings}_{t+1}$. Equation (3) implies that the market's subjective expectation, conditional on past information (which can be inferred from Equation (6a)) should be equal to the objective earnings expectation, which can be estimated by Equation (6b). Therefore, the test for rationality is $\alpha_1 = \alpha_1^*$.

To conduct the test of equality of the coefficients, the system is estimated jointly using the nonlinear least-squares procedure. To obtain estimates of both β and α_1, it is necessary to assume that α_0 in the prediction Equation (6a) is equal to α_0 in the returns Equation (6b). In turn, if $\alpha_1 = \alpha_1^*$, then the sum of the squares of the residuals of the constrained estimation ($\mathrm{SSR^c}$), in which $\alpha_1 = \alpha_1^*$, should be equal to the sum of the squares of the residuals of the unconstrained estimation ($\mathrm{SSR^u}$), with $\alpha_1 = \alpha_1^*$. Mishkin (1983) showed that this restriction can be tested using the likelihood ratio test (asymptotically distributed as χ^2 (*q*) under the null hypothesis):

$$2n * \ln\left(\frac{\mathrm{SSR^c}}{\mathrm{SSR^u}}\right) \tag{7}$$

where *q* is the number of constraints imposed when pricing is rational, *n* is the number of observations in each equation (2*n* is the number of observations in the stacked regression), $\mathrm{SSR^c}$ is the sum of the squares of the residuals of constrained system and $\mathrm{SSR^u}$ is the sum of the squares of the residuals of the unconstrained system.

When earnings are decomposed into operating cash flows (OCF) and accruals (Acc), the prediction and pricing equations become:

$$\mathrm{Earnings}_{t+1} = \gamma_0 + \gamma_1 \mathrm{OCF}_t + \gamma_2 \mathrm{Acc}_t + \upsilon_{t+1} \tag{8a}$$

$$Y_{t+1} = \beta(\mathrm{Earnings}_{t+1} - \gamma_0 - \gamma_1^* \mathrm{OCF}_t - \gamma_2^* \mathrm{Acc}_t) + \varepsilon_{t+1} \tag{8b}$$

Here the assumption of market efficiency imposes the restrictions $\gamma_1 = \gamma_1^*$ and $\gamma_2 = \gamma_2^*$, implying that the weights assigned to cash flow and accruals in the prediction equation are the same as assigned by the market to the components in the equilibrium pricing equation.

Trading strategy (second hypothesis)

The second hypothesis establishes that a trading strategy based on the magnitude of accruals provides consistent returns in the Brazilian capital market. The procedure generally used to test this property consists of analyzing a zero-investment portfolio.

Bernard, Thomas and Wahlen (1997) pointed out that an anomaly based on accounting numbers will indicate mispricing by the market only if the returns provided by a zero-investment portfolio are consistently positive. A zero-investment portfolio that produces a positive return resulting from cross-sectional differences in risk will demonstrate the variability of annual returns (Cheng & Thomas, 2006).

To verify whether a zero-investment portfolio based on accruals produces consistently positive returns in the Brazilian market, we distributed the assets by quintiles formed by the magnitude of the accruals component of earnings, resulting in the composition of five portfolios, one for each quintile (1 to 5). We repeated this procedure for each year of the sample.

In studies of accrual anomaly, this strategy is known as forming a hedge portfolio, so named because of the assumption of reduction of risk between assets with different magnitudes of the accruals component. Sloan (1996) demonstrated that such a hedge portfolio provides higher returns than maintaining a single position (long or short) based on the level of accruals.

Analysis of the Results

Descriptive statistics

Table 1 contains the descriptive statistics of the accounting variables used in the tests, divided into two panels. Panel A contains the components of working capital, and panel B contains earnings, cash flow and the components of accruals. For all the items, the annual observations were divided by the average of the total assets for the year of occurrence.

The accruals are formed by the variation of the working capital items – see Equation (1). The analysis of the working capital items provides preliminary information on the accruals, as demonstrated in panel A. Current assets are the dominant item of working capital (34% of the total assets). In turn, the accounts receivable and inventory components are the most relevant items (9.4% and 6.9% of total assets, respectively) of current assets, a similar situation to that found in international studies (Wu, Zhang, & Zhang, 2010). The current liabilities account represents 28.4% of total assets, with accounts payable (generally composed of short-term obligations to suppliers and similar creditors) being the most important item (4.6% of total assets).

Panel B contains statistics related to the variables depreciation, accruals, cash flow and variation of working capital items (third section shows details about procedures for variables' selection). The most representative item in the formation of accruals is depreciation. However, it has small variability in relation to other items, such as Δ Accounts Receivable. According to Chan, Chan, Jegadeesh, and Lakonishok (2006), the identification of variables with greatest dispersion helps map the components that effectively permit distinguishing the accruals in the sample.

In relation to total accruals, more than half the observations are negative (median of –3.8% of total assets), indicating that the companies in general have income-decreasing accruals. The value found is very near that identified by Sloan (1996) for the U.S. market (median of 3%), and similar to the one documented by Lopes and Galdi (2006) for the Brazilian market from 1994 to 2004 (mean of –0.0319).

Table 1

Descriptive Statistics

Variable	Mean	Standard deviation	25th percentile	Median	75th percentile
			A. Components of Working Capital		
Current Assets	0.3725	0.2188	0.1925	0.3431	0.5306
Current Liabilities	0.3360	0.2352	0.1883	0.2841	0.4189
Accounts Receivable	0.1122	0.0893	0.0435	0.0944	0.1582
Inventories	0.0908	0.0891	0.0059	0.0686	0.1465
Other Current Assets	0.0641	0.0628	0.0232	0.0453	0.0807
Accounts Payable	0.0641	0.0615	0.0196	0.0462	0.0880
Other Current Liabilities	0.0956	0.0977	0.0380	0.0643	0.1141
			B. Earnings, Cash Flow and Accruals		
Δ Current Assets	0.0177	0.0795	-0.0177	0.0110	0.0524
Δ Current Liabilities	0.0139	0.0645	-0.0162	0.0077	0.0391
Depreciation	0.0417	0.0276	0.0239	0.0374	0.0558
Δ Accounts Receivable	0.0390	0.1603	-0.0304	0.0249	0.1063
Δ Inventories	0.0049	0.0303	-0.0047	0.0002	0.0145
Δ Other Current Assets	0.0049	0.0370	-0.0088	0.0027	0.0183
Δ Accounts Payable	0.0046	0.0274	-0.0065	0.0011	0.0147
Δ Other Current Liabilities	0.0084	0.0482	-0.0105	0.0038	0.0246
Accruals	-0.0397	0.0899	-0.0860	-0.0384	0.0060
Earnings	0.0414	0.0903	-0.0061	0.0443	0.0993
Cash Flow	0.0847	0.1185	0.0165	0.0866	0.1580

Note. The sample is formed of all Brazilian nonfinancial firms listed on the BM&FBOVESPA with data in the Economatica database for the period from 1990 to 2008. Panel A presents a statistical summary of the components of working capital, while panel B offers statistics of the variation (Δ) of the nonfinancial items of current assets (Δ Current Assets – Δ Cash and Cash Equivalents), current liabilities (Δ Current Liabilities – Δ Short-term Debts – Δ Taxes Payable), accounts receivable, other current assets, accounts payable and other current liabilities. Panel B also contains the statistics depreciation, accruals (Δ Current Assets – Δ Current Liabilities – Depreciation), earnings (operating income) and cash flow (Earnings – Accruals). The values of the variables are divided by average total assets.

Results of the hypotheses

Pricing of earnings and their components (first hypothesis)

The Mishkin test consists of two steps. Initially the forecasting and valuation equations are estimated without imposing any restriction on the coefficients. In the second step, the same procedure is carried out with the rational pricing constraint, implying that the coefficients of earnings and the respective components are equal both in the forecasting and the valuation equation. The statistics utilized to test the null hypothesis that the market rationally prices earnings and their components is given by the likelihood ratio (Equation (7)), which is distributed asymptotically as $\chi^2(q)$, where q is the number of restrictions. Rational pricing is rejected if the likelihood ratio is sufficiently high.

To estimate the pricing of earnings and the respective components, we analyzed the average persistence of the following variables in future earnings: (a) current earnings, (b) cash flow and accruals. Categories (a) and (b), in turn, constitute distinct specifications under which the indicated sets of variables were tested. The results are presented in the following sub-sections. The estimates given by resolving the system composed of Equations (7a) and (7b) are shown in Table 2. The coefficient of earnings γ_1 is significant both in the forecasting and the valuation equation. The estimate of the valuation equation (0.7562) is higher than that of the forecasting equation (0.6371), suggesting that the market **exaggerates** the effect of current earnings when estimating earnings in the following period. To find out if this effect is statistically significant, we again estimated the coefficients of Equations (6a) and (6b) imposing the constraint that $\gamma_1 = \gamma_1^*$. The likelihood ratio demonstrates that the null hypothesis of rational pricing cannot be rejected, indicating that the difference between the coefficients γ_1 and γ_1^* is not significant. In panel B of Table 2, the real values of the observations were replaced by the corresponding quintiles of the distribution of the variables used in the Mishkin test. Specifically, the procedure consisted of first performing the classification by quintile for each period of the sample and then applying the Mishkin test employing this classification.

Table 2

Estimate of Pricing by the Market (Mishkin test) of Current Earnings in relation to the Implications on Earnings in the Next Period

Panel A – Regressions using real values of the variables

$$\text{Earnings}_{t+1} = \gamma_0 + \gamma_1 \text{Earnings}_t + \upsilon_{t+1} \quad (6a)$$

$$\text{Ab\_Ret}_{t+1} = \alpha + \beta(\text{Earnings}_{t+1} - \gamma_0 - \gamma_1^* \text{Earnings}_t) + \varepsilon_{t+1} \quad (6b)^{a.b}$$

Forecasting coefficient			Valuation coefficient		
Parameter	Estimate	T-statistic	Parameter	Estimate	T-statistic
γ_1	0.6371	56.0530	γ_1^*	0.7562	2.5696

Rational Pricing Test of Earnings

Null Hypothesis	Likelihood Ratio	Marginal Significance
Earnings: $\gamma_1^* = \gamma_1$	0.8289[c]	0.2895

Panel B – Regressions using classification of the variables by quantiles

Forecasting coefficient			Valuation coefficient		
Parameter	Estimate	T-statistic	Parameter	Estimate	T-statistic
γ_1	0.6363	55.41540	γ_1^*	1.0042	2.7994

Rational Pricing Test of Earnings

Null hypothesis	Likelihood ratio	Marginal significance
Earnings: $\gamma_1^* = \gamma_1$	4.9059	0.0155

Note. [a] Equations (6a) and (6b) were estimated jointly using the iterative nonlinear least-squares method, as proposed by Mishkin (1983 as cited in Sloan, R. G. (1996). Do stock prices fully reflect information in accruals and cash flows about future earnings? *Accounting Review, 71*(3), 289-315). We utilized all the observations available for the period from 1990 to 2008 for nonfinancial companies with information in the Economatica database. [b] The earnings variable refers to earnings before interest and taxes (EBIT) divided by the average total assets. [c] $2N \, \text{Ln}(SSR^c/SSR^u) = 2 \times 7.742 \times \text{Ln}(18{,}443.85/18{,}442.86) = 0.8289$, where N is the number of observations, Ln is the natural logarithm, $SSR^c(SSR^u)$ is the sum of the squares of the constrained (unconstrained) residuals of the regression.

In panel B, the constraint imposed of equality of the rational expectations (past data) and subjective expectations (market perception) is not rejected only at a more rigorous significance of 1%. This indicates that variations within the quintile have a relevant impact on the coefficients obtained. While in panel A the hypothesis cannot be rejected that the market correctly prices earnings, in panel B the evidence is different: the market is unable to identify the impact of current earnings on future earnings. It should also be stressed that the persistence found for the effect of current earnings on earnings for the subsequent period for the Brazilian market is lower than that found for the U.S. market. For example, Sloan (1996) found a coefficient of 0.841 for the period from 1962 to 1991, and Dechow and Ge (2006) identified an estimate of 0.696 for the period from 1988 to 2002. To summarize, the Mishkin test demonstrated that the hypothesis cannot be rejected that the market rationally prices this persistence in its estimate of the implications on future earnings.

Table 3

Estimate of Pricing by the Market (Mishkin test) of the Components or Earnings in Relation to their Implications on Future Earnings

Panel A – Regressions using real values of the variables

$$\text{Earnings}_{t+1} = \gamma_0 + \gamma_1 \text{OCF}_t + \gamma_2 \text{Acc}_t + \upsilon_{t+1} \quad (8a)$$

$$\text{Ab\_Ret}_{t+1} = \alpha + \beta(\text{Earnings}_{t+1} - \gamma_0 - \gamma_1^* \text{OCF}_t - \gamma_2^* \text{Acc}_t) + \varepsilon_{t+1} \quad (8b)^{a,b}$$

Forecasting coefficient			Valuation coefficient		
Parameter	Estimate	T-statistic	Parameter	Estimate	T-statistic
γ_1	0.6262	52.8613	γ_1^*	0.8333	3.3072
γ_2	0.5763	38.3354	γ_2^*	0.6523	2.0905

Rational Pricing Test of Earnings

Null hypothesis	Likelihood Ratio	Marginal Significance
OCF: $\gamma_1^* = \gamma_1$	3.5325	0.0363
Acc: $\gamma_2^* = \gamma_2$	0.2907	0.6399
OCF, Acc: $\gamma_1^* = \gamma_1$ and $\gamma_2^* = \gamma_2$	4.1177	0.0638

Panel B – Regressions using classification of the variables by quintiles

Forecasting coefficient			Valuation coefficient		
Parameter	Estimate	T-statistic	Parameter	Estimate	T-statistic
γ_1	0.6723	42.8437	γ_1^*	1.0968	1.7907
γ_2	0.4114	26.3778	γ_2^*	0.2864	0.5056

Rational Pricing Test of Earnings

Null hypothesis	Likelihood ratio	Marginal significance
OCF: $\gamma_1^* = \gamma_1$	0.8517	0.0974
Acc: $\gamma_2^* = \gamma_2$	0.0741	0.8552
OCF, Acc: $\gamma_1^* = \gamma_1$ and $\gamma_2^* = \gamma_2$	1.7787	0.0567

Note. [a] Equations (9a) and (9b) were estimated jointly utilizing the iterative nonlinear least-squares procedure, as proposed by Mishkin (1983 as cited in Sloan, R. G. (1996). Do stock prices fully reflect information in accruals and cash flows about future earnings? *Accounting Review, 71*(3), 289-315). We utilized all the observations available for the period from 1990 to 2008 for nonfinancial companies with information in the Economatica database. [b] The accruals (Acc) variable was obtained by focus on the balance sheet, according to Equation (1). Operating cash flow (OCF) corresponds to the difference between earnings and accruals. All the values except for abnormal returns were scaled by average total assets.

Table 3 presents the estimates of the system given by Equations (8a) and (8b), related respectively to the rational pricing by past data of the components of earnings (cash flow and accruals) and the valuation by the market of the implications of the earnings components on the result of the subsequent period. Evidence indicates that the market attributes a greater weight to the persistence of cash flow (0.8333) and accruals (0.6523) than to the estimates based on past data (0.6262 for cash flow and 0.5763 for accruals). The coefficients identified were submitted to some constraints to permit additional inferences.

The data presented in panel B basically paint the same picture. The small differences are related to the valuation coefficients. The level of significance of cash flow (t = 1.7907) is smaller than that found for the regression with real data (t = 3.3072). The valuation coefficient of accruals also attracts attention, both for its magnitude (0.2864) and its statistical significance (t = 0.5056). The differences between the results presented in panels A and B corroborate the evidence discussed previously: there are fluctuations in the real values that are not captured by the standardization by quintiles. These oscillations largely result from the operational activity of the company, and in principle should not be disregarded.

Trading strategy (second hypothesis)

According to Sloan (1996), one of the ways to verify the economic significance of the results obtained by a trading strategy based on accrual anomaly is to identify the deviations of the expected returns under the hypothesis of market efficiency. Specifically, the procedure consists of forming zero-investment portfolios from assets that compose the sample, based on the magnitude of the accruals, and identifying the returns obtained by taking a long (short) position in assets with low (high) accruals and by hedging the returns of assets with extreme accruals. For our purposes here, we separated the earnings components in various ways to identify the predictive power they have for future returns. The results are presented below.

The first analysis focuses on the accruals component of earnings. The gross and abnormal returns are separated into zero-investment portfolios, with the firms grouped according to the magnitude of their accruals. If accrual anomaly occurs in the Brazilian market, the application of this strategy will enable obtaining positive abnormal returns. To corroborate the predictive power of the accruals for returns, we also present panel regressions for the firms contained in the sample.

The predictive power of earnings surprises for future returns has been evidenced in various academic works, such as Bernard and Thomas (1990) and Chan, Jegadeesh and Lakonishok (1996). A broader analysis is to include accruals in the association of earnings with returns. This focus permits verifying whether the market assigns different weights to companies that report earnings with low or high levels of accruals. This analysis is reported in Table 4.

Table 4

Returns of the Portfolios Classified by Accruals and Variation of Earnings

	Accruals in relation to total assets					
Δ Earnings	1 (Lowest)	2	3	4	5 (Highest)	1-5
					A. Returns	
1 (Lowest)	0.1454	0.0482	0.0335	0.1716	0.0078	0.1377
2	0.4426	1.0996	0.1642	0.1369	0.3522	0.0904
3	0.2213	0.2871	0.3308	0.3883	0.4498	–0.2285
4	0.2910	0.3354	0.5997	0.6178	0.2733	0.0178
5 (Highest)	0.5261	0.4877	0.7053	0.6118	0.5735	–0.0474
5-1	0.3807	0.4395	0.6718	0.4402	0.5657	

Continues

Table 4 (continued)

	Accruals in relation to total assets					
Δ Earnings	1 (Lowest)	2	3	4	5 (Highest)	1-5
				B. Abnormal returns		
1 (Lowest)	–0.2051	–0.3799	–0.3368	–0.2322	–0.3392	0.1341
2	–0.0475	0.7029	–0.2125	–0.2458	–0.0251	–0.0224
3	–0.2711	–0.0999	–0.0899	–0.0514	0.0232	–0.2943
4	0.0573	–0.0608	0.1749	0.2043	–0.1127	0.1700
5 (Highest)	0.0650	0.1121	0.3211	0.2116	0.1832	–0.1182
5-1	0.2701	0.4920	0.6579	0.4438	0.5224	

Note. The sample is formed of all Brazilian nonfinancial firms listed on the BM&FBOVESPA with data in the Economatica database for the period from 1990 to 2008. The companies were classified in each year by accruals (in relation to average total assets) and independently by the variation of operating income (also in relation to average total assets). The variation of earnings is given by the difference between earnings in the reference year and those in the preceding year. The intersection of the two classifications (accruals and variation of earnings) resulted in 25 portfolios. Panel A presents the average returns (calculated by $\frac{(P_t - P_{t-1})}{P_{t-1}}$, where P is the closing price of each stock four months after the end of the fiscal year) of the portfolios equally weighted by quintiles of the classification variables (accruals and variation of earnings). Panel B provides the abnormal returns, calculated as the excess return over the control portfolio formed by companies of equivalent size. The classification variable for formation of the control portfolio was the natural logarithm of market value.

Panel A shows the returns, calculated by the percentage difference observed in the price of each asset between two consecutive periods. The accumulation period of the returns starts four months after the end of the year and ends four months after the end of the next year. The firms that ceased being listed during the study period because of going private or liquidation were excluded from the sample.

The returns are presented in relation to average total assets and associated with the intersection of the classifications by quintiles for accruals and variation of earnings. Therefore, the return in the first line of panel A (0.1454) represents 14.54% of the average total assets and refers to companies that had lower variation in earnings and lower level of accruals. The marginal effect of the earnings surprise (accruals) for each category of accruals (earnings surprise) is given by the spreads. The spreads were calculated by the difference between the returns of the first (last) and the last (first) quintile of the accruals (variation of earnings) and are shown in the last column (line) of panel A. The spread of the accruals for the first class of variation in earnings is positive and represents 13.77% of the total average total assets. If this behavior continued, it could be inferred that the market does a better job of pricing firms that have a lower level of accruals. However, the spread for the last class of variation in earnings (–4.74%) shows that this deduction is hasty for the data in the sample.

Panel B demonstrates the results of the same procedures detailed for panel A, but in relation to abnormal returns. The adjustments in the expected return to calculate the abnormal return followed the line indicated by Sloan (1996), in which abnormal returns are identified as the buy-and-hold return of a determined asset in excess of the average buy-and-hold return of a portfolio formed of assets of equivalent size. For this purpose, the size of the firms was given by the log of equity of each firm and grouped in quintiles to calculate the average return.

The conclusion of the analysis for abnormal returns is similar to that for panel A, where the spread of the variation of earnings (last line in the table) is positive for all the accrual quintiles. The marginal effect of the accruals on the analysis of the variation of earnings, once again, is not clear. The spread is positive for three earnings variation quintiles and negative for the other two (last column of the table). The finding that stands out is that the market is fairly efficient in pricing the variation of earnings and pays less attention to the level of accruals. In general, these results do not correspond to those obtained in other countries, where the usual finding is that returns (including abnormal ones) are higher for firms with lower accruals (Chan *et al.*, 2006; Sloan, 1996).

Table 5 presents the relationship between current earnings and risk proxies for future returns. The signs of the coefficients are as expected, as demonstrated in the matrix of correlations, in line with similar works (Sloan, 1996). Except for the coefficient of the book-to-market variable in the specification by fixed effects, the others are statistically significant. The regression mainly confirms that current earnings are positively related to future returns and that this relationship is significant.

Table 5

Regression of the Future Returns by Current Values of Earnings and Risk Proxies

$$\text{Ret}_{t+1} = \beta_0+\beta_1\text{Earnings}_t+\beta_2\text{Size}_t+\beta_3\text{BM}_t + \upsilon_{t+1} \quad (9)$$

Coefficients	Fixed effects	Random effects	Hausman test
β_0	5.3760	0.8505	173.9092
	(13.4281)	(6.3228)	(0.0000)
β_1	1.0136	0.7959	
	(2.8669)	(3.1644)	
β_2	–0.4001	–0.0539	
	(–13.0343)	(–5.2898)	
β_3	0.0011	0.0142	
	(0.1735)	(3.1566)	

Note. The sample is formed of all Brazilian nonfinancial firms listed on the BM&FBOVESPA with data in the Economatica database for the period from 1990 to 2008. The returns for the next period (Ret_{t+1}) were regressed by the current values of earnings (Earnings_t), size ($Size_t$) and book-to-market ratio (BM_t) in panel data for the entire time series. The t-statistic (*p* value) of the coefficients (Hausman test) is presented between parentheses. The returns are calculated by $\frac{(P_t-P_{t-1})}{P_{t-1}}$ (where *P* is the closing price of each stock four months after the end of the fiscal year) in a buy-and-hold strategy. Size is the control variable for firm size, identified by the logarithm of the equity, and BM is the control variable given by the book-to-market ratio.

Table 6 shows the results obtained when the future returns are regressed by the components of earnings (accruals and cash flow). The coefficients obtained for the earnings components are positive and significant, indicating that for the sample chosen accruals have positive explanatory power for future returns. This finding differs from that of Sloan (1996). The institutional environment (defined as the legal regime and corporate governance practices) and some characteristics of the Brazilian capital market (such as the small number of listed companies) are some possible explanations for this divergence in the results. The Wald test does not reject the constraint imposed of equality of the coefficients of the components of earnings ($\beta_1 = \beta_2$), indicating that the coefficients of the effect of accruals and cash flow on future returns can be considered equivalent.

Table 6

Regression of Future Returns by Current Values of Cash Flow, Accruals and Risk Proxies

$$\text{Ret}_{t+1} = \beta_0+\beta_1\text{OCF}_t+\beta_2\text{Acc}_t+\beta_3\text{Size}_t+\beta_4\text{BM}_t + \upsilon_{t+1} \quad (10)$$

Coefficients	Fixed effects	Random effects	Hausman test
β_0	5.3052	0,8409	152,3989
	(12.6443)	(5,8931)	(0,0000)
β_1	0.7897	0,3343	

Continues

Table 6 (continued)

Coefficients	Fixed effects	Random effects	Hausman test
	(1.9295)	(1,0553)	
β_2	1.1936	0,7300	
	(3.4161)	(2,9372)	
β_3	–0.3938	–0,0528	
	(–12.2961)	(–4,8881)	
β_4	–0.0006	0,0124	
	(–0.0895)	(2,6883)	
Probability of $\beta_1 = \beta_2$: 0.1414			

Note. The returns in the following period (Ret_{t+1}) were regressed by operating cash flow (OCF_t), accruals (Acc_t) and the control variables size and BM ratio, in panel data for the entire time series. Acc refers to accruals, obtained by focus on the balance sheet of Equation (1). The OCF represents the difference between earnings and accruals. The other variables and sample selection procedures are as described in the note to Table 5.

When gross returns are substituted by abnormal returns in the variable to be explained, the components of earnings (accruals and cash flow) do not present statistically significant coefficients, suggesting a weak relationship between accruals and cash flow with abnormal future gains.

Table 7

Regression of Abnormal Future Returns by Current Values of Cash Flow and Accruals

$$\text{Ab\_Ret}_{t+1} = \beta_0 + \beta_1 \text{OCF}_t + \beta_2 \text{Acc}_t + \upsilon_{t+1} \tag{11}$$

Coefficients	Fixed effects	Random effects	Hausman test
β_0	–0.0364	0.0109	6.3246
	(–0.5333)	(0.1803)	(0.0423)
β_1	–0.0234	–0.3189	
	(–0.0338)	(–0.6328)	
β_2	–0.4558	0.0430	
	(–0.5630)	(0.0652)	
Probability of $\beta_1 = \beta_2$: 0.4982			

Note. The abnormal returns in the following period (Ab_Ret_{t+1}) were regressed on the current period by the variables operating cash flow (OCF) and accruals (Acc) in panel data for the entire time series. Accruals were obtained by focus on the balance sheet of Equation (1), and OCF represents the difference between earnings and accruals. The probability of equality of the coefficients was given by the *F*-statistic and the Wald test. The other variables and sample selection procedures are as described in the note to Table 5.

Although not documented, studies have been conducted at the aggregate level by industry, but the results were unsatisfactory, probably because few companies integrate the division into sectors suggested by Economatica. In this regard it is noteworthy that more than half of the sectors analyzed have less than 30 companies in each segment and some, like **software**, had only three companies listed for the test period. The reduced number of companies imposes a restriction on the scope of the results that did not show statistical significance for the analysis of abnormal returns by business segment.

Conclusions and Recommendations

The first hypothesis investigated establishes that the persistence of earnings and their components is mispriced by the market. To test this assumption, we applied an adaptation of Sloan (1996) to the Mishkin test. The results suggest that the market **exaggerates** in pricing cash flow but rationally prices the accruals component of earnings. This conclusion was submitted to some constraints to identify its robustness. Among the restrictions, the most rigorous one requires that the valuation coefficients (by the market) and forecasting coefficients (by rational expectations) be equal. In this case, we found that the hypothesis that accruals and cash flow are on average correctly priced by the market cannot be rejected.

The second hypothesis states that a hedge portfolio, based on the characteristics of accruals in the Brazilian market, consistently generates abnormal returns. We tested this hypothesis in various arrangements. In the first of these, we found that accruals do not have a marginal effect on earnings surprises. While the results of the hedge portfolio for the variation of earnings were positive and consistent, the returns related to the magnitude of accruals were unstable, fluctuating between positive and negative values. Overall, the evidence indicates that the market is somewhat efficient in pricing the variation of earnings but pays less attention to firms' levels of accruals. These results do not correspond to those found for other countries, in that returns (including abnormal ones) are greater for firms with smaller accruals.

As an alternative procedure to the analyses based on trading strategy, the predictive power of the components of earnings for returns was identified by panel data regressions. The first of these confirmed that current earnings are positively and significantly related to future returns. When current returns were replaced by their components (accruals and cash flow), the coefficients obtained were positive and significant, indicating that for the sample chosen the accruals have positive explanatory power for future returns. This finding differs from that for the U.S. market, where this relationship has been found to be negative.

It should be pointed out that the evidence of the occurrence of accrual anomaly is modest. Besides the United States, there are only a few other countries where this anomaly has been detected, including Canada, Australia and the United Kingdom (Chan *et al.*, 2006; Clinch, Fuller, Govendir, & Wells, 2012; LaFond, 2005; Pincus, Rajgopal, & Venkatachalam, 2007). In the Brazilian market, the evidence of accrual anomaly is not favorable to the existence of arbitrage opportunities. The empirical tests did not identify consistent and statistically significant abnormal returns, a necessary condition for such a trading strategy (based on a zero-investment portfolio) to be efficient.

In the Brazilian case, besides the findings pointed out above, this study revealed that accruals are negatively related to cash flow; that earnings management is common with the intent of decreasing the reported earnings; and that variations in the magnitude of abnormal accruals between two consecutive periods are high. The peculiarities of the Brazilian market are thus not few.

Some specific circumstances in the Brazilian capital markets and corporate reporting system, such as poor corporate governance, concentrated ownership, lack of transparency in the disclosure of accounting numbers and strong tax influence (Lopes & Galdi, 2006), may provide explanation for these results.

The field of research into themes related to accruals is fertile. Some researchers argue that accruals should be considered a negative measure (Trammell, 2010). In reality, accruals can be used, together with other variables, to identify problems related to the operational aspects of firms. In this spirit, institutional differences, the legal regime followed (code law versus common law tradition), corporate governance, the role of auditing, the influence of sophisticated investors and the relevance of accounting information are some of the many variables that can be employed to study the effect of accruals in the Brazilian capital market.

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Cost of capital and earnings transparency ☆

Mary E. Barth [a,*], Yaniv Konchitchki [b], Wayne R. Landsman [c]

[a] Graduate School of Business, Stanford University, Stanford, CA 94305, USA
[b] Haas School of Business, University of California at Berkeley, Berkeley, CA 94720, USA
[c] Kenan-Flagler Business School, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599, USA

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ABSTRACT

We provide evidence that firms with more transparent earnings enjoy a lower cost of capital. We base our earnings transparency measure on the extent to which earnings and change in earnings covary contemporaneously with returns. We find a significant negative relation between our transparency measure and subsequent excess and portfolio mean returns, and expected cost of capital, even after controlling for previously documented determinants of cost of capital.

1. Introduction

This study provides evidence that firms with more transparent earnings enjoy a lower cost of capital. Firms with more transparent earnings are those whose earnings better reflect changes in the economic value of the firm. We operationalize transparency by developing a measure based on the explanatory power of the returns-earnings relation, i.e., the extent to which earnings and change in earnings covary contemporaneously with stock returns. We find that firms with more transparent earnings have a lower cost of capital as reflected in subsequent excess returns and portfolio mean subsequent returns. We also find that firms with more transparent earnings have a lower expected cost of capital. Our findings are based on tests that include controls for growth and other firm fundamentals that are known to be associated with cost of capital.

The Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB) state that a key purpose of financial statements is to improve decision-making by investors, lenders, and other providers of capital. To the extent that a firm's financial statements, including its earnings, are more transparent, uncertainty regarding the value of its equity may be lower, and therefore it will enjoy a lower cost of capital. Arthur Levitt, former chairman of the Securities and Exchange Commission (SEC), embraces this notion by suggesting that "high quality accounting standards … improve liquidity [and] reduce capital costs."[1]

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* Corresponding author. Tel.: +1 650 723 8536; fax: +1 650 725 7979.
E-mail addresses: mbarth@stanford.edu (M.E. Barth), yaniv@haas.berkeley.edu (Y. Konchitchki), wayne_landsman@unc.edu (W.R. Landsman).

[1] Remarks by Arthur Levitt, Inter-American Development Bank, September 29, 1997.

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We predict that earnings transparency is negatively associated with cost of capital. The basis for our prediction is the well-established positive relation between information asymmetry and cost of capital and our expectation that earnings transparency is negatively associated with information asymmetry. We expect a negative relation between earnings transparency and information asymmetry because when earnings transparency is low, some investors will engage in private information acquisition. Acquiring information about a firm's economic value beyond that reflected in earnings—which is low cost information about firm value—is costly. When this cost varies across investors, investors will differ in the extent to which they acquire information, which contributes to information asymmetry. Also, information asymmetry among investors can vary across firms such that it is negatively associated with transparency if investors' marginal acquisition costs are higher when there is less information about firm value beyond that reflected in earnings. However, ultimately it is an empirical question whether transparency is cross-sectionally negatively associated with information asymmetry. To the extent that earnings transparency is not negatively associated with information asymmetry, we will be unlikely to find a significant negative relation between earnings transparency and cost of capital.[2]

We base our measure of earnings transparency on the explanatory power of the returns-earnings relation because the relation measures the extent to which earnings captures changes in firm value. The intuition is that the higher is the explanatory power, the more earnings captures changes in firm value. Although investors can obtain information about changes in firm value from earnings or from other sources, our measure reflects only the extent to which earnings and change in earnings, and information correlated with earnings and change in earnings, explain returns.

Because both earnings transparency and cost of capital can differ across firms and vary over time, we base our earnings transparency measure on only current information and design the measure to permit cross-sectional and intertemporal variation. We permit intertemporal variation in our measure by estimating annual returns-earnings relations because there are several sources of intertemporal variation in earnings transparency that we expect to lead to economically meaningful variation in the cost of capital. One source is changes in accounting standards. We permit cross-sectional variation by exploiting industry and industry-neutral commonalities among firms in the returns-earnings relation, where industry-neutral commonalities are commonalities unrelated to the firm's primary industry. To exploit industry commonalities, we estimate annual returns-earnings relations by industry. To exploit industry-neutral commonalities, we estimate annual returns-earnings relations by quartile portfolios based on the residuals from the industry estimations. These portfolio estimations capture cross-sectional differences in the returns-earnings relation that are not captured fully by industry estimation. The portfolios are industry-neutral because each portfolio has the same industry composition. Our earnings transparency measure for each firm-year is the sum of the explanatory powers from that firm-year's returns-earnings industry and industry-neutral relations.

Application of accounting standards can result in variation in the explanatory power of the returns-earnings relation reflecting variation in earnings transparency as well as variation in firm fundamentals known to be related to cost of capital. For example, earnings captures poorly changes in firm value for growth firms because changes in internally generated intangible assets and growth options are not recognized in earnings. As a result, earnings of high growth firms are not transparent and high growth firms will have low explanatory power in the returns-earnings relation. However, growth is known to be associated with cost of capital regardless of whether earnings of high growth firms lack transparency. As a result, variation in our earnings transparency measure is likely correlated with intertemporal changes and cross-sectional differences in firm fundamentals such as growth. Therefore, detecting a relation between our earnings transparency measure and cost of capital could be attributable to earnings transparency or such firm fundamentals. To address this possibility, our tests include controls for growth and other firm fundamentals that are known to be associated with cost of capital.

If greater earnings transparency is associated with lower cost of capital, we should observe a negative relation between our earnings transparency measure and subsequent returns. We test whether this is the case using two approaches. The first tests for a relation between earnings transparency and subsequent excess returns, and the second tests for a relation between earnings transparency and portfolio mean subsequent returns. In our excess returns tests, we estimate cross-sectional relations between our earnings transparency measure and firms' subsequent returns in excess of returns predicted based on the Fama-French and momentum factors, which reflect known determinants of cost of capital. In our portfolio mean returns tests, we sort firms into portfolios based on our earnings transparency measure and test whether, after controlling for the Fama-French and momentum factors, mean returns are lower for higher transparency portfolios. If greater earnings transparency is associated with lower cost of capital, we also should observe a negative relation between our earnings transparency measure and a proxy for expected cost of capital. To test this, we estimate cross-sectional relations between our measure of earnings transparency and a proxy for expected cost of capital based on the Fama-French and momentum factors. We conduct our tests using a large sample of US firms over a 27-year period.

We find that our earnings transparency measure is significantly negatively related to subsequent excess and portfolio mean returns, which indicates that earnings transparency explains subsequent returns incremental to the Fama-French and momentum factors. We also find that our earnings transparency measure is significantly negatively related to our proxy for expected cost of capital, which indicates that earnings transparency and the combination of the Fama-French and

[2] Section 5 provides evidence that our earnings transparency measure is negatively associated with measures of information asymmetry used in prior research, which is consistent with the transparency measure reflecting intertemporal and cross-sectional variation in information asymmetry.

momentum factors reflect common information. However, the expected cost of capital finding obtains regardless of whether the fundamental risk characteristics underlying the factors are included in the estimating equation. This finding indicates that earnings transparency reflects information associated with expected cost of capital incremental to that reflected in these characteristics. Findings from all tests are robust to inclusion of explicit controls for leverage, growth, and the magnitude of the earnings response coefficient in the returns-earnings relation. In addition, findings relating to subsequent excess and portfolio mean returns are robust to inclusion of controls for changes in cash flow and cash flow risk, and findings relating to expected cost of capital are robust to using a measure of expected cost of capital implied by analysts' earnings forecasts. Collectively, these findings are consistent with greater earnings transparency being associated with lower cost of capital.

Using a relevance measure bearing some resemblance to our earnings transparency measure, Francis et al. (2004) reports evidence of negative relations between its measure and subsequent returns and a proxy for expected cost of capital. Although Francis et al. (2004) and we have similar predictions regarding the negative association between relevance/earnings transparency and cost of capital, the tests in Francis et al. (2004) do not support that study's inferences. The reported *t*-statistics in Francis et al. (2004) are biased upwards because the statistics do not take into account correlation of regression residuals. We show that after taking into account such correlation, there is no significant relation between the Francis et al. (2004) measure and cost of capital. A key distinction between our study and Francis et al. (2004) is that we develop an earnings transparency measure that is based only on current information, which likely accounts for our ability to find a significant relation between earnings transparency and cost of capital.

The remainder of this paper is organized as follows. Section 2 discusses the basis of our prediction and related research. Section 3 explains why earnings transparency varies across firms and over time. Section 4 develops the research design, Section 5 describes the sample, and Section 6 presents our results. Section 7 concludes the study.

2. Basis for prediction and related research

We predict that earnings transparency is negatively associated with cost of capital. There is an extensive literature showing that information asymmetry is positively associated with cost of capital (e.g., Diamond and Verrecchia, 1991). Therefore, earnings transparency will be negatively associated with cost of capital if transparency is negatively associated with information asymmetry. We expect that earnings transparency is negatively associated with information asymmetry based on the following reasoning.

When earnings transparency is low, earnings—which is informative and available at little or no cost—does not capture to a large extent changes in a firm's economic value. This will lead some investors to engage in private information acquisition. Acquiring information about a firm's economic value beyond that reflected in earnings is costly. It is likely that investors will differ in the extent to which they acquire information when there are differences in their marginal acquisition costs, which contributes to information asymmetry.[3] In addition, information asymmetry among investors can vary across firms such that it is negatively associated with transparency if investors' marginal acquisition costs are higher when there is less information about firm value beyond that reflected in earnings. To the extent that information asymmetry is not negatively associated with earnings transparency, we will be unlikely to find a significant negative relation between earnings transparency and cost of capital. Section 5 reports empirical evidence that our transparency measure is negatively associated with measures of information asymmetry used in prior research, which is consistent with earnings transparency and information asymmetry being negatively related.

Although there is an extensive empirical literature linking various characteristics of accounting information to proxies for equity cost of capital, with one exception, no study tests directly for a link between earnings transparency and cost of capital. Accounting characteristics these studies examine include proxies for voluntary disclosure levels (Welker, 1995; Botosan, 1997; Healy et al., 1999; Lang and Lundholm, 2000; Botosan and Plumlee, 2002), accruals quality (Francis et al., 2005; Ecker et al., 2006), and various accounting-based and/or market-based measures of accounting quality (Bhattacharya et al., 2003; Francis et al., 2004). Other studies provide empirical support for a link between quality of accounting information and proxies for cost of debt capital (Sengupta, 1998; Beatty et al., 2002; Francis et al., 2005).[4]

Only Francis et al. (2004) examines the relation between cost of capital and a measure that bears some resemblance to our earnings transparency measure. The measure is the adjusted R^2 from a regression of returns on earnings and change in earnings, which that study notes is adapted from the measure in an earlier version of our study.[5] Francis et al. (2004) refers to this measure as relevance, estimates it based on firm-by-firm time-series regressions using ten-year rolling windows of

[3] If information about firm value other than that reflected in earnings is available at little or no cost, it is possible that information asymmetry is low regardless of the level of earnings transparency. If this is the case, there will be no relation between earnings transparency and cost of capital.

[4] Although earnings quality and earnings transparency are likely related, firms with identical earnings quality can have different earnings transparency. For example, consider two hypothetical software firms, MegaSoft and TinySoft, each of which has proportionately similar revenues, expenses, and research and development costs, and each accounts for these items using US GAAP. Thus, the mapping from earnings to cash flows is the same for both firms and therefore the firms have the same earnings quality. Suppose information about MegaSoft's earnings is adequate for investors to have a clear understanding of valuation implications of earnings, but information about TinySoft's earnings is not. That is, even though the mapping from earnings to cash flows is the same for both firms, the explanatory power between earnings and return is likely to be higher for MegaSoft.

[5] Francis et al. (2004) defines transparency/relevance as the negative of adjusted R^2. This sign convention is opposite to ours. We apply our sign convention when discussing that study's findings.

fifteen-month returns, and uses it and a factor return constructed from it to test for an association between relevance and cost of capital using subsequent excess returns and a proxy for expected cost of capital. The study reports that the relevance factor is significantly negatively associated with subsequent returns and expected cost of capital. However, Francis et al. (2004) bases its inferences on test statistics that do not take account of correlation of regression residuals.[6]

3. Variation in earnings transparency

Cost of capital can vary cross-sectionally and intertemporally (e.g., Fama and French, 1992, 1993; Campbell et al., 2001; Xu and Malkiel, 2003). Variation in cost of capital can reflect differences in risk, including the risk arising from information asymmetry associated with earnings transparency, which also can vary cross-sectionally and intertemporally. Only if variation in earnings transparency reflects variation in information asymmetry will variation in earnings transparency explain variation in cost of capital incremental to other known determinants of cost of capital.

There are several sources of cross-sectional variation in earnings transparency. First, earnings is not designed to reflect all changes in economic value. For example, the accounting system is not designed to capture economic benefits associated with expected future contracts from current customer relationships. Second, the accounting system does not uniformly measure earnings in a manner that reflects changes in economic value.[7] Third, the way in which earnings maps into firm value can differ across firms for a variety of reasons that are not necessarily directly related to accounting.[8] Fourth, because of differences in incentives managers face, firms differ in the amount of discretion their managers apply opportunistically.

Similarly, there are several sources of intertemporal variation in earnings transparency, which we expect to lead to economically meaningful variation in the cost of capital. One source is changes in accounting standards. For example, Statement of Financial Accounting Standards No. 133 (SFAS 133, Financial Accounting Standards Board (FASB), 1998) requires recognition of derivative financial instruments that affects earnings, but recognition of these instruments was not required prior to SFAS 133. A second source is changes in the mix of a firm's assets. For example, until recently many insurance companies' assets and liabilities related only to insurance policies, but recently these companies have also invested in credit default swaps. As a result, insurance companies' asset mix changed and so likely did their earnings transparency. A third source is that, because of these changes or other reasons, e.g., changes in the clarity of firms' disclosures, the mapping of earnings into firm value can differ over time. Because there is cross-sectional variation in transparency, the effects of these intertemporal changes are likely to affect different firms differently.[9]

Because our sample comprises US firms, cross-sectional and intertemporal variations in transparency reflect effects of exposure to the US financial reporting system, which includes US GAAP, SEC regulation, and the US legal system. When a firm commits to the US financial reporting system, it commits to US reporting practices and changing practices when that system changes or when the way in which the system applies to the firm changes, e.g., when its asset mix changes. All aspects of the financial reporting system evolve and affect firms differently, thereby contributing to intertemporal and cross-sectional variation in earnings transparency.[10]

4. Research design

4.1. Earnings transparency measure

We operationalize earnings transparency by developing a measure based on the explanatory power of the returns-earnings relation, i.e., the extent to which earnings and change in earnings covary contemporaneously with stock returns. Regardless of the source of variation in earnings transparency, higher (lower) transparency will result in higher (lower) explanatory power in the returns-earnings relation. Although investors can obtain information about changes in firm value from earnings or from other sources, our measure reflects only the extent to which earnings and change in earnings, and information correlated with earnings and change in earnings, explain returns.

[6] Section 6.3 discusses tests using the Francis et al. (2004) relevance measure that take into account residual correlation. Findings reveal the Francis et al. (2004) relevance measure is not significantly related to cost of capital.

[7] Consider examples relating to fair value, pension, and oil and gas accounting. Firms with more assets measured at fair value could have higher explanatory power in their contemporaneous returns-earnings relations than those with more assets measured at modified historical cost. The effects of pension plan disclosures on transparency are likely to vary depending on whether a firm has defined benefit pension plans. Similarly, the effects of oil and gas disclosures on transparency are relevant only to firms with oil and gas activities.

[8] For example, firms may differ in the extent to which they convey information using conference calls or are covered by analysts.

[9] Consider the example of SFAS 133, which requires derivatives to be recognized at fair value, with changes in fair value recognized in income or other comprehensive income, and enhances derivatives disclosures. Application of SFAS 133 likely clarifies the valuation implications of bank earnings, but not necessarily those of retail firms that have few derivatives. Thus, it is possible a retail firm and a bank can have different earnings transparency in one year, e.g., before application of SFAS 133, but similar transparency in the next year, e.g., after application of SFAS 133.

[10] Based on Kyle (1985) and Diamond and Verrecchia (1991), Leuz and Verrecchia (2000) predicts that the relation between liquidity—a cost of capital proxy—and disclosure should be stronger when a firm credibly commits to higher financial reporting quality. Empirical studies testing this prediction typically focus on a firm's commitment to apply a set of accounting standards or a firm's decision to cross-list its shares on a foreign stock exchange (Leuz and Verrecchia, 2000; Leuz, 2003; Daske et al., 2008). We do not focus on cost of capital effects associated with a commitment to reporting quality because all sample firms are committed to the US financial reporting system, including application of US GAAP.

To construct our earnings transparency measure, *TRANS*, we use adjusted R^2s from annual cross-sectional regressions based on the relation between earnings and change in earnings deflated by price, E/P and $\Delta E/P$, and contemporaneous annual stock returns (Easton and Harris, 1991; Bushman et al., 2004). Appendix A, Section A.1, provides the details. We interpret higher explanatory power in these returns-earnings regressions as indicating greater earnings transparency. Valuation research establishes a link between equity book value and earnings and stock prices (Ohlson, 1995); earnings and change in earnings are the amounts corresponding to equity book value and earnings when explaining stock returns rather than stock prices.

We construct *TRANS* using a two-step estimation procedure designed to permit intertemporal and cross-sectional variation in our earnings transparency measure. Our measure for each firm-year is the sum of the explanatory powers from that firm-year's returns-earnings relations estimated in the two steps.[11] The first R^2 we use to construct *TRANS* is that from annual returns-earnings relations estimated by industry. By construction, this component of *TRANS* is the same for all firms for a given industry-year. There is a strong industry component to the returns-earnings relation as a result of accounting practices likely being similar within industries (Barth et al., 1999, 2005). However, estimating the returns-earnings relation by industry is not likely to capture fully differences across firms in the returns-earnings relation (Barth et al., 2005). First, some accounting practices that affect the returns-earnings relation apply to firms in all industries. Second, earnings can differ in the extent to which it reflects management's information and thus changes in the economic value of the firm. Third, identifying a firm's industry is difficult. Not only is the concept of industry not precisely defined, but also many firms operate in multiple industries.

The second R^2 we use to construct *TRANS* is that from the annual returns-earnings relation estimated by portfolio, where portfolio membership is based on the residuals from the industry regressions. As explained in Appendix A, there are four portfolios for each year, where, for example, the first portfolio is comprised of the quartile of observations from each annual industry regression with the most negative residuals. Thus, the portfolio regressions capture cross-sectional differences in the returns-earnings relation that are not captured fully by industry estimation. Also, the portfolios are industry-neutral because each portfolio has the same industry composition. Thus, differences in the R^2s from the portfolio regressions cannot be attributed to differences in industry membership. This approach is analogous to that used in Rouwenhorst (1998) in developing size- and country-neutral relative return portfolios.

If our grouping of firms into portfolios fails to reflect commonality in the returns-earnings relation among the firms within each portfolio, then the R^2s will be small. However, evidence in Table 2, Panel B, reveals substantial commonality among firms in each portfolio. In particular, the mean R^2s range from 17% to 42%, with a mean of 32%. All are substantially larger than untabulated mean R^2s from year-by-year regressions, 10%, and industry-by-industry regressions, 13%. The R^2s from our portfolio regressions are substantially higher than those reported in prior research (e.g., Lev, 1989).[12]

Our earnings transparency measure for firm *i* in year *t*, $TRANS_{i,t}$, is the sum of the R^2s pertaining to firm *i*'s industry and industry-neutral returns-earnings regressions in year *t*, which we label *TRANSI* and *TRANSIN*. Thus,

$$TRANS_{i,t} \equiv TRANSI_{j,t} + TRANSIN_{p,t}, \tag{1}$$

where *j* and *p* denote industry and portfolio.

If cross-sectional and intertemporal variation in *TRANS* is not reflective of variation in earnings transparency, e.g., if *TRANS* exhibits greater variation than earnings transparency, then basing our tests on *TRANS* will bias against detecting a relation between earnings transparency and cost of capital. Basing our tests on *TRANS* will bias in favor of detecting a relation between earnings transparency and cost of capital—even if none exists—if *TRANS* is correlated with other firm fundamentals that determine cost of capital, such as growth. For example, earnings captures poorly changes in firm value for growth firms because changes in internally generated intangible assets and growth options are not recognized in earnings. As a result, earnings of high growth firms are not transparent and high growth firms will have low *TRANS*. However, growth is known to be associated with cost of capital regardless of whether earnings of high growth firms lack transparency. As a result, detecting a relation between *TRANS* and cost of capital could be attributable to earnings transparency or growth because variation in *TRANS* is likely correlated with intertemporal changes and cross-sectional differences in growth. Thus, as explained in Section 4.2, our tests relating *TRANS* to cost of capital include controls for known risk factors, i.e., the Fama-French and momentum factors, that likely are associated with these firm fundamentals. In addition, Section 6.4 reports that our inferences are unaffected by inclusion of an explicit control for growth.

[11] Ideally, we would like to construct a firm- and year-specific measure of earnings transparency. To construct a firm-specific measure, one could estimate a time-series regression for each firm. However, such an approach does not permit intertemporal variation in earnings transparency. To construct a year-specific measure, one could estimate a separate cross-sectional regression for each year. However, such an approach does not permit cross-sectional variation in earnings transparency. To obtain an estimate of a firm's earnings transparency, it is necessary to group firm-year observations in some way. We use annual cross-sectional estimation and our grouping procedures to permit cross-sectional and intertemporal variation in earnings transparency within the constraints imposed by empirical estimation.

[12] Forming portfolios based on residuals from the industry regressions does not effectively group firms *ex ante* according to the magnitude of their returns. First, although for our sample the untabulated cross-industry mean correlation between returns and residuals from the annual industry returns-earnings regressions is 92%, the untabulated mean cross-portfolio correlation from the annual portfolio regressions is only 54%. Second, untabulated findings from regressions based on portfolios explicitly ranked on returns reveal little explanatory power; the mean (across 27 years) adjusted R^2 is only 4%. However, consistent with our predictions, grouping firms based on industry residuals groups firms with common risk characteristics as indicated by untabulated mean *ex post* annual raw returns that increase monotonically across portfolios.

4.2. Earnings transparency, subsequent excess returns, and portfolio mean returns

We test for a relation between *TRANS* and cost of capital using excess and portfolio mean subsequent returns. Such tests are commonly employed in the finance literature to determine whether posited risk factors are associated with cost of capital by determining whether such factors explain subsequent returns incremental to the Fama-French and momentum factors (e.g., Fama and French, 1993; Mohanram and Rajgopal, 2009; Konchitchki, 2011). The motivation for these tests is that firm risk is more complex than is captured by the projection of returns on the Fama-French and momentum factor returns. Evidence that a posited risk factor incrementally explains subsequent returns is viewed as evidence consistent with the risk factor reflecting dimensions of cost of capital not captured by the Fama-French and momentum factors.

To test for a relation between earnings transparency and subsequent excess returns, we regress on *TRANS* the firm's subsequent return in excess of the firm's predicted return based on the Fama-French and momentum factors. In particular, we estimate the following equation:

$$FFRET_{i,t+1} = \gamma_0 + \gamma_1 TRANS_{i,t} + \gamma_2 DBTA_{i,t+1} + \eta_{i,t+1}, \quad (2)$$

where the subscripts i and t denote firm and year.

The dependent variable, *FFRET*, is an annualized excess return computed using compounded monthly returns. In particular, *FFRET* for month m is the firm's realized month m return in excess of the risk-free rate minus the firm's predicted return based on the Fama-French and momentum factor betas estimated using Eq. (A5) in Appendix A, each multiplied by the month m realized factor returns. Thus, *FFRET* is the firm's realized return minus its expected return, conditional on the realized factor returns, assuming the firm's factor betas do not change during year $t+1$. To mitigate the effects of error in estimating the betas, we treat as missing observations for which *FFRET* or the monthly compounded risk-free rate adjusted annual return minus the predicted monthly compounded annual return from Eq. (A5) is less than -1.[13] If greater earnings transparency is associated with lower cost of capital, we should observe a negative relation between *TRANS* and subsequent excess returns. Thus, we predict γ_1 is negative.[14]

We include *DBTA*, the ratio of long-term debt to total assets, in Eq. (2) to avoid bias in the coefficient on *TRANS* resulting from omission of *DBTA* if leverage is related to cost of capital. However, we make no prediction for the sign of its coefficient, γ_2.[15] We estimate Eq. (2) pooling observations cross-sectionally and over time, and by year. For the pooled regression, we base tests statistics on residuals clustered by firm and including year fixed effects (Petersen, 2009). For the by-year regressions, following Fama and MacBeth (1973), we base test statistics on the mean and standard deviation of the coefficients.[16]

To test for a relation between earnings transparency and portfolio mean returns, we first sort firms into one of ten portfolios based on *TRANS* in month $m-1$. Firms with the highest (lowest) *TRANS* are placed into portfolio ten (one). Then, we estimate a regression, by portfolio, i.e., $p = 1,\ldots,10$, of the value-weighted month m portfolio return, $R_{p,m}$, on the month m Fama-French and momentum factors:[17]

$$R_{p,m} - R_{f,m} = \alpha_p + \beta_{RMRF,p}(R_{M,m} - R_{f,m}) + \beta_{SMB,p} SMB_m + \beta_{HML,p} HML_m + \beta_{MOM,p} MOM_m + \varepsilon_{p,m}. \quad (3)$$

α_p is portfolio p's mean realized return in excess of the risk-free rate conditional on the realized factor returns, permitting portfolio p's factor betas to be estimated contemporaneously with α_p. If greater earnings transparency is associated with lower cost of capital incremental to the Fama-French and momentum factors, we should observe a negative relation between *TRANS* and the portfolio alphas (Fama and French, 1993). Thus, we predict α_{10} is less than α_1. Because the residuals likely are correlated across the ten portfolio regressions, we estimate the portfolio regressions using seemingly unrelated regression (Zellner, 1962).[18] An advantage of conducting portfolio mean returns tests is that the estimation procedure permits factor betas, i.e., risk, to be estimated contemporaneously with returns.

By design, the factor betas in the portfolio mean returns tests reflect average risk over the estimation period. That is, the sensitivity of portfolio mean returns for each of the ten *TRANS*-based portfolios is assumed to be the same over the estimation period. This assumption differs from that associated with the excess returns tests, in which factor betas for each firm are estimated over a shorter period—60 months—but are predetermined when estimating excess returns. Because the tests rest on different assumptions regarding factor betas, finding consistent results for both tests

[13] These restrictions eliminate from the sample 323 firm-year observations.

[14] Although use of subsequent excess returns to test for associations with cost of capital is common in empirical finance (e.g., Fama and French, 1997), doing so requires several assumptions, including rational expectations and stationarity of factor betas. If betas are not stationary, subsequent excess returns can differ from zero because of changes in factor betas. As in prior research, we assume that any such changes only add noise to our tests. Subsequent excess returns also can differ from zero because of new information and, thus, such tests can lack power and be biased if the new information is correlated with *TRANS*. In Section 6.4, we report results from specifications of Eq. (2) that include controls for new information.

[15] We also estimated Eq. (2) omitting *DBTA*. Inferences relating to *TRANS* are unaffected.

[16] The Fama-MacBeth procedure is unaffected by cross-sectional correlation of residuals. Following Fama and French (1998), we do not attempt to adjust the by-year estimations for correlation of residuals across years because it is unlikely that excess returns, and thus residuals, are serially correlated.

[17] Untabulated findings relating to equal-weighted portfolio returns result in similar inferences.

[18] Although any remaining correlation between residuals for portfolios 1 and 10 could affect inferences from the test of whether α_{10} is less than α_1, untabulated Pearson and Spearman correlations are insignificant.

makes it less likely that our inferences are affected by changes in risk associated with the Fama-French and momentum factors.

To provide additional insights into the relation between earnings transparency and cost of capital, we also test whether the betas estimated using Eq. (3) vary systematically across the *TRANS* portfolios. Determining whether and which betas vary systematically reveals the factors with which *TRANS* is correlated. However, regardless of the pattern of the betas, finding that the portfolio alphas vary across *TRANS* portfolios indicates that earnings transparency reflects dimensions of cost of capital that the Fama-French and momentum factors do not.

4.3. Earnings transparency and expected cost of capital

We next test whether *TRANS* is negatively related to an estimate of expected cost of capital based on the Fama-French and momentum four-factor model. Finding such a relation indicates that earnings transparency and a combination of the factors reflect common information. The Fama-French model is an empirical factor-generating model and does not identify explicitly which economic risks underlie the factors. Several studies attempt to identify these risks (e.g., Lettau and Ludvigson, 2001; Petkova, 2006). Although these studies show that the factor returns appear to reflect empirically dimensions of risk identified by asset pricing models, it remains an open question what dimensions of risk the factors represent. Thus, it is possible that the factor returns reflect risk arising from information asymmetry (Hughes et al., 2007; Lambert et al., 2007).

We test whether greater earnings transparency is associated with lower expected cost of capital by estimating the following equation:

$$ECC_{i,t} = \gamma_0 + \gamma_1 TRANS_{i,t} + \gamma_2 DBTA_{i,t} + \gamma_3 MVE_{i,t} + \gamma_4 BM_{i,t} + \gamma_5 Beta_{i,t} + \gamma_6 FFMom_{i,t} + \eta_{i,t}, \tag{4}$$

where $ECC_{i,t}$ is firm *i*'s expected cost of capital for year $t+1$, based on information available as of the end of year *t*.[19] If greater earnings transparency is associated with lower expected cost of capital as measured by the four-factor model, we should observe a negative relation between *TRANS* and *ECC*. Thus, we predict γ_1 is negative.

As Section A.2 of Appendix A explains, to obtain an estimate of expected cost of capital, we use the four-factor model, with time-varying factor loadings, risk-free rates, and risk premia (Ang and Liu, 2004; Ibbotson Associates, 2005; Massa et al., 2005). As with Eq. (2), we include *DBTA* in Eq. (4) to avoid bias in the coefficient on *TRANS* that could result from omission of *DBTA*.[20]

To provide evidence on the extent to which any correlation between *TRANS* and *ECC* is attributable to fundamental risk characteristics identified in prior research, we estimate two versions of Eq. (4), one that excludes these characteristics, and one that includes them. The fundamental characteristics are *MVE*, the natural logarithm of market value of equity; *BM*, the equity book-to-market ratio; *Beta*, the CAPM beta; and *FFMom*, return momentum as implemented on the Fama and French website, i.e., return over the ten months that end two months prior to fiscal year-end. Based on prior research, we predict γ_3 and γ_4 are negative, and γ_5 and γ_6 are positive.

As with Eq. (2), we estimate Eq. (4) pooling observations cross-sectionally and over time, and by year. For the pooled regression, we base tests statistics on residuals clustered by firm and year (Gow et al., 2010). For the by-year regressions, we base test statistics on the mean and standard deviation of the coefficients obtained from estimation of a seemingly unrelated regression system of equations. We specify Eq. (4) with expected cost of capital as a function of earnings transparency, and not vice versa. This is because although expected cost of capital can affect a firm's future financial statement policy decisions and hence future earnings transparency, *TRANS* cannot be a function of expected cost of capital because a firm's current earnings transparency, *TRANS*, is known at the time investors assess the expected risk premium for its stock.

Finding a negative relation between *TRANS* and *ECC* is evidence that *TRANS* captures dimensions of risk reflected in the Fama-French and momentum factors. If so, γ_1 will be negative. If not, γ_1 will be insignificantly different from zero.

5. Sample and descriptive statistics

Our tests are based on a sample of US firms and 27 sample years, 1974–2000. Because construction of *TRANS* requires earnings lagged one year and *FFRET* and *ECC* require return data for 60 prior months, we use some data for years preceding 1974. To facilitate comparison of results, we restrict the sample period to be the same for all of our analyses. The final sample comprises 51,612 firm-year observations for 6,237 firms and reflects the data requirements described below.

To construct *TRANS* using Eqs. (A2) and (A3) in Appendix A, Section A.1, we obtain data from the CRSP Monthly Stock File and the Compustat Industrial Annual databases. To mitigate the effects of outliers, following Easton and Harris (1991) we treat as missing observations for which any of the earnings variables, E_t/P_{t-1}, E_{t-1}/P_{t-1}, or $\Delta E_t/P_{t-1}$, is not between $+1.5$ and -1.5. We also treat as missing observations for which annual return, *RET*, is in the extreme top and bottom one percentile (Kothari and Zimmerman, 1995; Collins et al., 1997; Fama and French, 1998; Barth et al., 1999), and observations with negative equity book value to avoid the ratio of long-term debt to total assets from exceeding 1. We also

[19] For expositional convenience, we use the same notation for coefficients and error terms in Eqs. (2) and (4). In all likelihood they differ.
[20] We also estimated Eq. (4) omitting *DBTA*. Inferences relating to *TRANS* are unaffected.

restrict the sample to observations with total assets and total revenue in excess of $10 million, and share price in excess of $1. We use the industry classifications in Barth et al. (1998). If the industry component of *TRANS*, *TRANSI*, is negative in year *t*, we set it to zero because negative explanatory power is not economically meaningful. To construct *FFRET* and *ECC*, we obtain monthly returns from CRSP and the factor returns from the Fama-French database. We winsorize *ECC* to be between 0.0 and 0.5 because it is unlikely that any firm has a negative expected cost of capital or one in excess of 50%.[21] *DBTA* is constructed using data from the Compustat Industrial Annual database.

Table 1 presents descriptive statistics for the variables used in our estimating equations. Panel A presents overall distributional statistics combining all industries and years, Panel B presents distributional statistics for each industry, and Panel C presents Pearson and Spearman correlations. Panel A reveals *TRANS* averages 42% and ranges from 3% to 143%. The industry statistics in Panel B indicate that this variation is attributable to both industry and industry-neutral differences. For example, mean *TRANSI* (excluding Other) ranges from 9% for computers, insurance and real estate, pharmaceuticals, services, and transportation to 17% for food. Panel A also indicates that expected cost of capital, *ECC*, also varies considerably, with a mean of 0.16 and a standard deviation of 0.12.

Panels A and B indicate that the industry component of *TRANS*, *TRANSI*, is, on average, substantially smaller than the industry-neutral component, *TRANSIN*. For the full sample, mean *TRANSI* is 11%, which is higher than the untabulated mean of 10% from annual regressions pooling observations without partitioning by industry. Strikingly, mean *TRANSIN* is 31%, which indicates that partitioning firm-year observations by the extent to which the industry specification fails to explain returns substantially improves the explanatory power of earnings and change in earnings. The means of both *TRANSI* and *TRANSIN* are representative for firms in all 15 industries.

Table 1, Panel C, indicates that *FFRET* is significantly negatively correlated with *TRANS* based on the Pearson but not the Spearman correlation.[22] Similarly, the components of *TRANS*, *TRANSI* and *TRANSIN*, are significantly negatively correlated with *FFRET* based on the Pearson but not the Spearman correlation. *ECC* is significantly negatively correlated with *TRANS* and with each of its components. However, we test our predictions using the multivariate regression Eqs. (2), (3), and (4). Table 1, Panel C, also indicates that *ECC* and *FFRET* are negatively correlated. *ECC* and *FFRET* need not be positively correlated because *ECC* reflects dimensions of cost of capital captured by the Fama-French and momentum factors, and *FFRET* reflects dimensions of cost of capital not captured by these factors.[23] Panel C also indicates that *DBTA* is positively correlated with *ECC* and negatively correlated with *FFRET*. These correlations are consistent with *ECC*, but not *FFRET*, reflecting financial risk as reflected in *DBTA*.

As an external validity check on *TRANS* as a proxy for earnings transparency, we calculate correlations between it and five disclosure/transparency measures used in prior research. These are AIMR disclosure indices (e.g., Botosan, 1997) and four S&P Ranking indices (Bailey et al., 2006).[24] Untabulated findings indicate that Pearson (Spearman) correlations range from 0.18 to 0.32 (0.16 to 0.33), all of which differ significantly from zero.[25] In addition, untabulated findings indicate that each of these proxies is significantly positively correlated with *TRANSI* and *TRANSIN*.

In addition, the economic intuition supporting a negative relation between *TRANS* and cost of capital depends on there being a negative association between *TRANS* and information asymmetry. Thus, we also calculate correlations between *TRANS* and five measures used in prior research reflecting information asymmetry: bid-ask spread (Brennan and Subrahmanyam, 1996), arbitrage risk (Mendenhall, 2004), and accrual quality and two measures related to accrual quality, the standard deviation of operating cash flows and the proportion of loss years in the prior ten years (Dechow and Dichev, 2002). We also use factor analysis to obtain a sixth information asymmetry measure based on the common variation in the individual information asymmetry measures. Untabulated findings support a negative association between *TRANS* and information asymmetry: Spearman (Pearson) correlations are significantly negative for all six measures, and range from -0.20 (-0.18) for the information asymmetry factor to -0.08 (-0.08) for the standard deviation of operating cash flows.[26]

Table 2, Panels A and B, presents summary statistics from estimating Eqs. (A2) and (A3) in Appendix A, which we use to calculate *TRANS*. All statistics are based on 27 annual regressions. Panel A presents results for the industry regressions used

[21] We set to zero fewer than 10% of the *TRANSI* observations. We set to zero fewer than 12%, and set to 0.5 fewer than 5%, of the *ECC* observations. Inferences from untabulated regressions in which we permit *TRANSI* to be negative and *ECC* to be negative or greater than 0.5 are identical to those from the tabulated findings.

[22] Throughout we use a five percent significance level under a one-sided alternative when we have a signed prediction and under a two-sided alternative otherwise.

[23] *FFRET* also reflects differences between realized and expected returns arising from new information. See Section 6.4.

[24] The four indices are: (1) the S&P Composite Ranking of ownership structure and investor rights, financial transparency and information disclosure, and board and management structure and processes; (2) the financial transparency and information disclosure sub-ranking; (3) the S&P Composite Ranking; and (4) the financial transparency and information disclosure sub-ranking. (1) and (2) are based on information in annual reports, 10-Ks, and proxy statements; (3) and (4) are based on information in annual reports.

[25] Sample sizes used to compute the correlations are limited because of the availability of these alternative proxies. For the AIMR correlations, there are 3,694 firm-year observations. We have 367 firms with S&P indices, which do not vary by year. Therefore, to correlate the S&P indices with *TRANS*, we compute the average *TRANS* for the 367 firms with S&P indices and correlate that average with the S&P index.

[26] Because *TRANS* and cost of capital reflect a common set of economic fundamentals, we also correlate the information asymmetry measures with residuals from a regression of *TRANS* on the fundamentals we control for in Eqs. (2), (3), and (4)—leverage, size, the equity book-to-market ratio, beta, and momentum—and residuals from a regression of *TRANS* on these fundamentals plus analysts' growth forecasts that we control for in Section 6.4.2. Untabulated findings reveal significant negative associations between these two residual *TRANS* measures and all the information asymmetry measures.

Table 1
Descriptive statistics.

Panel A: based on observations pooled across years and industries (N =51,612)

	Mean	Median	Std.	Max	Min
TRANS	0.42	0.41	0.18	1.43	0.03
TRANSI	0.11	0.10	0.09	0.88	0.00
TRANSIN	0.31	0.31	0.14	0.63	0.03
FFRET	0.02	−0.03	0.41	14.54	−0.92
RET	0.19	0.13	0.49	13.43	−0.94
E_t/P_{t-1}	0.09	0.09	0.14	1.50	−1.48
$\Delta E_t/P_{t-1}$	0.01	0.01	0.14	1.49	−1.43
DBTA	0.18	0.16	0.16	0.97	0.00
ECC	0.16	0.15	0.12	0.50	0.00

Panel B: across-year means and standard deviations within each industry

	TRANS		*TRANSI*		*TRANSIN*		*FFRET*		*DBTA*		*ECC*		
	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Nobs
Chemicals	0.48	0.21	0.16	0.15	0.32	0.141	0.00	0.32	0.18	0.12	0.15	0.11	1,697
Computers	0.38	0.18	0.09	0.08	0.29	0.138	0.09	0.63	0.12	0.13	0.16	0.14	3,471
Durable manufacturers	0.42	0.17	0.11	0.05	0.32	0.140	0.00	0.40	0.16	0.13	0.16	0.13	13,518
Extractive industries	0.41	0.17	0.10	0.08	0.32	0.140	0.00	0.37	0.23	0.16	0.16	0.11	2,111
Financial institutions	0.40	0.17	0.11	0.07	0.29	0.133	0.03	0.27	0.07	0.10	0.18	0.10	6,826
Food	0.49	0.23	0.17	0.17	0.32	0.140	0.06	0.45	0.19	0.14	0.14	0.10	1,633
Insurance, real estate	0.38	0.19	0.09	0.11	0.29	0.138	0.01	0.35	0.35	0.23	0.17	0.12	1,374
Mining, construction	0.43	0.20	0.11	0.11	0.31	0.141	−0.03	0.42	0.20	0.16	0.18	0.13	1,255
Pharmaceuticals	0.38	0.21	0.09	0.13	0.29	0.142	0.19	1.03	0.13	0.14	0.14	0.11	1,050
Retail	0.42	0.17	0.11	0.06	0.31	0.138	0.02	0.41	0.20	0.14	0.16	0.12	5,179
services	0.40	0.16	0.09	0.07	0.31	0.137	0.04	0.45	0.22	0.20	0.17	0.13	2,790
Textiles, printing, publishing	0.46	0.18	0.14	0.08	0.32	0.138	−0.01	0.32	0.19	0.14	0.17	0.12	4,169
Transportation	0.40	0.18	0.09	0.08	0.32	0.141	0.01	0.33	0.27	0.17	0.17	0.11	2,166
Utilities	0.43	0.19	0.11	0.09	0.32	0.137	0.01	0.20	0.33	0.09	0.14	0.07	4,239
Other	0.62	0.31	0.32	0.27	0.30	0.140	0.01	0.31	0.19	0.13	0.19	0.11	134
Total nobs													51,612

Panel C: correlations, pooling observations across years and industries. Pearson (Spearman) correlations below (above) diagonal.

	TRANS	*TRANSI*	*TRANSIN*	*FFRET*	*DBTA*	*ECC*
TRANS	1.000	0.624	0.902	0.006	0.037	−0.110
TRANSI	0.673	1.000	0.276	0.015	0.003	−0.043
TRANSIN	0.888	0.257	1.000	0.002	0.038	−0.108
FFRET	−0.038	−0.022	−0.036	1.000	−0.057	−0.042
DBTA	0.018	0.002	0.023	−0.059	1.000	0.027
ECC	−0.121	−0.059	−0.121	−0.038	0.026	1.000

TRANS, earnings transparency, is the sum of the industry component, *TRANSI*, and the industry-neutral component, *TRANSIN*. *TRANSI* (*TRANSIN*) is the adjusted R^2 from annual regressions of returns, *RET*, for year *t* on earnings before discontinued operations and extraordinary items, deflated by lagged price, E_t/P_{t-1}, and change in earnings, deflated by lagged price, $\Delta E_t/P_{t-1}$, by industry as listed in Panel B (by portfolio based on the quartile of the residual from the industry regressions). *FFRET* is an annualized excess return computed using compounded monthly returns. Excess return is the firm's raw return in excess of the risk-free rate minus the firm's predicted return based on the Fama-French and momentum factor-mimicking portfolios, i.e., excess market return, size, book-to-market, and momentum. All returns begin three months subsequent to the firm's fiscal year end. *ECC* is expected cost of capital estimated based on the Fama-French and momentum factors. *DBTA* is the ratio of long-term debt to total assets. All correlations in Panel C are significantly different from zero, except for the Spearman correlation between *TRANS* and its components and *FFRET*. Sample of US firms, 1974−2000.

to calculate *TRANSI* and Panel B presents results for the portfolio regressions used to calculate *TRANSIN*. Table 2, Panel A, reveals that, on average, the R^2 from the industry regressions, which is *TRANSI*, is at least 9%, and is somewhat higher than that found in prior research (e.g., Easton and Harris, 1991).[27] There is considerable cross-industry variation and cross-year variation within each industry. The coefficients on earnings and change in earnings, E/P and $\Delta E/P$, also exhibit considerable cross-industry variation and cross-year variation within each industry. However, the E/P ($\Delta E/P$) coefficient mean *t*-statistics indicate that it is significantly positive for 6 (6) industries.

Table 2, Panel B, reveals that mean R^2 from the portfolio regressions, which is mean *TRANSIN*, is substantially higher than mean R^2 from the industry regressions and those in prior research. *TRANSIN* ranges from 17% to 42%. This range

[27] The sample size in Table 2, Panels A and B, exceeds that of Table 1, Panel A, because we estimate Eqs. (A2) and (A3) with all available firm-year observations. Construction of *FFRET* and missing data result in a smaller sample size for Eqs. (2) and (4).

Table 2
Summary statistics from regressions of annual returns on earnings and change in earnings. Means and standard deviations are across years.

Panel A: estimated by industry by year. $RET_{i,j,t} = \alpha_0^I + \alpha_1^I E_{i,j,t}/P_{i,j,t-1} + \alpha_2^I \Delta E_{i,j,t}/P_{i,j,t-1} + \varepsilon_{i,j,t}$

	Intercept				E_t/P_{t-1}				$\Delta E_t/P_{t-1}$						
	Coefficient		t-statistic		Coefficient		t-statistic		Coefficient		t-statistic		Adj. R^2 = *TRANSI*		Mean
Industry	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Nobs
Chemicals	0.12	0.15	1.96	3.02	0.54	1.07	1.02	1.87	1.09	1.53	1.91	1.94	0.16	0.16	69
Computers	0.22	0.39	2.98	4.49	0.53	0.80	1.57	1.62	0.80	1.10	1.98	1.49	0.11	0.11	149
Durable manufacturers	0.14	0.20	5.79	8.63	0.43	0.41	3.97	2.71	0.46	0.29	3.48	1.55	0.11	0.05	562
Extractive industries	0.16	0.30	2.05	7.12	0.20	0.65	1.00	1.96	0.58	0.78	1.39	1.75	0.10	0.08	89
Financial institutions	0.11	0.24	4.23	8.91	0.59	0.51	2.80	2.13	0.37	0.47	1.87	2.03	0.13	0.14	282
Food	0.11	0.13	1.62	2.04	0.84	0.85	1.81	1.67	0.89	1.18	1.56	1.65	0.17	0.18	67
Insurance, real estate	0.13	0.18	2.18	3.23	0.43	0.55	1.30	1.65	0.26	0.58	0.80	1.40	0.12	0.15	60
Mining, construction	0.10	0.25	0.85	3.37	0.48	0.64	1.18	1.41	0.32	0.54	0.90	1.37	0.12	0.11	54
Pharmaceuticals	0.20	0.31	1.92	2.71	0.56	1.31	0.61	1.25	1.26	2.13	0.97	1.39	0.11	0.16	45
Retail	0.12	0.17	3.39	4.09	0.63	0.46	2.93	1.88	0.33	0.36	1.59	1.75	0.12	0.06	219
Services	0.18	0.18	3.52	2.98	0.42	0.41	1.52	1.48	0.63	0.51	1.98	1.32	0.10	0.08	121
Textiles, printing, publishing	0.11	0.19	2.83	5.22	0.63	0.40	2.74	1.66	0.44	0.56	1.97	1.99	0.14	0.08	171
Transportation	0.16	0.19	2.99	3.63	0.33	0.42	1.24	1.32	0.42	0.62	1.26	1.49	0.09	0.08	91
Utilities	0.10	0.14	3.09	4.65	0.42	0.54	1.90	2.38	0.53	0.84	1.60	2.50	0.11	0.10	166
Other	0.08	0.15	0.97	1.33	1.00	1.08	1.19	1.23	0.35	2.02	0.46	1.48	0.30	0.26	7
Mean	0.14	0.21	2.69	4.36	0.54	0.67	1.79	1.75	0.58	0.90	1.58	1.67	0.13	0.12	144

Panel B: estimated by portfolio by year. Portfolio 1 (4) comprises firm-year observations with the most negative (positive) residuals from the industry regressions in Panel A.
$RET_{i,p,t} = \alpha_0^{IN} + \alpha_1^{IN} E_{i,p,t}/P_{i,p,t-1} + \alpha_2^{IN} \Delta E_{i,p,t}/P_{i,p,t-1} + \varepsilon_{i,p,t}$

	Intercept				E_t/P_{t-1}				$\Delta E_t/P_{t-1}$						
	Coefficient		t-statistic		Coefficient		t-statistic		Coefficient		t-statistic		Adj. R^2 = *TRANSIN*		Mean
Portfolio	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Nobs
1	−0.22	0.13	−30.25	20.03	0.48	0.24	9.55	4.03	0.30	0.19	6.54	4.25	0.30	0.08	533
2	0.00	0.15	−3.41	24.13	0.49	0.31	10.86	5.80	0.38	0.23	8.24	4.46	0.42	0.12	540
3	0.19	0.18	23.26	19.84	0.42	0.32	8.98	5.64	0.42	0.25	7.91	3.97	0.39	0.13	544
4	0.65	0.30	29.46	10.13	0.10	0.62	1.67	3.40	0.83	0.49	5.65	2.21	0.17	0.09	537
Mean	0.15	0.19	4.77	18.53	0.37	0.37	7.77	4.72	0.48	0.29	7.08	3.72	0.32	0.10	538

Dependent variable is *RET*, return for year t, E_t/P_{t-1} is earnings before discontinued operations and extraordinary items, deflated by lagged price, and Δ denotes annual change. i denotes firm, j denotes industry, and p denotes portfolio. Sample is described in Table 1.

reflects substantial cross-portfolio variation. This high variation in *TRANSIN* and hence *TRANS* is important because it helps to increase the power of our tests. The higher R^2s reflect the higher t-statistics for the E/P and $\Delta E/P$ coefficients relative to those obtained from the industry regressions. These findings indicate that grouping firms into portfolios based on the industry returns-earnings regression residuals successfully identifies firms with common returns-earnings relations.

Panels A and B also reveal how the industry and industry-neutral earnings and change in earnings coefficients differ. For example, for chemical firms, the mean coefficients on earnings and change in earnings, α_1^I and α_2^I, are 0.54 and 1.09. Regardless of industry, firms in portfolio 1 have mean earnings and change in earnings coefficients, α_1^{IN} and α_2^{IN}, of 0.48 and 0.30. The analogous coefficients for firms in portfolio 4 are 0.10 and 0.83. This illustrates that assuming all chemical firms have coefficients of 0.54 and 1.09 imposes a binding constraint, and therefore does not fully reflect the explanatory power of earnings and change in earnings for returns.

6. Results

6.1. Subsequent excess and portfolio mean returns

Table 3 presents summary statistics from estimating Eq. (2). The first column contains statistics based on pooling observations across industries and over time, and the next three columns contain statistics from by-year estimations. Table 3 reveals, as predicted, a significant negative relation between *TRANS* and subsequent excess returns. This finding indicates that earnings transparency is negatively associated with cost of capital.[28] The *TRANS* t-statistic from the pooled regression is -2.73, and the Fama-MacBeth t-statistic from the by-year estimations is -1.96. The *TRANS* coefficient is -0.04 for the pooled regression, and -0.05 on average across years. Evaluated at the mean of *TRANS*, 0.42, these findings are consistent with a cost of capital that is 1.7% and 2.1% lower than for a firm with *TRANS* equal to zero. The coefficient on leverage, *DBTA*, is significantly negative in both specifications.[29]

Table 4 presents findings from estimating Eq. (3) for each of the ten *TRANS* portfolios. Consistent with our predictions, the Fama-French alpha declines from 0.0065 in portfolio 1 to 0.0000 in portfolio 10. In addition, untabulated findings from a trend regression indicate that this decline is significant (t-statistic$=-1.95$). Consistent with this trend, as the final column indicates, the difference in alphas for portfolios 10 and 1, -0.0065, is significantly negative (χ^2-statistic$=9.96$). These findings indicate that firms with higher *TRANS* have lower Fama-French alphas and provide additional evidence that earnings transparency is negatively associated with cost of capital.

Table 4 also indicates that the *RMRF*, *SMB*, and *MOM* (*HML*) coefficients decrease (increase) from portfolio 1 to portfolio 10. For *RMRF*, the coefficient difference between portfolios 10 and 1, -0.0423, is insignificantly different from zero (χ^2-statistic$=0.77$). The corresponding difference for *MOM*, -0.2000, is significantly negative (χ^2-statistic$=17.57$). The decrease in the *RMRF* and *MOM* coefficients is consistent with predictions in Lambert et al. (2007). The related differences in *HML* and *SMB* coefficients between portfolios 10 and 1, 0.2574 and -0.1621, are significantly positive and negative (χ^2-statistics $=13.13$ and 6.92). These findings indicate that the Fama-French and momentum factors and earnings transparency reflect some common information about cost of capital. In particular, the Table 4 findings reveal that earnings transparency is negatively related to the *SMB* and *MOM* factors, and positively related to the *HML* factor. However, finding that the alphas vary across earnings transparency portfolios indicates that earnings transparency captures dimensions of cost of capital that the Fama-French and momentum factors do not.[30]

6.2. Expected cost of capital

Table 5 presents summary statistics analogous to those in Table 3, but relating to Eq. (4). The first (second) set of columns presents findings excluding (including) the fundamental risk characteristics. Regarding the specification that excludes the fundamental risk characteristics, Table 5 reveals, as predicted, a significant negative relation between earnings transparency, *TRANS*, and expected cost of capital, *ECC*. The *TRANS* t-statistic from the pooled regression is -2.18,

[28] Finding a negative relation between *TRANS* and *FFRET* could be attributable to periods of greater correspondence between prices and earnings being associated with lower cost of capital. That is, a negative relation could result from a temporal effect unrelated to earnings transparency. If this is the case, then one would observe a negative correlation between annual averages of *TRANS* and annual averages of *FFRET* as well as expected cost of capital, *ECC*. Untabulated findings based on annual means and medians reveal none of these correlations is significant.

[29] To assess whether the significance of *TRANS* is attributable to its industry component, industry-neutral component, or both, we also estimate Eq. (2) including *TRANSI* and *TRANSIN* in place of *TRANS*. Untabulated findings reveal that *TRANSIN* is negatively related to subsequent excess returns in both estimations, but not significantly so, and that *TRANSI* is significantly negatively related to subsequent excess returns in both the pooled and by-year estimations.

[30] Our findings indicate that earnings transparency is significantly negatively associated with subsequent returns, and therefore significantly negatively associated with cost of capital. These findings do not address whether earnings transparency is a priced risk factor. Untabulated findings from implementing a Fama and MacBeth (1973) approach fail to support an inference that earnings transparency is a priced risk factor. However, this finding is not surprising in light of prior research that implements similar tests and fails to support inferences that CAPM market beta, size, and momentum are priced risk factors (Jegadeesh and Titman, 1993; Jagannathan and Wang, 1996; Lettau and Ludvigson, 2001; Fama and French, 2002; Cochran, 2005; Petkova, 2006; Core et al., 2008).

Table 3
Summary statistics from regression of subsequent returns on earnings transparency and control variables.

$FFRET_{i,t+1} = \gamma_0 + \gamma_1 TRANS_{i,t} + \gamma_2 DBTA_{i,t+1} + \eta_{i,t+1}$

	Pred	Pooled	By year		
			Mean	Std.	FM-*t*
Intercept	?	0.17	0.06	0.08	
t-statistic		13.55	1.70	2.44	3.52
TRANS	–	−0.04	−0.05	0.12	
t-statistic		−2.73	−0.41	1.79	−1.96
DBTA	?	−0.15	−0.14	0.12	
t-statistic		−12.41	−2.47	2.02	−6.17
Adj. R^2		0.02	0.01	0.01	
Nobs		51,612	1,912		

FFRET is an annualized excess return computed using compounded monthly returns. Excess return is the firm's raw return in excess of the risk-free rate less the firm's predicted return based on the Fama-French and momentum factor-mimicking portfolios, i.e., excess market return, size, book-to-market, and momentum. All returns begin three months subsequent to the firm's fiscal year end. *TRANS*, earnings transparency, is the sum of the industry component, *TRANSI*, and the industry-neutral component, *TRANSIN*. *TRANSI* (*TRANSIN*) is the adjusted R^2 from annual regressions of returns for year t on earnings before discontinued operations and extraordinary items, deflated by lagged price, E_t/P_{t-1}, and change in earnings, deflated by lagged price, $\Delta E_t/P_{t-1}$, by industry as listed in Table 1, Panel B (by portfolio based on the quartile of the residual from the industry regressions). *DBTA* is the ratio of long-term debt to total assets. Statistics from the pooled estimation are based on pooling observations cross-sectionally and over time, and clustering residuals by firm and including year fixed effects. Statistics from the by-year estimations include mean coefficients and *t*-statistics, standard deviations of the coefficients and *t*-statistics, and Fama and MacBeth (1973) *t*-statistics. FM-*t* is the Fama-MacBeth (1973) *t*-statistic, i.e., the mean coefficient across years divided by the standard deviation of the mean. Sample is described in Table 1.

Table 4
Summary statistics from portfolio regressions of monthly value-weighted portfolio excess returns on contemporaneous Fama-French and momentum factors. Portfolios are formed based on earnings transparency.

$R_{p,m} - R_{f,m} = \alpha_p + \beta_{RMRF,p}(R_{M,m} - R_{f,m}) + \beta_{SMB,p} SMB_m + \beta_{HML,p} HML_m + \beta_{MOM,p} MOM_m + \varepsilon_{p,m}$

	Transparency portfolio (nobs=334)										
	1	2	3	4	5	6	7	8	9	10	10−1
α_p	0.0065	0.0038	−0.0014	−0.0031	0.0009	−0.0007	−0.0005	−0.0010	−0.0015	0.0000	−0.0065
t-statistic	4.46	1.91	−1.02	−2.27	0.55	−0.51	−0.36	−0.69	−1.12	0.00	
χ^2-statistic											9.96
β_{RMRF}	1.0202	1.0000	1.0397	1.0023	1.0403	0.9973	1.0469	0.9534	1.0094	0.9779	−0.0423
t-statistic	29.96	21.56	32.04	32.01	27.63	30.31	31.57	28.48	32.34	27.21	
χ^2-statistic											0.77
β_{SMB}	−0.0254	0.0155	0.0481	−0.0497	−0.0366	−0.2428	−0.0467	−0.1240	0.0107	−0.1875	−0.1621
t-statistic	−0.58	0.26	1.16	−1.24	−0.76	−5.77	−1.10	−2.90	0.27	−4.08	
χ^2-statistic											6.92
β_{HML}	0.0013	−0.0273	0.0697	0.1787	−0.0997	0.1228	0.4114	0.1284	0.3879	0.2587	0.2574
t-statistic	0.03	−0.40	1.46	3.87	−1.80	2.53	8.41	2.60	8.43	4.88	
χ^2-statistic											13.13
β_{MOM}	0.1277	0.2325	0.0170	−0.1990	−0.0443	−0.0671	−0.1109	−0.1840	−0.0931	−0.0722	−0.2000
t-statistic	3.79	5.06	0.53	−6.42	−1.19	−2.06	−3.38	−5.55	−3.01	−2.03	
χ^2-statistic											17.57
Adj. R^2	0.78	0.66	0.80	0.78	0.76	0.76	0.76	0.74	0.77	0.71	

In each month, *m*, we form ten portfolios based on *TRANS*; firms with the highest (lowest) *TRANS* are in portfolio ten (one). For each portfolio, using seemingly unrelated regression (Zellner, 1962), we regress the value-weighted monthly portfolio excess returns, $R_{p,m} - R_{f,m}$, on the three Fama-French factors, $(R_{M,m} - R_{f,m})$, SMB_m, and HML_m, and the momentum factor, MOM_m. Portfolio value weights are based on equity market value at the beginning of month *m*. *TRANS*, earnings transparency, is the sum of the industry component, *TRANSI*, and the industry-neutral component, *TRANSIN*. *TRANSI* (*TRANSIN*) is the adjusted R^2 from annual regressions of returns for year t on earnings before discontinued operations and extraordinary items, deflated by lagged price, E_t/P_{t-1}, and change in earnings, deflated by lagged price, $\Delta E_t/P_{t-1}$, by industry as listed in Table 1, Panel B (by portfolio based on the quartile of the residual from the industry regressions). Sample is described in Table 1.

and its Fama-MacBeth *t*-statistic is −3.04 for the by-year estimations. The *TRANS* coefficient equals −0.08 in the pooled regression and −0.03 on average across years. Evaluated at the mean of *TRANS* in Table 1, Panel A, 0.42, and using the pooled (average across years) coefficient, these findings are consistent with an expected cost of capital that is 3.36%

Table 5
Summary statistics from regressions of expected cost of capital on earnings transparency.

$ECC_{i,t} = \gamma_0 + \gamma_1 TRANS_{i,t} + \gamma_2 DBTA_{i,t} + \gamma_3 MVE_{i,t} + \gamma_4 BM_{i,t} + \gamma_5 Beta_{i,t} + \gamma_6 FFMom_{i,t} + \eta_{i,t}$

			By year				By year		
	Pred	Pooled	Mean	Std.	FM-*t*	Pooled	Mean	Std.	FM-*t*
Intercept	?	0.19	0.17	0.09		0.15	0.13	0.17	
t-statistic		11.35	21.34	8.93	9.59	4.79	10.77	12.09	4.15
TRANS	−	−0.08	−0.03	0.06		−0.07	−0.01	0.05	
t-statistic		−2.18	−1.45	3.10	−3.04	−2.06	−0.77	2.87	−1.68
DBTA	?	0.02	0.03	0.03		0.02	0.02	0.03	
t-statistic		1.67	2.10	2.44	4.33	2.05	2.05	2.84	4.02
MVE	−					−0.01	−0.01	0.02	
t-statistic						−1.69	−3.45	14.31	−2.09
BM	−					−0.00	−0.00	0.01	
t-statistic						−0.17	−0.12	4.02	−0.18
Beta	+					0.07	0.06	0.04	
t-statistic						8.70	16.50	11.10	8.59
FFMom	+					0.03	0.03	0.03	
t-statistic						2.20	4.48	4.74	5.22
Adj. R^2		0.02	0.01	0.01		0.12	0.26	0.11	
Nobs		51,612	1,912			51,612	1,912		

ECC is expected equity cost of capital for year $t+1$ estimated using the Fama-French and momentum factors, based on information available at the end of year *t*. *TRANS*, earnings transparency, is the sum of the industry component, *TRANSI*, and the industry-neutral component, *TRANSIN*. *TRANSI* (*TRANSIN*) is the adjusted R^2 from annual regressions of returns for year *t* on earnings before discontinued operations and extraordinary items, deflated by lagged price, E_t/P_{t-1}, and change in earnings, deflated by lagged price, $\Delta E_t/P_{t-1}$, by industry as listed in Table 1, Panel B (by portfolio based on the quartile of the residual from the industry regressions). *DBTA* is the ratio of long-term debt to total assets. *MVE* is the natural logarithm of market value of equity, *BM* is the equity book-to-market ratio, *Beta* is the CAPM beta, and *FFMom* is return momentum, i.e., following Fama and French, return over the ten months that end two months prior to fiscal year-end. Statistics from the pooled estimation are based on pooling observations cross-sectionally and over time, and clustering residuals by firm and year. Statistics from the by-year estimations include mean coefficients and *t*-statistics, standard deviations of the coefficients and *t*-statistics, and Fama and MacBeth (1973) *t*-statistics. FM-*t* is the Fama-MacBeth (1973) *t*-statistic, i.e., the mean coefficient across years divided by the standard deviation of the mean. Sample is described in Table 1.

(1.26%) lower than for a firm with *TRANS* equal to zero. The findings also reveal that the coefficient on *DBTA* is significantly positive in the pooled and by-year estimations.[31,32]

Regarding the specification that includes the fundamental risk characteristics, findings from the pooled and by-year Fama-MacBeth estimations reveal that three of the four coefficients on the fundamental risk variables are significantly different from zero with predicted signs. More importantly, the findings reveal that the coefficient on *TRANS* is significantly negative (*t*-statistics = −2.06 and −1.68 in the pooled and Fama-MacBeth estimations). The lower significance level for the *TRANS* coefficient when fundamental risk characteristics are included in the estimating equation suggests that *TRANS* is correlated with them. Thus, consistent with the findings in Table 4 relating to the portfolio betas, these findings indicate that the fundamental risk characteristics and earnings transparency reflect some common information about cost of capital. However, finding that the *TRANS* coefficient is significantly negative when the risk characteristics are included in the estimating equation indicates that *TRANS* reflects information associated with *ECC* incremental to that reflected in these characteristics.

6.3. *Francis et al. (2004)*

Using a value relevance measure that bears some resemblance to our earnings transparency measure, Francis et al. (2004) reports evidence of a negative relation between that study's relevance measure and subsequent returns incremental to the three Fama-French factors, and a proxy for expected cost of capital.[33] However, as we establish below, had Francis et al. (2004) reported correctly calculated test statistics, those statistics would have revealed an insignificant relation between that study's relevance measure and cost of capital.

[31] The R^2s in the first specification in Table 5 appear low relative to those in prior research, e.g., Francis et al. (2004). However, the specification includes only *TRANS* and *DBTA*; *ECC* comprises the Fama-French and momentum factors, weighted by their betas. Thus, the R^2 only reflects the incremental effect associated with the two explanatory variables. Typically, prior research, e.g., Francis et al. (2004), includes the factors as additional explanatory variables, thereby increasing the R^2, as does the other specification in Table 5. This same observation applies to Tables 3 and 4.

[32] To assess whether the significance of *TRANS* is attributable to its industry component, industry-neutral component, or both, we estimate Eq. (4) including *TRANSI* and *TRANSIN* in place of *TRANS*. Untabulated findings reveal *TRANSIN* (*TRANSI*) is significantly negatively (insignificantly) related to *ECC* in both estimations.

[33] We apply our sign convention when discussing the Francis et al. (2004) findings (see footnote 5).

The Francis et al. (2004) relevance measure is the adjusted R^2 from firm-by-firm time-series returns-earnings regressions using ten-year rolling windows. Francis et al. (2004) uses its relevance measure and a factor return constructed from the measure to test for an association between relevance and cost of capital. Using subsequent returns as a measure of cost of capital, Francis et al. (2004) forms factor-mimicking portfolios based on its relevance measure to obtain factor returns for inclusion as an additional factor in firm-by-firm time-series regressions of returns on the three Fama-French factors, and estimates each firm's return sensitivity to the three Fama-French and the relevance factor returns. Using expected cost of capital implied by a model that incorporates analysts' earnings forecasts, Francis et al. (2004) estimates annual cross-sectional regressions of expected cost of capital on its relevance measure.

Francis et al. (2004) bases its inference from its subsequent returns tests on aggregated statistics from time-series regressions, and assesses significance of the relevance factor by implementing the Fama and MacBeth (1973) aggregation procedure to the time-series regression estimates. When aggregating estimates in the subsequent return tests, Francis et al. (2004) fails to adjust the resulting test statistics for cross-sectional correlation of residuals that results from the firm-specific coefficient estimates being based on observations from overlapping time periods (Schipper and Thompson, 1983). Francis et al. (2004) bases its inference from its expected cost of capital tests on aggregated statistics from year-by-year cross-sectional regressions, and assesses significance of the relevance measure by implementing the Fama and MacBeth (1973) aggregation procedure to the regression estimates. When aggregating estimates in the expected cost of capital tests, Francis et al. (2004) fails to adjust the resulting test statistics for intertemporal correlation of residuals.

We use two approaches to establish that the inference in Francis et al. (2004) that its relevance measure is negatively related to cost of capital is unfounded. First, we implement tests relating to returns analogous to those in Francis et al. (2004), taking into account cross-sectional correlation of residuals. We test whether returns on a factor-mimicking portfolio based on the Francis et al. (2004) relevance factor are significantly positively related to returns incremental to the Fama-French factors in portfolio- and firm-level tests. Untabulated findings from both tests reveal that the Francis et al. (2004) relevance factor return beta is insignificant. The adjusted Fama and MacBeth (1973) *t*-statistics corresponding to the portfolio- and firm-level tests are -0.75 and 0.50.[34] These findings indicate that after controlling for cross-sectional correlation of residuals, the Francis et al. (2004) relevance factor return is not significantly associated with returns incremental to the three Fama-French factors.[35] We also test whether the Francis et al. (2004) relevance measure is significantly negatively related to that study's expected cost of capital proxy. Untabulated findings reveal that it is not (*t*-statistic$=$0.77).

Second, we implement our tests to determine whether the Francis et al. (2004) relevance measure is significantly negatively related to subsequent excess and portfolio mean returns, and expected cost of capital. Untabulated findings relating to Eq. (2) indicate that the relevance measure is not significantly negatively related to subsequent excess returns. The pooled regression *t*-statistic is 0.68, and the Fama-MacBeth *t*-statistic from the year-by-year estimations is -0.13. Untabulated findings relating to Eq. (3) indicate that the alphas for portfolios 1 and 10 are insignificantly different (χ^2-statistic$=$0.89). Untabulated findings relating to Eq. (4) indicate that the Francis et al. (2004) relevance measure is not significantly negatively related to our measure of expected cost of capital (*t*-statistics$=$0.55 and 0.84 in the pooled and year-by-year estimations).

The apparent similarity between the Francis et al. (2004) relevance measure and our earnings transparency measure raises the question of why there is a significant negative relation between cost of capital and our earnings transparency measure but not the Francis et al. (2004) measure. To begin, the apparent similarity is false. Untabulated Pearson and Spearman correlations between the Francis et al. (2004) relevance measure and *TRANS* are both -0.02, and insignificantly different from zero. This lack of correlation is not surprising because the Francis et al. (2004) relevance measure is based on ten years of past data. As a result, the measure reflects dated information and exhibits essentially no intertemporal variation. In contrast, we construct *TRANS* using current data and permit it to vary intertemporally.

6.4. Alternative specifications

We consider alternative specifications of Eqs. (2) and (4) to assess the robustness of our inferences about the relation between earnings transparency and subsequent excess returns and expected cost of capital. Findings from these alternative specifications do not alter the inferences we draw from our primary findings.

6.4.1. New information in subsequent returns

Subsequent excess returns can differ from expected returns because of new information or if the four-factor model does not fully control for expected return. As a result, subsequent excess returns tests can lack power and can be biased if the

[34] Inferences from both the portfolio- and firm-level tests regarding significance of the Francis et al. (2004) relevance factor are unaffected by including a momentum factor return.

[35] Ecker et al. (2006) extends Francis et al. (2004) by showing that the loadings on a factor return based on a measure of accruals quality are correlated with proxies for earnings quality, including the Francis et al. (2004) relevance measure. This raises the possibility that accruals quality and transparency could be correlated and, therefore, reflect similar information insofar as explaining cross-sectional variation in returns. However, untabulated findings reveal that the Pearson (Spearman) correlation between *TRANS* and the Ecker et al. (2006) accruals quality measure is significant and negative, -0.15 (-0.16). In addition, untabulated findings from estimating the portfolio- and firm-level regressions of excess returns on the returns to the Fama-French factors and the Ecker et al. (2006) accruals quality factor, using the same estimation approach as described above relating to Francis et al. (2004), reveal that the accruals quality factor return is insignificantly associated with returns incremental to the Fama-French factor returns. The adjusted Fama and MacBeth (1973) *t*-statistics corresponding to the portfolio- and firm-level tests are 0.16 and -0.52.

new information or an omitted risk factor is correlated with *TRANS* (Elton, 1999; Vuolteenaho, 2002; Easton and Monahan, 2005). In particular, new information can alter investors' expectations of future cash flow. We include two measures of information about expected future cash flow as additional variables in our subsequent excess returns tests: change in operating cash flow (Minton and Schrand, 1999) and an indicator variable for whether earnings is negative. Change in operating cash flow, ΔCFO, is the difference between year $t+1$ and year t operating cash flow, *CFO*, deflated by total assets at the end of year t, where *CFO* is the annual equivalent to the quarterly *CFO*.[36] We set the negative earnings indicator variable, *NEG*, equal to one if earnings in year $t+1$, i.e., E_{t+1}, is negative and zero otherwise. Regarding a potential omitted risk factor, we include the coefficient of variation in cash flow as a control for cash flow risk (Minton and Schrand, 1999). The coefficient of variation in cash flow, *CVCF*, is the coefficient of variation in a firm's quarterly operating cash flow over the six-year period preceding each sample year minus the median coefficient of variation in cash flow for firms in the same two-digit SIC code.

Table 6 reports findings from specifications of Eq. (2) supplemented with combinations of each of the additional variables, *NEG*, ΔCFO, and *CVCF*. For the sake of parsimony, we tabulate only coefficients and test statistics corresponding to *TRANS*. Although untabulated findings indicate that the coefficients on *NEG*, ΔCFO, and *CVCF* are often significantly different from zero, the key result presented in Panel A is that in all specifications the coefficient on *TRANS* is significantly negative in both the pooled and by-year estimations. These findings indicate that our inferences relating to *TRANS* from the findings in Table 3 are unaffected by inclusion of controls for new information about expected future cash flow and cash flow risk.

6.4.2. *Correlation between TRANS and growth*

Because earnings of high growth firms are more likely to omit information about changes in future revenues and expenses, high growth firms have lower earnings transparency and lower R^2s in the returns-earnings relation, i.e., lower values of *TRANS*. However, this omission also results in *TRANS* being correlated with a firm's investment profile, which could confound our inferences that earnings transparency is related to cost of capital. To the extent that high growth firms are riskier, they will have higher costs of capital. As a result, *TRANS* could be negatively related to cost of capital solely because of the negative correlation between *TRANS* and growth.[37] To the extent that the Fama-French and momentum factors reflect dimensions of growth (Lettau and Ludvigson, 2001; Petkova, 2006), Eqs. (2), (3), and (4) implicitly control for the effect of growth on cost of capital. Thus, our finding a significant relation between *TRANS* and cost of capital in these equations cannot be attributed to growth as reflected in these factors. However, because the Fama-French and momentum factors may not reflect fully all dimensions of growth, we also estimate Eqs. (2), (3), and (4) including analysts' long-term earnings growth forecasts as an explicit proxy for growth. Untabulated findings reveal that although the growth proxy's coefficient is significantly different from zero in some specifications, the *TRANS* coefficient remains significantly negative. Thus, our inferences regarding the relation between earnings transparency and cost of capital are unchanged when we include an explicit proxy for growth.[38]

6.4.3. *Correlation between TRANS and earnings response coefficients*

Earnings response coefficients (ERCs) are positively correlated with model explanatory power (Johnston, 1984; Collins and Kothari, 1989; Kothari, 2001). Because *TRANS* is the sum of R^2s from two returns-earnings regressions, a positive correlation between ERCs and the R^2s from our regressions is a potential confounding factor or alternative explanation for our finding a negative relation between *TRANS* and cost of capital. A higher ERC is consistent with a lower cost of capital (Collins and Kothari, 1989). Therefore, finding that higher *TRANS* is associated with lower cost of capital could be a result of a positive correlation between *TRANS* and ERCs. For our sample, ERCs and R^2s are positively correlated. For example, focusing on the ERC for earnings, the correlation between ERC and R^2 from the first-stage (second-stage) regression is 0.40 (0.52). The analogous correlation between *TRANS* and the ERC is 0.34 (0.49). To mitigate the possibility that the correlation between *TRANS* and ERCs affects our inferences, we estimate Eqs. (2), (3), and (4) alternatively including the average of the ERCs from the two stages, and the ERC from each stage. Untabulated findings relating to all three specifications of each equation reveal our inferences regarding the relation between *TRANS* and cost of capital are unchanged.

6.4.4. *Implied expected cost of capital*

Our proxy for expected cost of capital used in estimation of Eq. (4) is based on the four-factor model. Use of the model assumes that the four factors reflect all dimensions of risk. Our findings in Table 3 indicate that this assumption may not

[36] Quarterly *CFO* is sales minus the sum of cost of goods sold, selling, general, and administrative expenses, and the change in working capital. Working capital is current assets other than cash and short-term investments minus current liabilities, and is calculated as the sum of accounts receivable, inventory, and other current assets minus the sum of accounts payable, income taxes payable, and other current liabilities. Quarterly selling, general, and administrative expenses exclude one-quarter of annual research and development costs and advertising expenses when those data items are available.

[37] Although some prior studies suggest that growth is positively related to cost of capital, others suggest it is negatively correlated (e.g., Fama and French, 1992). See Zhang (2005) for further discussion.

[38] It is possible that using alternative growth proxies or specifications could result in different inferences.

Table 6
Summary statistics from alternative specifications of the regression of subsequent excess returns on earnings transparency.

Model 1 : $FFRET_{i,t+1} = \gamma_0 + \gamma_1 TRANS_{i,t} + \gamma_2 DBTA_{i,t+1} + \gamma_3 NEG_{i,t+1} + \eta_{i,t+1}$
Model 2 : $FFRET_{i,t+1} = \gamma_0 + \gamma_1 TRANS_{i,t} + \gamma_2 DBTA_{i,t+1} + \gamma_3 \Delta OCF_{i,t+1} + \eta_{i,t+1}$
Model 3 : $FFRET_{i,t+1} = \gamma_0 + \gamma_1 TRANS_{i,t} + \gamma_2 DBTA_{i,t+1} + \gamma_3 CVCF_{i,t+1} + \eta_{i,t+1}$
Model 4 : $FFRET_{i,t+1} = \gamma_0 + \gamma_1 TRANS_{i,t} + \gamma_2 DBTA_{i,t+1} + \gamma_3 NEG_{i,t+1} + \gamma_4 \Delta OCF_{i,t+1} + \eta_{i,t+1}$
Model 5 : $FFRET_{i,t+1} = \gamma_0 + \gamma_1 TRANS_{i,t} + \gamma_2 DBTA_{i,t+1} + \gamma_3 NEG_{i,t+1} + \gamma_4 CVCF_{i,t+1} + \eta_{i,t+1}$
Model 6 : $FFRET_{i,t+1} = \gamma_0 + \gamma_1 TRANS_{i,t} + \gamma_2 DBTA_{i,t+1} + \gamma_3 \Delta OCF_{i,t+1} + \gamma_4 CVCF_{i,t+1} + \eta_{i,t+1}$
Model 7 : $FFRET_{i,t+1} = \gamma_0 + \gamma_1 TRANS_{i,t} + \gamma_2 DBTA_{i,t+1} + \gamma_3 NEG_{i,t+1} + \gamma_4 \Delta OCF_{i,t+1} + \gamma_5 CVCF_{i,t+1} + \eta_{i,t+1}$

		Pooled			By Year			
	Pred	Coef.	R^2	Nobs	Mean Coef.	Std.	FM-*t*	Mean R^2
Model 1: *TRANS*	–	−0.04	0.04	51,612	−0.04	0.11		0.04
t-statistic		−2.83			−0.43	1.73	−2.04	
Model 2: *TRANS*	–	−0.06	0.03	33,875	−0.05	0.15		0.07
t-statistic		−3.29			−0.54	1.56	−1.80	
Model 3: *TRANS*	–	−0.07	0.02	33,967	−0.11	0.25		0.02
t-statistic		−3.53			−0.60	1.62	−2.35	
Model 4: *TRANS*	–	−0.06	0.05	33,875	−0.05	0.14		0.07
t-statistic		−3.49			−0.57	1.43	−7.70	
Model 5: *TRANS*	–	−0.07	0.04	33,967	−0.11	0.24		0.06
t-statistic		−3.71			−0.63	1.50	−7.92	
Model 6: *TRANS*	–	−0.06	0.03	33,875	−0.09	0.22		0.05
t-statistic		−3.29			−0.53	1.56	−2.24	
Model 7: *TRANS*	–	−0.06	0.05	33,875	−0.09	0.21		0.08
t-statistic		−3.49			−0.57	1.44	−2.29	

FFRET is an annualized excess return computed using compounded monthly returns. Excess return is the firm's raw return in excess of the risk-free rate less the firm's predicted return based on the Fama-French and momentum factor-mimicking portfolios, i.e., excess market return, size, book-to-market, and momentum. All returns begin three months subsequent to the firm's fiscal year end. *TRANS*, earnings transparency, is the sum of the industry component, *TRANSI*, and the industry-neutral component, *TRANSIN*. *TRANSI* (*TRANSIN*) is the adjusted R^2 from annual regressions of returns for year t on earnings before discontinued operations and extraordinary items, deflated by lagged price, E_t/P_{t-1}, and change in earnings, deflated by lagged price, $\Delta E_t/P_{t-1}$, by industry as listed in Table 1, Panel B (by portfolio based on the quartile of the residual from the industry regressions). *DBTA* is the ratio of long-term debt to total assets. *NEG* is an indicator variable that equals 1 if E_t is negative, and 0 otherwise. ΔOCF *is* annual change in realized operating cash flow, defined as the difference between one-year ahead and current year *OCF*, deflated by current year total assets. Current year *OCF* is the annual equivalent to the quarterly *OCF* defined in Minton and Schrand (1999). *CVCF* is the coefficient of variation in cash flow, defined following Minton and Schrand (1999) as the coefficient of variation in a firm's quarterly operating cash flow over the six-year period preceding each sample year. Statistics from the pooled estimation are based on pooling observations cross-sectionally and over time, and clustering residuals by firm and including year fixed effects. Statistics from the by-year estimations include mean coefficients and *t*-statistics, standard deviations of the coefficients and *t*-statistics, and Fama and MacBeth (1973) *t*-statistics. FM-*t* is the Fama-MacBeth (1973) *t*-statistic, i.e., the mean coefficient across years divided by the standard deviation of the mean. Sample is described in Table 1.

be warranted. An alternative approach is to use a measure of expected cost of capital implied by a model that incorporates analysts' earnings forecasts. Studies that adopt this approach, including Claus and Thomas (2001), Gebhardt et al. (2001), Gode and Mohanram (2003), and Easton (2004), develop somewhat different implied expected cost of capital measures. Therefore, to assess the robustness of our findings in Table 5, we estimate Eq. (4) using the mean of the several measures of implied expected cost of capital (Hail and Leuz, 2006; Dhaliwal et al., 2007; Barth et al., 2008). Also, because Gode and Mohanram (2008) and McInnis (2010) find that estimates of implied expected cost of capital reflect bias in analysts' forecasts, we use the procedure in Gode and Mohanram (2008) to correct the implied expected cost of capital measures for analysts' forecast bias. Untabulated findings reveal that *TRANS* is significantly negatively associated with the mean implied expected cost of capital measure, with a *t*-statistic of −2.33. Additional untabulated findings reveal that *TRANS* is significantly negatively associated with each of the four component measures.

7. Conclusion

This study examines whether firms with more transparent earnings enjoy a lower cost of capital. We base our measure of earnings transparency on the explanatory power of the returns-earnings relation, i.e., the extent to which earnings and change in earnings covary contemporaneously with returns.

We find that earnings transparency is significantly negatively associated with cost of capital by showing that our earnings transparency measure is negatively related to subsequent excess returns and differences in portfolio mean subsequent returns incremental to the three Fama-French and momentum factors. These findings indicate that earnings transparency captures dimensions of cost of capital that the factors do not. We also find a significant negative relation between our earnings transparency measure and an estimate of expected cost of capital based on the four-factor model.

This finding indicates that earnings transparency is systematically related to the Fama-French and momentum factors. However, we also find that earnings transparency reflects information associated with expected cost of capital incremental to that reflected in the fundamental risk characteristics underlying these factors. Inferences relating to the subsequent excess and portfolio mean returns and expected cost of capital tests are robust to inclusion of explicit controls for leverage, growth, and the magnitude of the earnings response coefficient in the returns-earnings relation. The subsequent excess and portfolio mean returns inferences are robust to including controls for changes in cash flow and cash flow risk. The expected cost of capital inferences are robust to using a measure of expected cost of capital implied by analysts' earnings forecasts. Taken together, our findings provide evidence that firms with more transparent earnings enjoy a lower cost of capital.

Appendix A

A.1. Calculation of earnings transparency proxy

Eq. (1), repeated here as Eq. (A1), expresses *TRANS* as the sum of two measures, *TRANSI* and *TRANSIN*:

$$TRANS_{i,t} \equiv TRANSI_{j,t} + TRANSIN_{p,t}. \tag{A1}$$

To calculate *TRANSI*, we estimate Eq. (A2):

$$RET_{i,j,t} = \alpha_0^I + \alpha_1^I E_{i,j,t}/P_{i,j,t-1} + \alpha_2^I \Delta E_{i,j,t}/P_{i,j,t-1} + \varepsilon_{i,j,t}. \tag{A2}$$

RET is annual return measured beginning three months after the firm's fiscal year end, E_t/P_{t-1} is earnings before extraordinary items and discontinued operations deflated by beginning of year price, and ΔE is change in earnings from year $t-1$ to year t.[39] We estimate this model for 27 years ($t=1974, \ldots, 2000$) and for 15 industries, provided there are at least 10 observations for that industry-year. This yields 396 separate industry components, $TRANSI_{j,t}$. This estimation procedure constrains the coefficients in Eq. (A2), α_0^I, α_1^I, and α_2^I, to be the same for firms within industry *j* in year *t*.

To calculate *TRANSIN*, we estimate Eq. (A3):

$$RET_{i,p,t} = \alpha_0^{IN} + \alpha_1^{IN} E_{i,p,t}/P_{i,p,t-1} + \alpha_2^{IN} \Delta E_{i,p,t}/P_{i,p,t-1} + \varepsilon_{i,p,t}. \tag{A3}$$

When estimating Eq. (A3), we place observations from each industry-year regression, i.e., Eq. (A2), into one of four portfolios based on the magnitude of their associated residuals from each annual regression for that industry.[40] We estimate Eq. (A3) by year, pooling observations in portfolio *p*, $p=1, \ldots, 4$. This permits the industry-neutral component of earnings transparency to vary over time. Because there are 27 years and 4 portfolios, we estimate 108 regressions, obtaining 108 industry-neutral components, $TRANSIN_{p,t}$. This estimation procedure does not constrain the coefficients in Eq. (A3), α_0^{IN}, α_1^{IN}, and α_2^{IN}, to be the same for firms within industry *j* in year *t*. Rather, it constrains firms within portfolio *p* to have the same coefficients in year *t*.

As an illustration, consider a hypothetical industry *j*, which has 100 observations per year. For each year, we rank the 100 residuals from 1 to 100 and place into portfolio 1 the 25 observations with the largest negative residuals, place into portfolio 2 the observations with the next largest 25 residuals, and so on, until each observation is assigned to a portfolio. We repeat this procedure for all 27 years and all 15 industries, so that portfolio 1 contains the quartile of observations with the largest negative residuals from each of the 15 industries in each year, portfolio 2 contains the quartile of observations with the next largest residuals from each of the 15 industries in each year, and so on. Thus, portfolios 1 and 4, which contain the observations with the largest negative and largest positive residuals from the annual industry regressions, comprise those firm-year observations for which the annual industry return regression model is least descriptive.

Selection of the optimal number of portfolios is an empirical matter reflecting a tradeoff between precision of estimation and forcing otherwise different groups of firms to have the same earnings transparency measure. For example, suppose instead of four portfolios we partitioned firms into eight portfolios, but firms in portfolios 1 and 2, 3 and 4, 5 and 6, and 7 and 8 have identical earnings transparency. This would result in a loss of estimation efficiency compared with partitioning firms into four portfolios, combining portfolios 1 and 2, 3 and 4, 5 and 6, and 7 and 8. In contrast, suppose instead eight portfolios capture differences in earnings transparency, then partitioning firms into four portfolios masks the cross-sectional earnings transparency differences.[41]

[39] Following Easton and Pae (2004), we also estimated versions of Eqs. (A2) and (A3) including year $t-1$ dividends and the effects of other comprehensive income. Untabulated findings indicate that none of our inferences is affected using this alternative specification.

[40] This procedure assumes that residuals of equal magnitude are equally informative about industry-neutral commonality regardless of the firm's industry regression standard error. To the extent that this procedure results in misclassifying firms across portfolios, our tests will be biased against finding an association between *TRANS* and cost of capital.

[41] Untabulated findings indicate that the significance of the *TRANS* coefficient in Eq. (2) is highest when we use four portfolios, although it is also significant for other numbers of portfolios.

A.2.Calculation of expected cost of capital proxy

We calculate our proxy for each firm's expected cost of capital for year $t+1$ as of year t, $ECC_{i,t}$, based on Eq. (A4):

$$ECC_{i,t}=\overline{R}_{f,t}+\hat{\beta}_{RMRF,i,t}\times\overline{(R_M-R_f)}_t+\hat{\beta}_{SMB,i,t}\times\overline{SMB}_t+\hat{\beta}_{HML,i,t}\times\overline{HML}_t+\hat{\beta}_{MOM,i,t}\times\overline{MOM}_t, \tag{A4}$$

where $\hat{\beta}_{RMRF,i,t}$,$\hat{\beta}_{SMB,i,t}$, $\hat{\beta}_{HML,i,t}$, and $\hat{\beta}_{MOM,i,t}$ are firm-specific coefficients estimated from Eq. (A5). $\overline{(R_M-R_f)}_t$, $\overline{SMB}_t$, $\overline{HML}_t$, and $\overline{MOM}_t$ are the expected annual Fama-French and momentum factor returns for year $t+1$. We estimate the expected annual factor returns by first calculating each factor's average monthly return over the 60 months prior to month m, and then compounding the resulting average monthly returns over the twelve months prior to the beginning of firm i's fiscal year.[42]

For each firm, we estimate the betas associated with the firm's return to each of the factors by estimating the following monthly time-series regression:

$$RET_{i,m}-R_{f,m}=\alpha_i+\beta_{RMRF,i}(R_{M,m}-R_{f,m})+\beta_{SMB,i}SMB_m+\beta_{HML,i}HML_m+\beta_{MOM,i}MOM_m+\varepsilon_{i,m}, \tag{A5}$$

where $RET_m-R_{f,m}$ is the firm's monthly return in excess of the risk-free rate, $R_{f,t}$. $R_{M,m}-R_{f,m}$ is the monthly return of the market portfolio in excess of the risk-free rate, HML_m and SMB_m are the monthly returns to the book-to-market and size factor mimicking portfolios as described in Fama and French (1993), and MOM_m is the monthly return to the momentum factor mimicking portfolio (Jegadeesh and Titman, 1993; Carhart, 1997). We estimate Eq. (A5) using the most recent 60 months returns prior to the beginning of firm i's fiscal year t. This results in estimated coefficients, $\hat{\beta}_{RMRF,i,t}$,$\hat{\beta}_{SMB,i,t}$, $\hat{\beta}_{HML,i,t}$, and $\hat{\beta}_{MOM,i,t}$ that are updated annually.

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A measurement approach to conservatism and earnings management

Pingyang Gao *

The University of Chicago Booth School of Business, United States

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ABSTRACT

This paper formalizes a two-step representation of accounting measurement and uses it to formalize a general rationale for conservatism as a measurement principle. A transaction's economic substance manifests itself in characteristics of the transaction, and an accounting rule is a mapping from transaction characteristics to an accounting report. Managers who have stakes in the accounting report are able to influence transaction characteristics. Such earnings management is ex post rational for managers but ex ante inefficient. To safeguard against such ex post opportunism, the optimal ex ante accounting rule is conservative in the sense that it requires more verification of the transaction characteristics favorable to managers. Thus, this rationale for conservatism is as general as the managers' ability and incentive to inflate transaction characteristics. By opening the black box of accounting measurement, the two-step representation also formalizes some classic accounting concepts, such as relevance, reliability, verifiability, verification, and accounting-motivated transactions.

1. Introduction

When facing uncertainty, accounting measurement guided by conservatism requires more verification to recognize gains than to recognize losses. The long and pervasive influence of conservatism on accounting practice is evident by even a casual inspection of accounting practice and has been systematically documented in empirical studies (see Watts, 2003a, 2003b for a review).

Despite the persistent and pervasive influence of conservatism, the *general* value of conservatism as a measurement principle remains controversial in the theoretical literature and policy discourse. The core of the controversy might be understood as follows. In this literature, accounting measurement is treated as a black box that emanates an accounting report with certain statistical properties. With this reduced-form representation, conservatism is *defined* as trading an increase in the false negative (type II) error for an equal amount of decrease in the false positive (type I) error in the accounting report. The evaluation of conservatism is then conveniently transformed to an evaluation of the economic consequences of the report's measurement errors. As a result, the theories arrive at the conclusion that conservatism is

* Tel.: +1 2035080945
E-mail addresses: researches.gao@gmail.com, pingyang.gao@chicagobooth.edu

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efficient if and only if the false negative error is less costly than the false positive error, a common thread underlying the results in many papers on conservatism (e.g, Gigler et al., 2009; Lu et al., 2011; Nan and Wen, 2011; Caskey and Hughes, 2012). In this framework, the generality of conservatism as a measurement principle is questionable to the extent that accounting reports are used in various settings in which the comparison of costs of measurement errors could go either direction. The controversy ensues.

Notwithstanding the empirical evidence, the lack of theoretical support for conservatism seems to be influencing standard setters both in the United States and around the world. Conservatism as a measurement principle was recently eliminated from the FASB and IASB's joint conceptual framework (FASB, 2010), which guides the making of future accounting standards. Given the enormous implications of the topic, Leuz (2001) has called for the reconciliation of this stark discrepancy between practice and theories, a theme echoed by Guay and Verrecchia (2006), Gigler et al. (2009), and Lambert (2010).

A careful examination of the discrepancy between theories and empirical works reveals the inadequacy of the reduced-form representation of accounting measurement. For example, one rationale for conservatism, discussed in most empirical works (e.g., Ball, 2001; Watts, 2003a; Kothari et al., 2010), views conservatism as a differential verification requirement and emphasizes managers' opportunistic influence on accounting measurement as the main justification, but neither feature shows up in the above framework that treats accounting measurement as a black box emanating an accounting report with certain statistical properties.

Opening the black box of accounting measurement invites a number of interesting questions. Conceptually, accounting measurement converts a firm's transactions and events into accounting reports by accounting rules, with the aim to capture the economic substance of the transactions. What is an accounting rule? How does an accounting rule relate the economic substance of a transaction to an accounting report? What are the major frictions in the process? What instruments does a rule designer control to influence the quality of an accounting report? What do we mean by a conservative accounting rule? As an institutional feature of accounting measurement, conservatism cannot be fully understood without answering these questions.

To answer these questions, I formalize a two-step representation of accounting measurement. This representation and its importance for understanding the design of accounting rules have long been noted in the classical accounting literatures (e.g., Ijiri, 1975; Watts and Zimmerman 1986; Ball, 1989; Leuz, 1998b). First, the state of nature, or the economic substance of a transaction, manifests itself in various characteristics of the transaction. Second, an accounting rule is defined as a mapping from transaction characteristics to an accounting report. While the goal of the rule is to measure the transaction's economic substance as accurately as possible, the design of the rule is subject to the restriction that it can only be written on transaction characteristics.

This restriction introduces a natural representation of two major frictions in accounting measurement. First, even in the absence of managers' influence, the correlation between a transaction's economic substance and its characteristics is likely to be imperfect. This correlation might be termed as a transaction characteristic's *relevance*. Second, firms could engage in activities to influence the characteristics of a transaction without improving its economic substance. These activities might be termed as *earnings management* and a transaction characteristic's vulnerability to earnings management could be interpreted as one measure of its *reliability*. Earnings management ranges from outright fabrication of evidence to the sophisticated accounting-motivated transactions such as off-balance-sheet financing activities. Such earnings management is ex post rational for managers but ex ante inefficient.

Facing these two frictions, the rule designer could use at least three instruments to influence the properties of the report. First, what transaction characteristics are admitted to the rule? Second, how much verification is required before the transaction characteristics are accepted? Finally, what is the evidence threshold above which an accounting treatment is accorded? While all the three instruments could be related to conservatism, I focus on the verification requirement. An accounting rule is conservative if it requires more verification of a positive transaction characteristic than of a negative one (e.g., Ball, 2001; Watts, 2003a; Kothari et al., 2010).[1]

By committing to more verification of transaction characteristics favorable to managers, the ex post benefit of earnings management diminishes and so does the incentive to engage in earnings management. This asymmetric verification requirement takes the form of conservatism when managers prefer better accounting reports. Thus, conservatism as a measurement principle is as *general* as managers' ability and incentive to *inflate* transaction characteristics.

This paper makes two contributions. First, it contributes to the literature on conservatism. By opening the black box of accounting measurement, the paper formalizes the notion that conservatism serves as ex ante safeguards against managers' ex post opportunistic influence on accounting measurement, which is widely cited in empirical works as the

[1] To make the representation more concrete, consider as an example a typical revenue recognition rule. The economic substance the rule aims to capture is the revenue earning process in a transaction. The characteristics of the transaction include cash receipt, product delivery, terms of warranty, customer credit worthiness, and so on. These characteristics are imperfectly correlated with the revenue earning process, and vulnerable to managers' influence. For example, even if the firm has not earned revenue from the transaction, the manager may be able to accelerate cash receipt or product delivery through "channel stuffing." A revenue recognition rule has at least three components. It identifies the subset of transaction characteristics to be used, imposes a verification requirement for each transaction characteristic, and prescribes a threshold of evidence above which revenue is recognized. It is conservative if it requires more verification of transaction characteristics that lead to revenue recognition (good news) than those that do not lead to revenue recognition (bad news).

contracting explanation of conservatism (e.g., Watts, 2003a).[2] It suggests that the reduced-form treatment of accounting measurement is responsible for the controversy about the general value of conservatism as a measurement principle discussed in the second paragraph of this Introduction. For most specifications of verification technologies discussed in the paper, the optimal accounting rule could be conservative even if the false negative error is more costly than the false positive error. Moreover, the optimal accounting rule is always conservative if the costs of measurement errors are equal. In other words, a conservative rule is the path to a "neutral" accounting report in presence of managers' opportunism.

The *simplicity* of this rationale for conservatism matches the persistent and pervasive influence conservatism has on accounting practice. Accounting rules are conservative as long as managers have incentive and ability to inflate transaction characteristics. Rewarding managers for good accounting performance is not only a general prescription from incentive theories but also a common feature of many real-world institutions. Empirically, most accounting frauds or irregularity involve inflated accounting reports.

The paper's second contribution is to clarify two related questions in the context of accounting standard setting. The first concerns the demand for accounting: given the properties of an accounting report, how is it optimally used and what are its economic consequences? The second concerns the supply of accounting: what are the optimal properties of an accounting rule that generates an accounting report with the targeted properties? While answers to both questions provide guidance for accounting standard setting, the first question has received most attention in the literature since Demski (1973). Various models have greatly advanced our understanding of the demand for accounting information by looking at how an accounting report with a given property affects market and non-market interactions, including valuation in capital markets, communication in product markets, and contracting within a firm. In this endeavor, accounting measurement is often treated as a black box that emanates a signal with certain statistical properties.

While this convenient representation could be justified on the ground of focusing on the first question, it could become misleading when the results from this framework are extrapolated as direct answers to the second question about the design of accounting rules. The two questions differ to the extent that the properties of an accounting report differs from those of an accounting rule that generates the report. This distinction is absent in the reduced-form representation, but it is for real for accounting standard setting. Suppose an accounting report with certain properties has been established as desirable (from answering the first question), we are still left with the second question of designing the measurement process that generates such a report. After all, it is this process that determines the *actual* properties of accounting reports and that is presumably the core of accounting as an independent discipline. To the extent that the properties of an accounting report are influenced only indirectly by the design of accounting rules, the answer to the first question cannot substitute for the answer to the second.

This paper illustrates the importance of differentiating these two questions. Even though conservatism is, at least implicitly, interpreted as a property of an accounting rule in the previous literature, it is nonetheless defined as a property of an accounting report, partially due to the reduced-form representation's inability to differentiate the two. With the two-step representation in this paper, conservatism is explicitly defined as a property of an accounting rule that generates the report. When we shift the focus from the first to the second question, a simple yet general rationale for conservatism as a measurement principle emerges. Thus, it is critical to look into the accounting measurement process in order to better guide accounting standard setting. The two-step representation of accounting measurement provides one useful framework to open the black box of accounting measurement.

Note that there is a large literature on biased performance measure and earnings management. However, most of that literature focuses on how *the use of an accounting report* (the demand side) is affected by earnings management (see Lambert, 2001 for a survey and see Glover et al., 2005; Arya and Glover, 2008 for recent examples). In contrast, this paper focuses on how the design of an accounting rule, or *the production of an accounting report* (the supply side), is constrained by earnings management. A review of literatures on conservatism and other efforts to open the black box of accounting measurement is deferred to Section 5.

The rest of the paper proceeds as follows. Section 2 describes the model. In Section 3, I show that the optimal accounting rule is conservative as long as the manager's one-sided earnings management is not contractible. Section 4 considers several extensions, including different verification technologies, renegotiation, and multi-period contracting. Section 5 provides a review of related literatures. Section 6 discusses the model's empirical and policy implications. Section 7 concludes.

2. A model of accounting measurement

To evaluate conservatism as a measurement principle, we require a setting in which the demand for accounting reports arises endogenously. I choose a corporate financing setting in which an accounting-based covenant is used. It will become clear that the rationale for conservatism goes beyond this specific setting. After describing the demand for an accounting-

[2] Watts and Zimmerman (1990) summarize it concisely: "Reacting to the incentive of managers to exercise accounting discretion opportunistically, the accepted set includes 'conservative' (e.g., lower of cost or market) and 'objective' (e.g., verifiable) accounting procedures."

Table 1
Expected payoffs at date 1.

State ω	Measure r	Probability	Action taken	Financier's payoff	Manager's payoff
G	g	$q_G(1-Q_G^b)$	a_M	pD	$p(Y-D)+X_G$
G	b	$q_G Q_G^b$	a_F	L	0
B	g	$q_B Q_B^g$	a_M	0	X_B
B	b	$q_B(1-Q_B^g)$	a_F	L	0

based debt covenant, I elaborate the structure of the accounting measurement process. Because the focus of the paper is on the latter, I keep the former part deliberately simple.

2.1. A setting with "the difficulty of selective intervention"

An owner–manager (henceforth the manager or the firm) with initial wealth of A has an indivisible project that requires an initial investment I at date 0. At date 1 after the firm is financed, the state of nature, ω, is realized. It is either *Good* or *Bad* with probability q_G and $q_B \equiv 1-q_G$, respectively, *i.e.*, $\omega \in \{G,B\}$. A firm in state ω is referred to as firm ω. After the realization of the state, one of the two actions has to be taken, *i.e.*, $a \in \{a_M,a_F\}$. The project's payoff depends on both state ω and action a. In state ω, action a_M yields the manager a private benefit $X_\omega > 0$ and a risky cash flow $\tilde{Y}_\omega$ at date 2.[3] $\tilde{Y}_G = Y$ with probability $p \in (0,1)$ and $\tilde{Y}_G = 0$ with probability $1-p$, and $\tilde{Y}_B = 0$ with probability 1. In contrast, action a_F yields no private benefit to the manager and a constant cash flow L, regardless of the state. For ease of reference, a_M is referred to as continuation and a_F as liquidation. I assume that $\Delta^{Under} \equiv pY+X_G-L > 0$ and $\Delta^{Over} \equiv L-X_B > 0$. That is, when the total payout of the firm is considered, continuation (a_M) of a good firm is a positive NPV decision whereas continuation of a bad firm is a negative NPV decision. Δ^{Under} is the efficiency loss of liquidating a good firm and Δ^{Over} of continuing a bad firm. Thus, if the manager could finance the firm with his own wealth, *i.e.*, $A \geq I$, he takes action a_M at date 1 if and only if the state is *Good*. The value of the project under this first best solution is $q_G(X_G+pY)+q_B L-I$.

I assume that the manager is wealth constrained ($A < I$) and has to finance the difference $I-A$ through a standard debt contract at date 0. The financier provides $I-A$ at date 0 and in return receives a prioritized payment up to the face value $D \leq Y$ at date 2. I call D face value or interest rate interchangeably. Both the manager and the financier are risk neutral and the risk free rate is 0. The lending market is assumed to be competitive at date 0. As a result, the financier's individual rationality (IR) condition binds in equilibrium and the surplus to the manager also measures the efficiency of the contract.

To simplify the notation, I assume that $L < D$ in equilibrium so that all the cash flow from action a_F goes to the financier. In addition, I assume that $pD < L$ in equilibrium.[4] Otherwise, if $pD \geq L$, the first best is achieved by giving the control right to the financier unconditionally (e.g., through a short-term debt contract or equity) and there is no need for a covenant. As a result of these two assumptions, the payoffs to the manager and the financier (M,F) under the combination of states and actions are simplified in Table 1 (the second and third columns are explained later).

This simple setting creates a classic problem of "the difficulty of selective intervention" as in Williamson (1985) and Aghion and Bolton (1992). While the socially optimal action is state-contingent, *i.e.*, $a^*(\omega = G) = a_M$ and $a^*(\omega = B) = a_F$, it is clear from Table 1 that the manager prefers a_M and the financier prefers a_F in both states, resulting in the demand for selective intervention. One way to implement the selective intervention is to use a state-contingent covenant that allocates the control right to the financier *in and only in* the *Bad* state. The implementation of such a covenant calls for the measurement of the state at date 1. That is, a state-contingent covenant is implemented as a measurement-contingent covenant in practice. Denote the measurement of the state as $r \in \{g,b\}$ with $r=g$ indicating a better state. Without loss of generality, if a covenant is ever used, it takes the following form: the firm retains the control right if and only if $r = g$.[5]

We now turn to the design of the accounting rule at date 0 that generates accounting report r at date 1 that settles the measurement-contingent covenant.

[3] As standard in the literature, the difference between cashflow and private benefit is that private benefit cannot be paid out to the financier. That is, X_ω is non-pledgable. Since the manager has spent time in initiating, developing, and implementing the project, he cares not only about the cashflow of the project but also about other non-monetary aspects such as social objectives, employee relationship, reputation, etc. Further, the manager may also accumulate skills and human capital from implementing the project in his own way that could improve his value in the labor market in the future. Most of these benefits are non-pledgable.

[4] The equilibrium value of D could be restricted by parameters, including p, Y, and A.

[5] Such accounting-based covenants are widely used in debt contracts, see, e.g., Watts and Zimmerman (1986), Christensen and Nikolaev (2012), and Tan (forthcoming).

2.2. A two-step representation of accounting measurement

To open the black box of accounting measurement, I use the following two-step representation. First, the state of nature ω, interpreted as a transaction's economic substance, manifests itself in the transaction's characteristics t. Second, an accounting rule is a mapping from transaction characteristics t to accounting report r.[6]

As discussed in the Introduction, the design of an accounting rule involves at least three instruments: the set of admissible transaction characteristics, the verification requirement, and the evidence threshold. This paper focuses on verification because the differential verification requirement is probably the most common interpretation of conservatism in the empirical literature (e.g., Watts and Zimmerman, 1983; Watts, 2003a; Kothari et al., 2010). Gao (2012) examines the third instrument and provides a rationale for the pervasive use of binary classifications and thresholds in accounting rules.

In particular, I assume that t is a scaler and binary. It is either positive P (good news) or negative N (bad news). To capture the idea that the mapping from ω to t could be noisy even in the absence of the manager's influence, I assume that $\Pr(t=P|\omega=G)=\phi_G$ and $\Pr(t=N|\omega=B)=\phi_B$. $\phi_G \in (\frac{1}{2},1]$ and $\phi_B \in (\frac{1}{2},1]$ are the relevance of the transaction characteristic. The verification requirement is operationalized as a vector $\{\gamma_t\}$, $t \in \{P,N\}$. If transaction characteristic t is presented, an accounting rule (verification requirement) γ_t requires that t be verified with probability γ_t. The technology of verification is specified later.

In this two-step representation, accounting report r relates to state ω through transaction characteristic t and the verification process γ_t. While the goal of accounting measurement is to capture ω as accurately as possible, the rule can only be written on t. This restriction introduces a natural representation of earnings management.

Earnings management is modeled as the manager's activities to inflate t. Between date 0 and date 1, that is, after signing the contract but before the realization of the state, the manager can increase by $\beta \in [0,\phi_B]$ the probability that the *Bad* state (transaction) exhibits the positive characteristic $t=P$.[7,8] Thus, with earnings management, the mapping from ω to t is altered to $\Pr(t=P|\omega=G,\beta)=\phi_G$ and $\Pr(t=P|\omega=B,\beta)=1-\phi_B+\beta$. The private cost of earnings management is $hK(\beta)$, $h>0$. A higher h means that it is more costly for the manager to manipulate transaction characteristics. Thus, h might be interpreted as the reliability (or "hardness" of Ijiri 1975) of a transaction characteristic. $K(\beta)$ has the standard properties of a cost function: it is increasing and convex with $K(0)=K'(0)=0$, and $K'(\phi_B)$ is sufficiently large. Further, $\frac{d}{d\beta}\left[\frac{K'}{K''}\right]=\frac{(K'')^2-K'K'''}{(K'')^2}>0$, which sets a bound on the speed at which K'' increases.[9] For example, the standard quadratic cost function $K(\beta)=\beta^2/2$ with h properly restricted satisfies these assumptions.

That transaction characteristics could be compromised by earnings management generates the demand for verification. There could be at least two views about the role verification plays in accounting measurement. The narrow view is that verification attests to the authenticity of transaction characteristics, such as whether an invoice is fabricated or not. To understand this view, we could interpret the above specification of earnings management in a different way. Let an indicator variable s denote the success of earnings management. $s=1$ indicates that the manager succeeds in generating the positive transaction characteristic in the *Bad* state and $s=0$ indicates otherwise. The probability that $s=1$ is β. The narrow view of verification amounts to a claim that verification reveals the realization of s in the model. In contrast, the broad view equates verification with information production in general. That is, verification reveals the realization of the state ω. I start with the narrow definition in the baseline model and examine the broad interpretation and various other specifications of verification technology in Section 4.

In the baseline model, if verification is conducted, s is revealed perfectly, earnings management is undone, and the authentic transaction characteristic is measured accordingly. If verification is not conducted, then the transaction characteristic is taken at its face value. Verification incurs a cost $\delta>0$ when it is conducted. Denote τ as the total probability that verification is conducted under accounting rule $\gamma_t: \tau \equiv \Pr(t=P)\gamma_P+\Pr(t=N)\gamma_N$. Thus, the total expected cost of verification is $\delta\tau$. Because $\delta\tau$ is known at date 0, I assume it is financed from the financier at date 0.

Finally, this two-step representation enables us to separate two critical concepts: the property of an accounting report versus the property of an accounting rule that generates the report. Define the (conditional) measurement errors of accounting report r as

$$Q_G^b \equiv \Pr(r=b|\omega=G)=1-\phi_G, \tag{1}$$

$$Q_B^g \equiv \Pr(r=g|\omega=B)=1-\phi_B+\beta(1-\gamma_P). \tag{2}$$

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6 The idea of treating accounting rule as a mapping from transaction characteristics to accounting measures has a long history in accounting thoughts (see, e.g., Ijiri, 1975; Leuz, 1998a, 1998b).

7 The main results are qualitatively the same if it is assumed that the manager could alter the transaction characteristics *after* the state is observed by the manager. This different assumption only scales the cost function of earnings management by q_B, the probability that the *Bad* state occurs at date 1.

8 At one extreme, some firms simply fabricate evidence to recognize fictitious profit. For example, SEC (2011) claims that Satyam inflated its revenue by $1.1 billion by manufacturing false invoices for services never provided and, in some cases, for customers that did not exist.

At the other extreme, firms often structure their transactions to qualify for favorable accounting treatment at the expense of economic efficiency. Lys and Vincent (1995) report one striking example: "AT&T (in acquiring NCR) paid a documented $50 million and possibly as much as $500 million to satisfy pooling accounting, thus boosting EPS by roughly 17% but leaving cash flows unchanged." Systematic evidence on accounting-motivated transactions for accounting or regulation purpose has been documented by, among others, Imhoff and Thomas (1988) (through lease), Engel et al. (1999) (through hybrid securities), and Dechow et al. (2010) (through securitization).

9 This assumption on the cost function eliminates the "boil them in oil" results, in which earnings management is prevented entirely with sufficiently large punishment for even small amount of earnings management.

Definition 1. An accounting rule $\{\gamma_t\}$, $t \in \{P,N\}$, is conservative if it requires more verification of $t=P$ than of $t=N$, *i.e.*, $c \equiv \gamma_P - \gamma_N > 0$.

Definition 2. An accounting report r is neutral if the measurement errors are equal, *i.e.*, $Q_G^b = Q_B^g$.

Footnote 1 in page 2 provides a concrete example of this two-step representation of accounting measurement, which could also be depicted as follows:

$$\omega \underbrace{\text{-------------------}}_{\substack{\text{firm influence} \\ \text{(earnings management)}}} t \underbrace{\text{-------------------}}_{\substack{\text{rule design} \\ \text{(e.g., verification)}}} r$$

In sum, the timeline of the events is summarized as follows:

1. At date 0, the manager and the financier sign a debt contract with face value D, an accounting-based covenant in which the manager retains control right if and only if $r=g$, and the accounting rule (γ_P,γ_N) that generates r.
2. At date $\frac{1}{2}$ (between 0 and 1), the manager chooses the level of earnings management β.
3. At date 1, the state is realized, transaction characteristic t occurs, accounting report r is generated according to the accounting rule (γ_P,γ_N), the covenant is settled, and the action is taken.
4. At date 2, the project pays out and payment is made.

3. The main results

3.1. Preliminary analysis

The model is solved with backward induction. At date 1, the contracting parties' expected payoffs depend on both the state ω and its accounting measurement r. The probabilities of the combination of (ω,r) are summarized in Table 1 in page 4. Denote the financier's date-0 expectation of earnings management as $\hat{\beta}$ and the manager's actual choice of earnings management as β^*. The contracting problem at date 0 can be formulated as the following maximization problem, labeled as Problem 1

$$\max_{(D,\gamma_N,\gamma_P)} V(D,\gamma_N,\gamma_P) = q_G(1-Q_G^b)(p(Y-D)+X_G)+q_B Q_B^g(\beta^*)X_B - hK(\beta^*)$$

subject to

$$I-A+\delta\tau \le q_G(1-Q_G^b)pD + q_G Q_G^b L + q_B(1-Q_B^g(\hat{\beta}))L \tag{IR}$$

$$\beta^* = \arg\max_{\beta} q_G(1-Q_G^b)(p(Y-D)+X_G)+q_B Q_B^g(\beta)X_B - hK(\beta) \tag{IC}$$

$$\beta^* = \hat{\beta} \tag{rational expectations}$$

$$\gamma_t \in [0,1], \quad t \in \{P,N\}.$$

The manager chooses face value D and accounting rule γ_t at date 0 to maximize his expected payoff, subject to the financier' break-even condition, the anticipated ex post earnings management, the requirements of rational expectations and of γ_t being a probability. The objective function V is the manager's expected payoff at date 0, calculated as the inner product of the third and fifth columns of Table 1 with β being replaced by β^* net of the cost of earnings management $hK(\beta^*)$. The right-hand side of Constraint IR is the financier's expected payoff from the debt contract, calculated as the inner product of the third and fourth columns of Table 1 with β being replaced by $\hat{\beta}$. Constraint IC describes the manager's earnings management decision at date $\frac{1}{2}$, taking D and γ_t as given. Finally, the rational expectations require that the financier's conjecture about the manager's ex post earnings management be consistent with the manager's actual choice.

The assumption of a competitive market for financiers at date 0 assures that Constraint IR binds in equilibrium and we could solve for the expression of D as a function of $\hat{\beta}$ and γ_t. Substituting D into the objective function and imposing the requirement $\hat{\beta}=\beta^*$ in equilibrium, we rewrite Problem 1 as Problem 2

$$\max_{(\gamma_P,\gamma_N)} V(\gamma_P,\gamma_N) = V^{FB} - q_B Q_B^g(\beta^*)\Delta^{Over} - q_G Q_G^b \Delta^{Under} - hK(\beta^*) - \delta\tau(\beta^*) \tag{3}$$

subject to

$$\beta^* = \arg\max_{\beta} q_G(1-Q_G^b)(p(Y-D)+X_G)+q_B Q_B^g(\beta)X_B - hK(\beta) \tag{IC}$$

$$\gamma_t \in [0,1], \quad t \in \{P,N\}.$$

$V^{FB} \equiv q_G(X_G+pY)+q_BL-I+A$ is the manager's initial wealth plus the first-best firm value when the socially optimal actions are implemented in both states. Expression (3) states that, compared with V^{FB}, the actual firm value V is reduced by four terms. $q_BQ_B^g(\beta^*)\Delta^{Over}$ and $q_GQ_G^b\Delta^{Under}$ are the costs resulting from the suboptimal actions that are induced by the measurement errors $Q_B^g(\beta^*)$ and Q_G^b. $hK(\beta^*)$ and $\delta\tau(\beta^*)$ are the resources consumed by earnings management and verification.

3.2. Benchmark: contractible earnings management

To highlight the role of non-contractible earnings management, we first look at the benchmark in which ex post earnings management could be contracted upon ex ante. Ex ante and ex post refer to the timing of signing the contract. Thus, the IC constraint is dropped and β becomes a choice variable in Problem 2. Then the firm value could be rewritten as

$$V^{BM}(\beta,\gamma_t) = V^{FB}-q_B\Delta^{Over}(1-\phi_B+\beta(1-\gamma_P))-q_G\Delta^{Under}(1-\phi_G)-hK(\beta)-\delta\tau(\beta). \quad (4)$$

Lemma 1. *When earnings management is contractible, in equilibrium,*

1. *there is no earnings management, i.e.,* $\beta^{BM}=0$;
2. *the optimal verification requirement is* $\gamma_P^{BM}=\gamma_N^{BM}=0$. *Trivially, the optimal rule is neutral, i.e.,* $c^{BM}=0$.

Lemma 1 is straightforward from inspecting Eq. (4). The effect of the verification of $t=N$ on firm value is $\partial V^{BM}/\partial\gamma_N = -\delta(d\tau/d\gamma_N)<0$ for any β and γ_t. It consumes resources without any benefit, because $t=N$ is not manipulated by the manager, hence $\gamma_N^{BM}=0$. The effect of earnings management on firm value is captured by $\partial V^{BM}/\partial\beta = -hK'-q_B\Delta^{Over}(1-\gamma_P)-\delta q_B\gamma_P$. Earnings management consumes real resource (the first term). When it succeeds in generating $t=P$, it either enables the manager to take suboptimal action a_M in the *Bad* state (the second term) or invokes costly verification (the third term). Thus, the optimal earnings management is 0. With $\beta^{BM}=0$, the effect of the verification of $t=P$ on firm value is $\partial V^{BM}/\partial\gamma_P = -\delta(d\tau/d\gamma_P)<0$. Without earnings management, the verification of $t=P$ consumes resources without any benefit, just like the verification of $t=N$. Thus, $\gamma_P^{BM}=0$ and $c^{BM}=0$.

3.3. The design of ex ante accounting rule with non-contractible earnings management

In practice, earnings management is rarely contractible. Instead, the manager's choice of earnings management is governed only by his IC condition in Problem 2. In particular, the manager takes the interest rate D and accounting rule γ_t as given at the time of earnings management. The optimal earnings management β^* satisfies the following first-order condition:

$$q_B(1-\gamma_P)X_B = hK'(\beta^*). \quad (5)$$

From the manager's perspective, the left-hand side is the marginal benefit of earnings management at date $\frac{1}{2}$. By generating the positive transaction characteristic that is measured as *good*, earnings management allows the manager to retain the control right in the *Bad* state and receive the private benefit X_B. The right-hand side is the marginal cost of earnings management borne by the manager.

Lemma 2. *When earnings management is not contractible,*

1. *earnings management exists in equilibrium (i.e.,* $\beta^*>0$*) unless* $\gamma_P=1$;
2. *the verification of the positive transaction characteristic is more useful in mitigating earnings management than the verification of the negative transaction characteristic, i.e.,* $\partial\beta^*/\partial\gamma_P < \partial\beta^*/\partial\gamma_N = 0$.

Part 1 of Lemma 2 is proved by inspecting Eq. (5). It suggests that earnings management is ex post rational for the manager. After signing the contract (ex post), it is the accounting report r, not the state ω, that settles the covenant. The manager could keep out the external intervention as long as the state is *measured* as *good* by the pre-specified accounting rule. Thus, it is ex post rational for the manager to spend resources inflating transaction characteristics.

Part 2 of Lemma 2 is obtained by differentiating Eq. (5) with respect to γ_N and γ_P: $\partial\beta^*/\partial\gamma_N=0$ and $\partial\beta^*/\partial\gamma_P = -q_BX_B/hK''<0$. The verification of $t=N$ does not affect earnings management; in contrast, the verification of $t=P$ detects earnings management and prevents the manager from obtaining the preferred report, rendering earnings management less attractive to the manager. This asymmetry in the value of verification in deterring earnings management has immediate consequences for the design of the accounting rule.

Proposition 1. *If earnings management is not contractible and verification cost* δ *is sufficiently small, the optimal accounting rule is conservative.*

To see the intuition of Proposition 1, we verify that $\gamma_N^* = 0$ and $\gamma_P^* > 0$ for a sufficiently small δ. The effect of the verification of $t = N$ on firm value is $\partial V/\partial \gamma_N = -\delta(d\tau/d\gamma_N)$, which is negative for any β and γ_t. It is the same as in the benchmark case because γ_N does not affect earnings management. Thus, the optimal accounting rule sets $\gamma_N^* = 0$. Because $\gamma_N^* = 0$ holds for any β and γ_P, Problem 2 can be treated as a maximization problem with one choice variable γ_P. The first-order condition of γ_P could be expressed as

$$\frac{\partial V}{\partial \gamma_P} = q_B \Delta^{Over} \beta^* - (q_B \Delta^{Over}(1-\gamma_P) + hK')\frac{\partial \beta^*}{\partial \gamma_P} - \delta \frac{d\tau}{d\gamma_P}. \tag{6}$$

Eq. (6) reveals the effects of the verification of $t = P$ on firm value through its interaction with earnings management. First, given earnings management β^*, the verification of $t = P$ reduces the measurement error induced by earnings management (the first term). Second, the verification of $t = P$ reduces the manager's incentive to engage in earnings management in the first place, as captured by the term $\partial\beta^*/\partial\gamma_P < 0$. This reduction in earnings management improves firm value because it reduces the measurement error ($q_B \Delta^{Over}(1-\gamma_P)$) and saves the cost of earnings management (hK'). Finally, the total cost of verification also interacts with earnings management through τ, the probability that the verification of $t = P$ is triggered. This interaction is complex and analyzed in detail in Appendix A. Because the first two effects are positive, the verification of $t = P$ always occurs if it is not prohibitively costly. That is, for a sufficiently small δ, $\partial V/\partial \gamma_P|_{\gamma_P = 0} > 0$ and thus $\gamma_P^* > 0$. The combination of $\gamma_N^* = 0$ and $\gamma_P^* > 0$ proves Proposition 1 that $c^* \equiv \gamma_P^* - \gamma_N^* = \gamma_P^* > 0$. Further, this result of $c^* > 0$ is independent of the specifics of the underlying economic problem, namely, $q_G \Delta^{Under}$ and $q_B \Delta^{Over}$.

Proposition 1 is strikingly simple and general. While it might be straightforward after the accounting measurement process is articulated in the model, this result is at the heart of the heated debate on conservatism that has been influencing the accounting standard setting around the world. As discussed in the second paragraph of Introduction, much controversy about conservatism is predicated on the reduced-form representation that treats accounting measurement as a black box emanating a report with certain statistical properties. As a result, the property of an accounting report cannot be differentiated from the property of an accounting rule that generates the report. In the context of the model, the reasoning underlying the controversy could be understood as follows. One looks at the accounting report r, asks what are the optimal Q_B^g and Q_G^b if $Q_B^g + Q_G^b$ is constrained to be a constant, and arrives at the conclusion that $Q_G^{b*} > Q_B^{g*}$ if and only if $q_B \Delta^{Over} > q_G \Delta^{Under}$. Based on this exercise, one argues further that standard setters who serve a broad range of constituents should take an agnostic view of $q_B \Delta^{Over} = q_G \Delta^{Under}$. Therefore, the optimal accounting *report* is neutral. This conclusion is then further extrapolated as that the optimal accounting *rule* that generates the report is neutral.

While this reasoning is correct in describing the optimal property of accounting report r, it is misleading in describing the optimal property of the accounting rule that generates r. With the reduced-form representation of accounting measurement as an exogenous statistical process in the previous literature, conservatism is defined as a property of accounting report r, *i.e.*, $Q_G^b > Q_B^g$. In contrast, in this paper, the two-step representation of accounting measurement allows us to define conservatism explicitly as a property of an accounting rule that generates r. Conservatism requires more verification for *good* news ($t = P$) than for *bad* news ($t = N$), *i.e.*, $\gamma_P > \gamma_N$. Proposition 1 states that even if the economic problem calls for an accounting report r with the property of $Q_G^{b*} = Q_B^{g*}$, the optimal accounting rule that generates such a report is conservative. A conservative rule is the path to a neural accounting report in the presence of managers' opportunism. This simple shift of perspective, made possible by the articulation of the two-step representation of accounting measurement, clarifies the major controversy on conservatism.

We conduct comparative statics to derive empirical predictions about the determinants of conservatism. Proposition 1 relies only on $\gamma_P^* > 0$. In the Appendix, it is shown that γ_P^* is unique and interior under the following assumption, under which all the comparative statics are conducted.

Assumption 1. δ is sufficiently small and h is sufficiently large.

Corollary 1. *Under Assumption 1, the optimal accounting rule is more conservative if*

1. *it is easier for the manager to manipulate, e.g., h is smaller;*
2. *the manager's incentive to engage in earnings management is higher, e.g., q_B is larger;*
3. *the consequence of earnings management is more severe, e.g., Δ^{Over} is larger.*

Corollary 1 is proved by differentiating the first-order condition for γ_P with respect to relevant parameters. The optimal level of conservatism increases as the ex post earnings management becomes more severe a problem, either because it is cheaper or more attempting for the manager or more costly for the contracting parties as a whole. This heightens the contention of the paper that conservatism arises as an ex ante response to the manager's ex post opportunistic earnings management.

The effect of private benefit X_B on conservatism is ambiguous in the model. On one hand, an increase in X_B makes earnings management more attractive to the manager, which demands a more conservative rule as a counteraction. On the other hand, an increase in X_B reduces the inefficiency resulting from the manager obtaining the control right in the *Bad* state, which leads to a lower conservatism. The net effect of X_B on conservatism is thus determined by these two opposing effects.

3.4. Verifiability, reliability and relevance

One major benefit of opening the black box of accounting measurement is that it helps to formally define some commonly used concepts in accounting. In the model, the cost of verification δ might be interpreted as the verifiability of transaction characteristics. A smaller δ indicates that a transaction characteristic is more verifiable. Similarly, h could be interpreted as the reliability of a transaction characteristic and $\phi_i, i \in \{G,B\}$ as the relevance of a transaction characteristic. With these terminologies, we could ask the question how the verifiability, reliability and relevance of a transaction characteristic affects the firm value.

Corollary 2. *Under Assumption 1 and $K(\beta)=\beta^2/2$, the firm value increases in the verifiability, reliability, and relevance of a transaction characteristic, i.e., $dV^*/d\delta<0$, $dV^*/dh>0$ and $dV^*/d\phi_i>0$ for $i \in \{G,B\}$. Further, there is a trade-off between the reliability and relevance of a transaction characteristic, i.e., $dh/d\phi_i<0$, for $i \in \{G,B\}$.*

Corollary 2 is proved by the application of the envelop theorem. It formalizes some common intuition in accounting discourse. If a transaction characteristic becomes more verifiable, more reliable, or more relevant, the quality of accounting measurement improves and so does the firm value.[10] When two transaction characteristics differ in both their relevance and reliability, we obtain the classic trade-off between relevance and reliability.

3.5. Conservatism and price protection through interest rate

So far the analysis has not exploited the structure of the underlying financing problem except that it entails the use of a measurement-contingent covenant. This independence attests to the generality of the rationale for conservatism.

With the specifics of the financing problem, we could also examine the interaction of the accounting rule and other parts of the contract, in this case, the interest rate. We could rewrite the financier's break-even requirement at date 0 (binding IR condition in Problem 1) as

$$q_G\phi_G pD = I-A+\delta\tau-q_G(1-\phi_G)L-q_B(\phi_B-\hat{\beta}(1-\gamma_P))L. \tag{7}$$

Proposition 2. *Under Assumption 1, the face value D satisfies these properties:*

1. *ceteris paribus, it increases in the financier's conjecture about earnings management $\hat{\beta}$, i.e., $\partial D/\partial\hat{\beta}>0$;*
2. *in equilibrium, it is negatively associated with the level of conservatism, i.e., $dD^*/dc^*<0$.*

Part 1 captures the notion of ex ante price protection by the financier. If the financier believes that the manager is more likely to engage in earnings management after contracting, which enables the manager to pursue his own interest at the financier's expense, the financier demands a higher interest rate at date 0. As a result of the price protection, the manager bears the consequences of the ex post earnings management.

However, the ex ante price protection through the adjustment of interest rate does not eliminate the ex post opportunism. Because earnings management occurs *after* the interest rate is negotiated, the manager takes the interest rate as given when he chooses the level of earnings management. The first-order condition for the choice of earnings management (Eq. (5)) suggests that earnings management β^* does not directly depend on the interest rate D. Therefore, the interest rate in the contract alone does not perfectly align the contracting parties' preferences.

Part 2 of Proposition 2 states that conservatism and interest rate are imperfect substitutes for financier "protection" in the contract. The financier demands a lower interest rate when the accounting rule in the covenant is more conservative. The reason is because conservatism increases the chance that the control right is transferred to the financier, *i.e.*, $d\Pr(r=b)/d\gamma_P>0$. The control right at date 1 is valuable and thus the financier is willing to receive less cashflow in return for more control right. In other words, the financier can be "protected" by either a higher interest rate or a more conservative accounting rule in the covenant.

4. Extensions

The baseline model is deliberately simplified to highlight the general rationale for conservatism and contrast it to results in the previous literature. In this section, I extend the model in various ways to show the robustness of the general rationale for conservatism.

[10] The joint conceptual framework of FASB and IASB lists relevance and faithful representation (reliability) as two fundamental qualitative characteristics, and verifiability as one of the enhancing qualitative characteristics. Corollary 2 indicates that the three concepts should be at par with each other.

4.1. A broad view of verification as information production

The first extension considers a broad definition of verification. In the baseline model, verification is interpreted narrowly as the attestation to the authenticity of transaction characteristics. A broad definition equates verification with information production about the state ω.

In particular, I assume that when verification is not conducted, the transaction characteristic is accepted at its face value and that when verification is conducted, the state ω is revealed and measured perfectly. With information production, the linear cost $\delta\tau$ is not sufficient to guarantee an interior choice of γ_t. Thus, I assume that $\gamma_t, t \in \{P,N\}$ incurs a cost of $T(\gamma_t)$, with $T(0)=T'(0)=0$, $T' \geq 0$, $T'' > 0$ and $T'(1)=\infty$, and set $\delta=0$. The measurement errors under this new verification technology are

$$Q_G^b \equiv (1-\phi_G)(1-\gamma_N) = (1-\phi_G)-(1-\phi_G)\gamma_N,$$
$$Q_B^g \equiv (1-\phi_B+\beta)(1-\gamma_P) = (1-\phi_B+\beta(1-\gamma_P))-(1-\phi_B)\gamma_P.$$

The *Good* state generates $t=N$ with probability $1-\phi_G$. When it is not verified, $t=N$ is accepted as $r=b$, hence Q_G^b. Q_B^g has a similar interpretation except that $t=P$ could result additionally from earnings management β.

Compared with their counterparts in the baseline model (Eq. 1 and 2), Q_G^b and Q_B^g admit the additional components of $-(1-\phi_G)\gamma_N$ and $-(1-\phi_B)\gamma_P$. They reflect the information production of verification. In the baseline model, verification only mitigates the measurement bias introduced by earnings management; let us label it as the behavioral value of verification. With the broad definition, verification also reduces the measurement noise; let us label it as the technical value of verification. Conservatism is justified by the asymmetric behavioral value of verification in the baseline model, which is preserved in this extension. The technical value of verification depends on the specifics of the problem and is symmetric for $t=P$ and $t=N$. As a result, in a symmetric setting the optimal accounting rule is still strictly conservative.

Using the same procedure as in the baseline model, we could obtain the following results.

Proposition 3. *When verification generates information about ω,*

1. *with contractible earnings management, $\beta^{BM}=0$, $c^{BM} \equiv \gamma_P^{BM}-\gamma_N^{BM} > 0$ if and only if $q_B\Delta^{Over}(1-\phi_B) > q_G\Delta^{Under}(1-\phi_G)$. γ_P^{BM} and γ_N^{BM} are determined by*

$$\frac{\partial V^{BM}}{\partial \gamma_N^{BM}} = q_G\Delta^{Under}(1-\phi_G)-T'(\gamma_N^{BM})=0,$$
$$\frac{\partial V^{BM}}{\partial \gamma_P^{BM}} = q_B\Delta^{Over}(1-\phi_B)-T'(\gamma_P^{BM})=0.$$

2. *with non-contractible earnings management, $\beta^* > 0$, $\partial\beta^*/\partial\gamma_P < \partial\beta^*/\partial\gamma_N = 0$, $\gamma_P^* > \gamma_P^{BM}$, and $\gamma_N^* = \gamma_N^{BM}$. Thus, $c^* > c^{BM}$;*

3. *In a symmetric case with $q_B=q_G$, $\phi_G=\phi_B$, and $\Delta^{Over}=\Delta^{Under}$, $\gamma_P^* > \gamma_N^* = \gamma_P^{BM} = \gamma_N^{BM} > 0$. Thus $c^* > 0$.*

Proposition 3 mirrors Lemmas 1 and 2 and Proposition 1. The asymmetric behavioral value of verification is preserved, as confirmed by $\partial\beta^*/\partial\gamma_P < \partial\beta^*/\partial\gamma_N = 0$. The only difference is that with the additional technical value of verification, the base level of verification is elevated in the benchmark case and carried over to the setting with non-contractible earnings management. Even though the technical value of verification depends on the specifics of the problem, it is symmetric in the specifics of the problem. Therefore, its presence does not alter the asymmetry of the total value of verification. In the case with symmetric costs of measurement errors, the optimal accounting rule is strictly conservative.

4.2. Noisy verification technologies

So far, the verification technologies are assumed to be costly but perfect. In this extension, I show that the rationale for conservatism is robust to noisy verification technologies. This extension also generates a result consistent with the notion that accounting measurement involves a trade-off of different measurement errors.

The setting is the same as in the previous subsection except that verification now reveals the state ω imperfectly. Verification generates additional evidence (transaction characteristics) t' in the following way:

$$\Pr(t'=P|\omega=G) = \Pr(t'=N|\omega=B) = \pi, \quad \pi \in \left(\frac{1}{2},1\right).$$

To make verification not trivial, I assume that r is determined by t' when verification is conducted: $r(t'=P)=g$ and $r(t'=N)=b$. That is, π is sufficiently large. Note that the direct cost of verification is not necessary because verification is endogenously costly due to its imprecision. Subjecting a transaction characteristic to verification may result in its wrong measurement. As a result, we could set $\delta=0$ and $T=0$. For simplicity, I also assume that $\phi_G=\phi_B=1$ so that the technical value of verification is absent. In addition, I assume that earnings management in the absence of verification is sufficiently severe so that the corner solution of no verification at all is not optimal.

With this technology, the new measurement errors are

$$Q_G^b = \gamma_P(1-\pi),$$

$$Q_B^g = \beta(1-\gamma_P+\gamma_P(1-\pi))+(1-\beta)\gamma_N(1-\pi) = \gamma_N(1-\pi)+\beta(1-\pi\gamma_P-\gamma_N(1-\pi)).$$

When $t=P$ is subject to verification and fails to pass, Q_G^b occurs. Similarly, Q_B^g originates from two sources. First, with earnings management, the *Bad* state generates $t=P$, which could be measured as *good* with probability $1-\gamma_P+\gamma_P(1-\pi)$. Second, even if the *Bad* state generates $t=N$, it could still be measured as *good* when it is subject to verification but fails to pass, which occurs with probability $\gamma_N(1-\pi)$.

Using the same procedures in the baseline model, we obtain the following results.

Proposition 4. *When verification is noisy,*

1. *with contractible earnings management,* $\beta^{BM}=0$, *and* $\gamma_P^{BM}=\gamma_N^{BM}=0$;
2. *with non-contractible earnings management,* $\beta^*>0$, *and* $\partial\beta^*/\partial\gamma_P<\partial\beta^*/\partial\gamma_N<0$;
3. *in a symmetric case with* $q_G=q_B$ *and* $\Delta^{Under}=\Delta^{Over}$, $\gamma_P^*>\gamma_N^*=\gamma_P^{BM}=\gamma_N^{BM}=0$. *Thus* $c^*>0$.

Again, Proposition 4 mirrors Lemmas 1 and 2 and Proposition 1. The asymmetric behavioral value of verification is preserved ($\partial\beta^*/\partial\gamma_P<\partial\beta^*/\partial\gamma_N$) and so does the rationale for conservatism. The only difference is that with the noisy verification technology, the endogenous cost of verification is related to the specifics of the problem. For example, because the verification of $t=P$ could result in measurement error Q_G^b, the cost of γ_P depends on Δ^{Under}, the consequence of the measurement error Q_G^b. Moreover, this cost of verification is symmetric for γ_P and γ_N. As shown in the proof in the Appendix, the optimal verification requirement thus has two components, one for its asymmetric behavioral value and the other for its symmetric cost. Due to the asymmetric value of γ_P and γ_N in mitigating earnings management, the optimal accounting rule is still conservative when the costs associated with different measurement errors are symmetric.

4.3. Renegotiation

In the baseline model, the state-contingent covenant is not renegotiation proof but renegotiation is assumed away. Empirically, debt covenants are often renegotiated (e.g., Roberts and Sufi, 2009). Because at date 1 the financier and the manager may have information that is not captured by the accounting report used in the contract, a natural question is that whether the contracting parties could improve efficiency through renegotiation. Does the possibility of costless renegotiation after the settlement of the debt covenant preempt the value of using conservative accounting measurement rules? The answer is somewhat surprising: the possibility of ex post renegotiation intensifies earnings management and thus could make conservatism more attractive.

The only case in which renegotiation is possible is when the state is *Bad* but measured as *good*.[11] Without renegotiation, the manager would take action a_M, resulting in an ex post efficiency loss of Δ^{Over}. Thus, the financier could "bribe" the manager to take action a_F by sharing with the manager some surplus from the saving of Δ^{Over}. Denote the manager's bargaining power as $\mu\in[0,1]$ and consider a Nash bargaining solution. The manager's payoff in the *Bad* state with $r=g$ changes from X_B to $X_B+\mu\Delta^{Over}$. Anticipating the increased payoff in the *Bad* state with $r=g$, the manager's earnings management β^{**} is determined by the new first-order condition

$$q_B(X_B+\mu\Delta^{Over})(1-\gamma_P) = hK'(\beta^{**}) \tag{8}$$

Comparing it with its counterpart in the baseline model (Eq. (5)), it is straightforward that $\beta^{**}\geq\beta^*$. In addition to receiving the private benefit, the manager also receives a fraction of the surplus resulting from the renegotiation. As a result, $r=g$ becomes more valuable to the manager. As the marginal benefit of earnings management increases, the manager chooses a higher level of earnings management. Therefore, while renegotiation improves the ex post action taken at date 1, it intensifies ex ante earnings management. As a result, conservatism is even more attractive.[12]

[11] If the state is Good, there are two cases. In the case $r=g$ renegotiation is not necessary because the manager takes a_M efficiently. In the case of $r=b$ renegotiation is not feasible because the firm does not have any wealth to pay the financier and the private benefit is not pledgable. If the state is Bad and measured as bad, renegotiation is not necessary because the financier takes a_F efficiently.

[12] Another possible solution combines a non-contingent contract with renegotiation. The firm retains control right by default and the financier could bribe the firm to take a_F in the Bad state. While this arrangement implements socially optimal actions in both states without inducing the cost of earnings management and verification, it does have one drawback. It requires a face value higher than D^* in the baseline model. Thus, if the cash flow Y is limited, there is a region in which this arrangement is not feasible but the contract in the baseline model is still feasible. See Aghion and Bolton (1992) for more details of results in this line.

4.4. Two types of conservatism

One limitation of this paper is that it focuses only on one aspect of a conservative rule, namely, the differential verification requirement. As such, all the results in the paper are obtained under the assumption that it is optimal to recognize a given transaction characteristic. Therefore, the model describes the "interior" form of conservatism but does not directly address the "corner solution" form of conservatism. Revenue recognition is an example of the interior form of measurement in which r could be either g or b, depending on t.

Corollary 2 shows that the value of using a transaction characteristic depends on its quality in terms of verifiability, reliability and relevance. Thus, it could be optimal not to use a transaction characteristic when the quality of a transaction characteristic deteriorates, leading to a corner solution. The corner solution corresponds to the more extreme types of conservatism in practice, such as expensing R&D in which $r=b$ regardless of t. It might be argued that the transaction characteristics indicative of the economic substance of R&D are often difficult to verify (a high δ) and vulnerable to managers' influence (a low h). As a result, it could be optimal not to capitalize any R&D expenditure. That is, $r=b$ regardless of t and the verification of positive transaction characteristics that lead to $r=g$ is absent. This type of conservatism requires a model that focuses on the first instrument of the design of measurement rules and is left to future research. The classification of interior-form versus corner-solution-form conservatism also corresponds to the classification of conditional versus unconditional conservatism (e.g., Beaver and Ryan, 2005).

4.5. Does the value of conservatism reverse as the conservative bias for current contracts reverse in future?

One criticism of conservatism is that the conservative bias in current period leads to upward bias in future periods, as expressed by FASB: "Understating assets or overstating liabilities in one period frequently leads to overstating financial performance in later periods" (FASB 2010 BC3.28). It is interpreted that whatever value conservatism has in one period is inevitably reversed in others. This concern seems to be an important consideration when conservatism is eliminated from the FASB and IASB's joint conceptual framework (FASB, 2010). In this extension, I show that when a conservative bias exists and reverses in the future, it does not diminish the efficiency of conservatism for contracting.[13] The intuition relies on a careful differentiation of ex ante contractibility versus ex post observability of information.

To examine this issue, the model has to be extended to multiple periods. A simple way is to repeat the same stage game every period. Suppose every period the firm discovers a project that needs financing. All the payoffs of the projects across periods are independent and identically distributed. The firm enters into one new contract to finance the newly discovered project each period. The timeline could be depicted as follows:

date	$t-1$	t	$t+1$	$t+2$
Project t	Contract t signed	ω^t measured	ω^t realized	
Project $t+1$		Contract $t+1$ signed	ω^{t+1} measured	ω^{t+1} realized

Further, so far the state ω has been assumed to be not contractible at date 0. Now I also assume that it is observable ex post at date 1. This assumption is implicitly behind the above criticism. If ω is not observable at date 1, then we cannot ascertain the existence of the bias, rendering the criticism moot in the first place. Specifically, at date t, the state of project t, ω^t, is measured as $r^t(\omega^t)$. The bias of the accounting report for contract t is conservative if $r^t(\omega^t)-\omega^t<0$. Similarly, at date $t+1$, the state of project $t+1$, ω^{t+1}, is measured as $r^{t+1}(\omega^{t+1})$. In addition, ω^t is realized at date $t+1$. The realization of ω^t then reverses the bias in the previous measurement $r^t(\omega^t)$. That is, the reversal, $-(r^t(\omega^t)-\omega^t)$, is added to the accounting report at date $t+1$. The aggregate accounting report at date $t+1$ is

$$r^{t+1}(\omega^t,\omega^{t+1})=r^{t+1}(\omega^{t+1})+(\omega^t-r^t(\omega^t)).$$

$r^{t+1}(\omega^t,\omega^{t+1})$ has an upward bias $\omega^t-r^t(\omega^t)>0$ because contract t has a conservative bias, *i.e.*, $r^t(\omega^t)-\omega^t<0$. Under-measuring state ω^t at date t leads to the over-measurement of state ω^{t+1} at date $t+1$. In this sense, FASB's observation is correct.

Does contract $t+1$ have to use $r^{t+1}(\omega^t,\omega^{t+1})$ as it is? From the contracting perspective, recall that at date t when contract t is settled, ω^t is observed. In other words, the conservative bias $r^t(\omega^t)-\omega^t$ is transparent. Therefore, contract $t+1$ could use a modified accounting report $r^{t+1}_{Modified}(\omega^t,\omega^{t+1})=r^{t+1}(\omega^t,\omega^{t+1})-(\omega^t-r^t(\omega^t))=r^{t+1}(\omega^{t+1})$ to exclude the impact of the reversal of the conservative bias from contract t. As a result, the conservative bias used in contract t is not carried over to contract $t+1$. FASB's reason for eliminating conservatism from the conceptual framework is thus flawed from the contracting perspective.

Consider the example in which the outcome of R&D is not ex ante contractible but ex post observable. At the time the current contract was negotiated, it was excluded from measurement (or expensed) for contracting purpose because of its lack of reliability. However, one period later, after the state that determines the outcome of the R&D is observed but before

[13] I operate under the assumption that there exists a conservative bias when a conservative rule is in place. This assumption itself is nebulous in that the benchmark for the bias is not specified. Because a conservative rule mitigates the manager's aggressive influence, the direction of the net bias is not certain. See Section 4.4 for the discussion of the two different types of conservatism.

the actual benefit pays out, the contracting parties learn the magnitude of the conservative bias resulting from the expensing, and expect it to reverse when the actual benefit of the R&D pays out later. The key observation is that when the information that is not used in the previous contract due to its lack of reliability becomes observable ex post, it can be used for the *new* contract. That is, at the time of negotiating the new contract, the contracting parties could use the knowledge about the conservative bias from the previous contract to make appropriate adjustment to exclude the confounding effects of its expected reversal. As a result, due to the differential timing of the two contracts and the difference between ex ante contractibility and ex post observability of information, the conservative bias in the current contract does not affect the new contract.

5. Literature review

The two-step representation of accounting measurement, which separates the property of an accounting report from that of an accounting rule that generates the report, differentiates my paper from many models on conservatism. For example, Chen et al. (2007) also study the role of conservatism in dampening the insiders' earnings management. In their model, efforts lead to economic earnings, which in turn are converted to reported earnings. Both earnings management and conservatism are defined as direct influence on the second mapping from economic earnings to reported earnings. The two-step representation adds transaction characteristics between economic earnings (economic substance) and reported earnings (accounting report). This allows me to define earnings management as the influence on the first step from economic substance to transaction characteristics, and define conservatism as a property of an accounting rule that maps from transaction characteristics to reported earnings. As a result, the two models are substantially different.

As discussed in the Introduction, with a reduced-form representation of accounting measurement and conservatism, many models essentially turn the evaluation of conservatism into a comparison of decision costs associated with different measurement errors. For example, Gigler et al. (2009) show that for a project that has been financed already, a false negative error is more costly than a false positive error. As a result, conservatism, defined as trading a higher false negative error for a lower false positive error, reduces debt contracting efficiency. Similarly, other papers explore frictions that alter the relative costs in different settings. For example, by adding a non-contractible ex post asset substitution problem that raises the cost of a false positive signal, Caskey and Hughes (2012) show that conservatism could be efficient when the asset substitution problem is sufficiently severe. Li (2010) introduces costs of renegotiation and Jiang (2011) brings in non-accounting information to find regions where conservatism could be efficient. Lu et al. (2011) introduce a value-enhancing expansion opportunity that is traded off with an asset substitution problem. In Nan and Wen (2011), conservatism could be efficient if the proportion of bad firms is large, which makes a false positive signal more costly.

It is worth noting that there are two types of agency problems in this context. One is the agency problem in the economic setting that creates the demand for accounting information, and the other is the agency problem with the accounting measurement process that directly affects the design of accounting rules. The models above, except (Chen et al., 2007), focus exclusively on the first friction to evaluate conservatism. Antle and Gjesdal (2001) and Beyer (2012) define conservatism in an articulated context of accounting measurement, expense recognition in the former and lower of cost or market in the latter. That the conditions for conservatism to be valuable identified in both papers rely heavily on the specifics of their economic settings that is, on the comparison of the relative costs of measurement errors, seems to be related to the lack of managers' opportunistic influence on accounting measurement in their models. In Gox and Wagenhofer (2009, 2010) the main results are obtained without the second agency problem as well.

There are also models on conservatism in a principal-agent setting. Antle and Lambert (1988) motivate conservatism from the auditor's asymmetric loss function and Antle and Nalebuff (1991) further endogenize the auditor's preference from the strategic interaction between the auditor and the privately informed manager. In Kwon et al. (2001), conservatism loosens the limited liability of the agent and thus improves efficiency. Gigler and Hemmer (2001) model the link between the bias in accounting measurement and the incentives for the managers to issue voluntary disclosure. They argue that the concave earnings-return relation does not necessarily result from the conservatism in accounting. Bagnoli and Watts (2005) and Chen and Deng (2010) model conservatism as a signaling device to convey the manager's private information.

Defining conservatism as differential verification requirements also relates this paper to the literature on costly state verification and conditional investigation. In Townsend (1979) the firm tends to claim a low report in an attempt to extract concessions from lenders who then respond with more verification of the low report. In my model, the firm has incentive to inflate the report so as to prevent intervention from the lenders, inducing more verification of a high report. Thus, Townsend (1979) is more appropriate for a short-term debt contract in which the report is the same as cash payment, whereas my model focuses on a long-term debt contract that demands accounting reports (earnings) to settle the covenant in the interim.[14] As I argued in the introduction, as far as the use of accounting reports is concerned, users' concerns tend to be more about the inflation of earnings than about the opposite. Baiman and Demski (1980) and Dye (1986) study a principal-agent model and conclude the optimal investigation policy depends on the agent's utility function in general.

[14] In practice earnings and cash typically move in opposite directions. Empirical research finds firms that are doing well and expanding have reductions in cash and firms that are doing poorly and contracting have increases in cash (see, e.g., Dechow et al., 1998).

Christensen and Demski (2004) extend Baiman and Demski (1980) by allowing the agent to report the output. They highlight the asymmetric value of additional information in motivating agents' effort and truth-telling, but do not explicitly model the accounting measurement process and the design of accounting rules.

6. Empirical and policy implications

The large empirical literature has relied on the contracting explanation of conservatism in Watts (2003a). By formalizing it, my model provides a formal justification for many empirical findings in the literature. In particular, it substantiates empirical predictions about the consequences and determinants of conservatism. When conservatism is considered as an institutional parameter, the model predicts that conservatism constrains the manager's ex post opportunism and lowers the interest rate. When conservatism is viewed as a choice variable, the model predicts that conservatism level is higher if the reliability or hardness of a firm's transactions is lower or if the agency cost associated with the manager is higher. Further, the cost of earnings management h could also be broadly interpreted as the strength of other mechanisms that constrain the manager's earnings management, such as reputation, corporate governance, and legal regimes. Thus, the model predicts that conservatism could be a substitute for these mechanisms. These predictions are consistent with the existing evidence such as Ball et al. (2000), Watts (2003b), Zhang (2008), Watts and Zuo (2011), and Kim et al. (forthcoming).

Second, the model strengthens the contracting explanation of conservatism. For example, the efficiency of conservatism does not rely on the assumption that the cost of overinvestment is larger than that of underinvestment. For another example, the financier's posterior beliefs about the state do not play a direct role in the model, which has two important implications. First, earnings management in equilibrium could be observable ex post as long as it is not contractible ex ante. This equilibrium existence of transparent earnings management is empirically important. Many empirical studies of earnings management use direct proxies for earnings management and thus assume that earnings management is observable. These studies would be self-contradictory if they relied on a theory that requires earnings management be non-observable. Second, that the contracting parties' posterior beliefs do not affect the model directly implies that an accounting report is useful for contracting as long as it is *correlated* with the state; in particular, it *does not have to be* incrementally informative to contracting parities. This makes the contracting view of accounting measurement directly testable.

Finally, the model might have some implications for accounting standard setting. Arguably, one of the most difficult issues in standard setting is to deal with managers' ex post opportunistic response to standards, as evident in standards for such controversial issues as consolidation, securitization, and leases. In the presence of this difficulty (non-contractibility of earnings management) and managers' opportunistic incentives, my model shows that the optimal accounting rule is conservative even if the neutrality of accounting reports is the desirable goal. There is a difference between the properties of an accounting report and those of an accounting rule that generates the report. Even if it is agreed on that a neutral accounting report is desirable, the accounting rule, which is the domain of accounting standard setting, is conservative. This issues a cautionary note to the approach of pursing neutral accounting reports via neutral accounting rules.

7. Conclusion

This paper formalizes the long-lasting intuition in accounting that conservatism serves as an ex ante safeguard against managers' ex post opportunistic influence on accounting measurement. The key innovation is to use a two-step representation of accounting measurement. The representation features earnings management as the main friction and specifies instruments in the design of an accounting rule. With this framework articulated, it is easy to see that conservatism is optimal as long as the manager has the incentive and ability to inflate accounting reports. This rationale is more general than the requirement imposed on the comparison of the costs of measurement errors of the accounting report. Thus, the paper substantiates the generality of conservatism as measurement principle by shifting the focus from the properties of an accounting report to the properties of an accounting rule that generates the report.

In addition to its contribution to the debate on conservatism, this paper also illustrates the importance of opening the black box of accounting measurement. To understand institutional features of accounting practice, two questions could be asked. First, given a feature of accounting information, how is it used (optimally) and what are its economic consequences? Second, how is the accounting measurement process designed to generate accounting information with a targeted feature? The previous literature has devoted most attention to the first question and as a result dealt with the institutional features of accounting practice indirectly at most. This paper takes one step towards answering the second question and shows that the two-step representation of accounting measurement is a useful tool.

Finally, this paper focuses on contracting as the economic setting that calls for accounting measurement. Contracting setting has the nice feature that the contracting parties' posteriors about the state do not directly interfere with the ex post settlement of the contract. The model could be extended to other economic settings that demand accounting measurement, such as informing capital markets. Gao (2012) models a general setting of the demand for accounting information.

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Appendix

Proof of Lemma 1 and 2, Proposition 1, and Corollary 1. By definition, the total probability of verification τ is

$$\tau(\beta,\gamma_t) \equiv \Pr(t=P)\gamma_P + \Pr(t=N)\gamma_N = (q_G\phi_G + q_B(1-\phi_B+\beta))\gamma_P + (q_G(1-\phi_G)+q_B(\phi_B-\beta))\gamma_N.$$

$$\frac{\partial\tau}{\partial\gamma_P} = (q_G\phi_G + q_B(1-\phi_B+\beta)) > 0,$$
$$\frac{\partial\tau}{\partial\gamma_N} = (q_G(1-\phi_G)+q_B(\phi_B-\beta)) > 0,$$
$$\frac{\partial\tau}{\partial\beta} = q_B(\gamma_P-\gamma_N).$$

For the benchmark case, β is a choice variable at date 0. Because $\partial V^{BM}/\partial\gamma_N = -\delta(d\tau/d\gamma_N) < 0$ for any β and γ_t, $\gamma_N^{BM}=0$ for any β and γ_P. Because $\partial V^{BM}/\partial\beta = -hK' - q_B\Delta^{Over}(1-\gamma_P) - \delta q_B\gamma_P < 0$, $\beta^{BM}=0$ for any γ_P. Because $\partial V^{BM}/\partial\gamma_P = -\delta(d\tau/d\gamma_P) < 0$, $\gamma_P^{BM}=0$. Thus, $c^{BM}=0$. This proves Lemma 1.

From Eq. (5), we have $\beta^* > 0$ if $\gamma_P < 1$. Because Eq. (5) is independent of γ_N, $\partial\beta^*/\partial\gamma_N = 0$. Differentiating Eq. (5) with respect to γ_P, we have $\partial\beta^*/\partial\gamma_P = -q_B X_B/hK'' < 0$. This proves Lemma 2.

For Proposition 1, I prove that $\gamma_N^* = 0$ and $\gamma_P^* > 0$ for a sufficiently small δ. It is a straightforward application of Kuhn–Tucker theorem except that the cost of verification $\delta\tau$ in the objective function does not behave well: it is neither always increasing nor always convex in γ_P. To see the possibility of non-increasing,

$$\frac{d\tau}{d\gamma_P} = \frac{\partial\tau}{\partial\gamma_P} + \frac{\partial\tau}{\partial\beta^*}\frac{\partial\beta^*}{\partial\gamma_P}.$$

$\partial\tau/\partial\gamma_P > 0$, $\partial\tau/\partial\beta^* > 0$, but $\partial\beta^*/\partial\gamma_P < 0$. That is, the marginal cost of verification could be negative. The intuition is that an increase in γ_P has both a direct and an indirect effect on τ. The direct effect is that it triggers verification more often, holding earnings management constant, *i.e.*, $\partial\tau/\partial\gamma_P > 0$. The indirect effect is that it reduces earnings management, which decreases the probability of $t=P$ being presented and thus of verification being triggered, *i.e.*, $\partial\beta^*/\partial\gamma_P < 0$. As a result, $d\tau/d\gamma_P$ could be negative. To see the possibility of non-convexity

$$\frac{d^2\tau}{d\gamma_P^2} = q_B\left(2+\gamma_P\frac{q_B X_B K'''}{h(K'')^2}\right)\frac{\partial\beta^*}{\partial\gamma_P}$$

could be clearly negative. A sufficiently small δ assures that the properties of the objective function are not dominated by $\delta\tau$.

With this, I proceed to prove $\gamma_N^* = 0$ and $\gamma_P^* > 0$. Because

$$\frac{\partial V}{\partial\gamma_N} = -\delta\frac{d\tau}{d\gamma_N} = -\delta(q_G(1-\phi_G)+q_B(\phi_B-\beta^*)) < 0,$$

$\gamma_N^* = 0$ for any γ_P and β^*. To prove $\gamma_P^* > 0$, I show that $\partial V/\partial\gamma_P$ evaluated at $\gamma_P = 0$ is strictly positive

$$\frac{\partial V}{\partial\gamma_P} = q_B\Delta^{Over}\beta^* - (q_B\Delta^{Over}(1-\gamma_P) + hK'(\beta^*))\frac{\partial\beta^*}{\partial\gamma_P} - \delta\frac{d\tau}{d\gamma_P} = q_B\left(\Delta^{Over}\beta^* + (\Delta^{Over}+X_B)\frac{K'}{K''}\right) - \delta\frac{d\tau}{d\gamma_P}. \tag{9}$$

The second equality utilizes the first-order condition for β^* (Eq. (5)) and the expression of $\partial\beta^*/\partial\gamma_P = -q_B X_B/hK''$. As mentioned in the text, the first term in Eq. (9) is the marginal benefit of γ_P through its interaction with earnings management. From $\partial\beta^*/\partial\gamma_P < 0$ and $(K'/K'')' > 0$, we know that β^* is maximized at $\gamma_P = 0$ and thus the first term in Eq. (9) is maximized at $\gamma_P = 0$. The second term is the marginal verification cost of γ_P, as analyzed above. Therefore, with a sufficiently small δ, $\partial V/\partial\gamma_P|_{\gamma_P=0} > 0$ and $\gamma_P^* > 0$, hence Proposition 1.

To conduct comparative statics in order to prove Corollary 1, I first prove that γ_P^* is unique and interior under Assumption 1: δ is sufficiently small and h is sufficiently high. At $\gamma_P = 1$, $\beta^* = 0$. Evaluating $\partial V/\partial\gamma_P$ at $\gamma_P = 1$, we have

$$\frac{\partial V}{\partial\gamma_P}\bigg|_{\gamma_P=1} = -\delta\frac{d\tau}{d\gamma_P}\bigg|_{\gamma_P=1} = -\delta\left(\frac{\partial\tau}{\partial\gamma_P}+\frac{\partial\tau}{\partial\beta^*}\frac{\partial\beta^*}{\partial\gamma_P}\right)\bigg|_{\gamma_P=1} = -\delta(\left(q_G\phi_G+q_B(1-\phi_B)-q_B\frac{q_BX_B}{hK''(0)}\right).$$

If h is sufficiently high, the indirect effect of γ_P on τ is mild. As a result, $d\tau/d\gamma_P|_{\gamma_P=1} > 0$ and $\partial V/\partial\gamma_P|_{\gamma_P=1} < 0$. Furthermore, a sufficiently small δ assures that the first-order condition is both necessary and sufficient (because $\gamma_N^* = 0$ for any γ_P, Problem 2 is effectively a single-variable maximization problem.) Together, Assumption 1 assures that γ_P^* satisfying $\partial V/\partial\gamma_P^* = 0$ is unique and interior. With the first-order condition $\partial V/\partial\gamma_P^* = 0$ and $\gamma_N^* = 0$ for any γ_P, the comparative statics for c^* are obtained by differentiating $\partial V/\partial\gamma_P^* = 0$ with respect to relevant parameters. That is, $dc^*/di = d\gamma_P^*/di$,i is a relevant parameter. For example, for $i = h$,

$$\frac{dc^*}{dh} = \frac{d\gamma_P^*}{dh} = -\frac{q_B\left(\Delta^{Over}+(\Delta^{Over}+X_B)\left(\frac{K'}{K''}\right)'\right)\frac{\partial\beta^*}{\partial h}-\delta\left(q_B\frac{\partial\beta^*}{\partial h}+q_B\gamma_P\frac{\partial^2\beta^*}{\partial\gamma_P^*\partial h}\right)}{\frac{d^2V}{d\gamma_P^{*2}}} < 0.$$

Other results could be obtained similarly. □

Proof of Corollary 2. The proof is by a straightforward application of the envelope theorem

$$\frac{dV^*}{dh} = \frac{\partial V}{\partial h}\bigg|_{\gamma_P=\gamma_P^*,\gamma_N=\gamma_N^*=0} = -q_B\Delta^{Over}(1-\gamma_P^*)\frac{\partial\beta^*}{\partial h}+\frac{\beta^{*2}}{2}-\delta q_B\gamma_P^*\frac{\partial\beta^*}{\partial h} > 0,$$

$$\frac{dV^*}{d\phi_G} = \frac{\partial V}{\partial\phi_G}\bigg|_{\gamma_P=\gamma_P^*,\gamma_N=\gamma_N^*=0} = q_G\Delta^{Under}-\delta(q_G\gamma_P^*) > 0,$$

$$\frac{dV^*}{d\phi_B} = \frac{\partial V}{\partial\phi_B}\bigg|_{\gamma_P=\gamma_P^*,\gamma_N=\gamma_N^*=0} = q_B\Delta^{Over}(1-\gamma_P^*)+\delta(q_B\gamma_P^*) > 0,$$

$$\frac{dV^*}{d\delta} = \frac{\partial V}{\partial\delta}\bigg|_{\gamma_P=\gamma_P^*,\gamma_N=\gamma_N^*=0} = -\tau < 0.$$

$dV^*/dh > 0$ utilizes $K(\beta) = \beta^2/2$ and $dV^*/d\phi_G > 0$ relies on δ being sufficiently small. Applying the total differentiation to V^* with respect to ϕ_i and h, we have $0 = dV^* = (dV^*/dh)\,dh+(dV^*/d\phi_G)\,d\phi_G+(dV^*/d\phi_B)\,d\phi_B$. Therefore, there is a trade-off between h and ϕ_i because

$$\frac{dh}{d\phi_G} = -\frac{dV^*/d\phi_G}{dV^*/dh} < 0, \quad \frac{dh}{d\phi_B} = -\frac{dV^*/d\phi_B}{dV^*/dh} < 0. \quad \square$$

Proof of Proposition 2. From Eq. (7), by treating γ_t and τ as constants, we have $q_G\phi_Gp(\partial D/\partial\hat{\beta}) = q_B(1-\gamma_P)L > 0$. In equilibrium, $\hat{\beta} = \beta^*$ and neither β^* nor γ_P^* cannot be treated as constant. Substituting $\gamma_N^* = 0$ in to Eq. (7) and differentiating it with respect to c^* or γ_P^*

$$q_G\phi_Gp\frac{dD}{dc^*} = q_G\phi_Gp\frac{dD}{d\gamma_P^*} = q_B(1-\gamma_P)L\frac{\partial\beta^*}{\partial\gamma_P}-q_B\beta^*L+\delta\frac{d\tau}{d\gamma_P} = \left(q_B(1-\gamma_P)\frac{\partial\beta^*}{\partial\gamma_P}-q_B\beta^*\right)L+q_B\left(\Delta^{Over}\beta^*+(\Delta^{Over}+X_B)\frac{K'}{K''}\right)$$

$$= -q_BX_B\beta^*+q_B\left((1-\gamma_P^*)\frac{\partial\beta^*}{\partial\gamma_P}+\frac{K'}{K''}\right)L = -q_BX_B\beta^* < 0.$$

The second step utilizes the first-order condition of $\partial V/\partial\gamma_P^* = 0$, the third the definition of $\Delta^{Over} = L-X_B$, and the last the expression of $\partial\beta^*/\partial\gamma_P$ and Eq. (5). □

Proof of Proposition 3. With the new Q_B^g and Q_G^b, Problem 2 could be rewritten as

$$\max_{(\gamma_P,\gamma_N)} V = V^{FB}-q_B\Delta^{Over}(1-\phi_B+\beta^*)(1-\gamma_P)-q_G\Delta^{Under}(1-\phi_G)(1-\gamma_N)-hK(\beta^*)-T$$

subject to

$$hK'(\beta^*) = q_BX_B(1-\gamma_P)$$
$$\gamma_t \in [0,1].$$

When earnings management is contractible, $\partial V^{BM}/\partial\beta = -q_B\Delta^{Over}(1-\gamma_P)-hK' < 0$ for any γ_t. Thus, $\beta^{BM} = 0$. The first-order conditions for γ_t are obtained accordingly

$$\frac{\partial V^{BM}}{\partial\gamma_N} = q_G\Delta^{Under}(1-\phi_G)-T'(\gamma_N) = 0,$$

$$\frac{\partial V^{BM}}{\partial \gamma_P} = q_B \Delta^{Over}(1-\phi_B) - T'(\gamma_P) = 0.$$

The Hessian matrix,

$$\begin{pmatrix} -T''(\gamma_N) & 0 \\ 0 & -T''(\gamma_P) \end{pmatrix}$$

is negative definite. Because $T'' > 0$, $\gamma_P^{BM} > \gamma_N^{BM}$ if and only if $q_B \Delta^{Over}(1-\phi_B) > q_G \Delta^{Under}(1-\phi_G)$.

When earnings management is not contractible, we have $\partial\beta^*/\partial\gamma_P < \partial\beta^*/\partial\gamma_N = 0$ by differentiating the IC condition. Thus, $\gamma_N^* = \gamma_N^{BM}$. In contrast,

$$\frac{\partial V}{\partial \gamma_P} = q_B \Delta^{Over}(1-\phi_B) + q_B\left(\Delta^{Over}\beta^* + (\Delta^{Over} + X_B)\frac{K'}{K''}\right) - T'(\gamma_P).$$

Because $\partial^2 V/\partial\gamma_P^2 = q_B(\Delta^{Over} + (\Delta^{Over} + X_B)(K'/K'')')(\partial\beta^*/\partial\gamma_P) - T'' < 0$, $\partial V/\partial\gamma_P$ is decreasing in γ_P. Evaluating $\partial V/\partial\gamma_P$ at $\gamma_P = \gamma_P^{BM}$, we have

$$\left.\frac{\partial V}{\partial \gamma_P}\right|_{\gamma_P = \gamma_P^{BM}} = q_B\left(\Delta^{Over}\beta^* + (\Delta^{Over} + X_B)\frac{K'}{K''}\right)\Bigg|_{\gamma_P = \gamma_P^{BM}} > 0.$$

Thus, $\gamma_P^* > \gamma_P^{BM}$ and $c^* > c^{BM}$. Further, in a symmetric case, it is easy to verify that $\gamma_P^* > \gamma_N^* = \gamma_P^{BM} = \gamma_N^{BM} > 0$ and thus $c^* > 0$. □

Proof of Proposition 4. With the newly defined Q_B^g and Q_G^b, Problem 2 could be rewritten as

$$\max_{(\gamma_P,\gamma_N)} V = V^{FB} - q_B \Delta^{Over}(\gamma_N(1-\pi) + \beta^*(1-\pi\gamma_P - \gamma_N(1-\pi))) - q_G \Delta^{Under}\gamma_P(1-\pi) - hK(\beta^*)$$

subject to

$$hK'(\beta^*) = q_B X_B(1-\pi\gamma_P - \gamma_N(1-\pi))$$
$$\gamma_t \in [0,1].$$

When earnings management is contractible, $\partial V^{BM}/\partial\beta = -q_B\Delta^{Over}(1-\pi\gamma_P - \gamma_N(1-\pi)) - hK' < 0$ for any γ_t. Thus, $\beta^{BM} = 0$. Because $\partial V^{BM}/\partial\gamma_P = -q_G\Delta^{Under}(1-\pi) < 0$ and $\partial V^{BM}/\partial\gamma_N = -q_B\Delta^{Over}(1-\pi) < 0$, $\gamma_N^{BM} = \gamma_P^{BM} = 0$.

When earnings management is not contractible, by differentiating the IC condition, we have $\partial\beta^*/\partial\gamma_P = -q_B X_B/hK''\pi$ and $\partial\beta^*/\partial\gamma_N = -q_B X_B/hK''(1-\pi)$. Because $\pi \in (\frac{1}{2},1)$, $\partial\beta^*/\partial\gamma_P < \partial\beta^*/\partial\gamma_N < 0$.

The effects of γ_t on firm value are

$$\frac{\partial V}{\partial \gamma_N} = q_B\left(\Delta^{Over}\beta^* + (\Delta^{Over} + X_B)\frac{K'}{K''}\right)(1-\pi) - q_B\Delta^{Over}(1-\pi),$$
$$\frac{\partial V}{\partial \gamma_P} = q_B\left(\Delta^{Over}\beta^* + (\Delta^{Over} + X_B)\frac{K'}{K''}\right)\pi - q_G\Delta^{Under}(1-\pi).$$

Suppose (γ_P^*, γ_N^*) are the optimal solutions and we prove that $\gamma_P^* > \gamma_N^*$ for the symmetric case of $q_G = q_B$ and $\Delta^{Under} = \Delta^{Over}$. We first prove $\gamma_P^*\gamma_N^* < 1$ by contradiction. If $\gamma_P^* = \gamma_N^* = 1$, then $(1-\pi\gamma_P^* - \gamma_N^*(1-\pi)) = 0$ and $\beta^* = 0$, which imply that $\partial V/\partial\gamma_N|_{\gamma_N = 1} = -q_B\Delta^{Over}(1-\pi) < 0$ and $\partial V/\partial\gamma_P|_{\gamma_P = 1} = -q_G\Delta^{Under}(1-\pi) < 0$, contradicting $\gamma_P^* = \gamma_N^* = 1$. Thus, $\gamma_P^*\gamma_N^* < 1$. This implies $\beta^* > 0$ and $(\partial V/\partial\gamma_P - \partial V/\partial\gamma_N)|_{\gamma_P = \gamma_P^*, \gamma_N = \gamma_N^*} = q_B(\Delta^{Over}\beta^* + (\Delta^{Over} + X_B)K'/K'')(2\pi - 1) > 0$. Second, we prove that $\gamma_P = \gamma_N = 0$ is not the optimal solution by contradiction. If $\gamma_P^* = \gamma_N^* = 0$, then $\beta^* = \beta^0 \equiv \arg\max hK'(\beta^*) - q_B X_B$ is maximized. By the assumption that earnings management is sufficiently important,

$$\left.\frac{\partial V}{\partial \gamma_N}\right|_{\gamma_N = 0, \gamma_P = 0} = q_B\left(\Delta^{Over}\beta^0 + (\Delta^{Over} + X_B)\frac{K'(\beta^0)}{K''(\beta^0)}\right)(1-\pi) - q_B\Delta^{Over}(1-\pi) > 0,$$

contradicting $\gamma_N^* = 0$. Finally, collecting $\gamma_P^*\gamma_N^* < 1$, $(\partial V/\partial\gamma_P - \partial V/\partial\gamma_N)|_{\gamma_P = \gamma_P^* \gamma_N = \gamma_N^*} > 0$, and $\gamma_P = \gamma_N = 0$ is not optimal, we have either $\partial V/\partial\gamma_P|_{\gamma_P = \gamma_P^*} \geq 0 > \partial V/\partial\gamma_N|_{\gamma_N = \gamma_N^*}$, which means that $\gamma_P^* > 0 = \gamma_N^*$ or $\partial V/\partial\gamma_P|_{\gamma_P = \gamma_P^*} > 0 \geq \partial V/\partial\gamma_N|_{\gamma_N = \gamma_N^*}$ which means that $\gamma_P^* = 1 > \gamma_N^*$. Thus, for the symmetric case, $c^* > 0$. □

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An Empirical Investigation of the Relationship between Corporate Ownership Structures and their Performances (Evidence from Tehran Stock Exchange)

Mohammad Namazi*, Ehsan Kermani

Department of Accounting, College of Economics, Management and Social Science, Shiraz University, Shiraz, Iran
*Corresponding author: mnamazi@rose.shirazu.ac.ir

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Abstract This study investigates the effects of ownership structure on the performance of the listed companies in the Tehran Stock Exchange (TSE). Consequently, a main hypothesis is presented, which states that there is a significant relationship between companies' ownership structures and their performances and then five sub-hypotheses are provided. For testing the hypotheses, the statistical "panel data" technique is employed. For testing each hypotheses, 4 accounting and economics performance evaluation variables models based on different ownership structures are established. The statistical population includes 66 companies in the period between 2003-2008. Based on the research results, all hypotheses except the fourth one, were confirmed. The findings revealed a significant negative relationship between the "institutional ownership" and companies' performances; and the relationship between "corporate ownership" and companies' performance generally was significantly positive. "Management ownership", however, would affect the performance significantly and negatively. For "foreign ownership", there was no information that would indicate ownership of the foreign investors in our samples companies. With respect to the "company ownership", just in the models based on the accounting variables (i.e., ROA and ROE) coefficients are significant and negative. But in the models based on the "market variables" (i.e., Q-Tobin and MBVR) coefficients are not significant. In general, there was a significant relationship between companies' ownership structures and their performances.

Keywords: *ownership structure, corporate governance, Tehran Stock Exchange (TSE), panel data, performance evaluation*

1. Introduction

In its primitive form, agency theory, [30] and [6], with respect to the owner- management relations, hypothesizes that firms consist of two individuals; the agent (management) and the principal (the owner). The principal delegates authority of the decision makings concerning utilization of the firms' scarce resources to the agent based upon a designated fee schedule. However, since the objectives of the agent may be incompatible with the principal's objectives and their incentives may not be congruent, the agent's performance evaluation must be appropriately exerted [43].

Recently, the concept and applications of the basic agency theory, however, has been extended to more realistic situations-i.e., the corporate governance situations [60] and [58] in that, the role of the board of directors, management and those who are responsible in governing the corporation, are being identified and their potential relationships with corporate performances are being sought. However, as it will be explained later, the findings are primitive and sometimes opposite. Additionally, in developing countries, this kind of studies is in its early stages and a solid empirical studies are limited. (see e.g., [23] and [40], Hence, no conclusive results in this vital area can be derived from the existing literature.

Consequently, the major objective of this study is providing an empirical evidence to respond to this inquiry: does different corporations', ownership structure would lead to different financial performances? If that is the case, which form of the ownership structures, is the most appropriate one for enhancing the firms' financial performances? In approaching these questions, data for the companies listed in the Tehran Stock Exchange (TSE) will be extracted for 5 year period (2003-2008).

The structure of the paper is as follow. Section 2 is devoted to explain theoretical foundation of the paper. Section 3 reviews the domestic and foreign literature regarding the kinds of the ownerships and their significance in the corporate governance domain. The research method ,including hypotheses, research variables ,model buildings, population and sample selection ,data collection method, and statistical test is provided in section 4. Section 5 reveals the findings of the study and hypotheses. The concluding remarks and discussion of the article is reported in section 6. Finally, section 7 offers suggestions for future studies.

2. Theoretical Structure

Theoretical framework of this study is centered on the concept of the "corporate governance". This concept is based upon governing corporations in such a manner to respond to the stockholders and other stakeholders' financial demands and performing managements' stewardship functions [28]. In essence, different groups have attempted to define corporate governance. One group defines it as an attempt to discover a structure in such a manner that the power of realizations and decision makings of the managers will be exerted for servicing the firm's stockholders by the best channel [58].

Another group emphasizes corporate governance from the economic realm and considers it as a means for making corporations more efficient by establishing appropriate infrastructures such as contracts and designing corporate rules and regulations. This view is focused on the principle of increasing the value (wealth) for the stockholders [37].

The Organization for Economic Cooperation and Development (OECD, 1998) also has defined corporate governance as an organizational structure among stockholders, board members and management which determines their responsibilities.

Recently, different corporate governance models have been introduced in the literature. [50] and [4], for example, identify two distinctive models:

English-American (Anglo.-Saxon), and

German-Japanese model.

In the first model, private ownership is the key matter and stock exchange is the major source for providing corporations' funds. In the second model, a corporation is viewed as a coalition of different groups with incompatible interests and thus the function of the top management is to reach to equilibrium among different stakeholders. [63] consider these two models as the "Control Originated" and "Arms-Length Financing" models.

Given the nature and objective of this study, the Arms-length financing model will be adopted.

3. Literature Review

Kumar [34] identifies two main ownership structures: 1) institutional ownership and 2) private ownership. The first kind of ownership is referred to as the percentage of the stocks from the whole stocks which is maintained by the public corporations. The corporations include insurance companies, financial institutions banks, public corporations and other government sections. The second structure consists of private ownership and is divided into the following sub-sections:

1) firm investors, 2) management investors and 3) foreign investors [13]

In Iran, until almost 5 years ago and before the emergence of the so called "The Principle 44", most businesses were under the ownership and control of the government. After promulgation of this principle", government was forced to follow privatization and offering public stocks to private individuals. Thus, institutional firms were reduced and private ownerships were increased. The first private ownership structure is "Corporate Shareholding" in that public ownership is transferred to private firms which are known as "corporate shareholding". These firms attempt to obtain more of the firms' stocks in order to control operations of the invested firms. Another significant group of this category is mainly "Investment Companies" that are striving to obtain other firms' stocks in an effort to optimize their profits.

The second private ownership structure is known as the "Managerial Shareholding" in that public stocks are offered to private individuals through the stock market mechanism. The separation of ownership and management has mostly occurred in this situation and some family firms are listed in this category.

The third type of the private ownership structure is via the foreign investments, which is based upon a particular laws and regulations. This type of ownership is very limited in Iran and thus, does not play a significant role in the TSE ownership structure [35] and [23]

Since in this study we would investigate two main variables- ownership structures and company's performance-in the TSE, merely those studies will be reviewed here which will support these two selected variables.

In Iran, limited empirical studies have been conducted in this domain directly. Thus, some researches in this field, which is somehow related to our study, will be reviewed. Furthermore, some of these studies are enunciated just to support employment of the selected variables and their selections in the performance evaluation realm.

3.1. Institutional Investors and Privatization

3.1.1. Foreign Studies

Tsaia and GU, [60] investigated the relationship between "institutional ownership" and "company performance" in the Casino Industry from 1999 to 2003. An institutional ownership was determined by the percentage of the stocks which public corporations maintained from the whole stocks. Corporations included insurance companies, financial institutions, banks, public corporations and other government sections. The study revealed that institutional ownership in Casinos could possibly help investors in this industry to reduce obstacles of separating management from ownership. In addition, financial institutions would prefer to invest in those Casinos which maintained lower financial leverages.

Fernando et al. [20], theoretically and experimentally, studied the difference in institutional ownerships and the level of stock prices among American companies in the NYSE and AMEX from 1985 to 2005. The findings showed that companies with higher values, did maintain more institutional ownerships and higher stock price levels and the positive relation between stock prices and the institutional ownership was independent of the liquidity consideration and sizes of the companies.

Cornett et al. [13] also investigated the relation between institutional investors' involvement and operational performances of the large firms. They found that there was a significant relationship between "operating cash flow returns" of the companies and the percentage of the institutional stock ownerships and institutional stockholders. However, this relationship was just observed for a sub-group of institutional investors that did have less business relations with the firms.

Elyasiani and Jia, [18] have also studied the dependence of the Bank Holding Company (BHC) and the "institutional ownership stability". The results of their study showed that first, the performance of the BHC Companies are related positively to institutional ownerships. Second, dependence, of the BHC Companies on returns is weaker than the dependence in the firms' industry. Third, this dependency is stronger in new deregulated years and for the BHC Companies, in which they have lower possibility of adjustments.

3.1.2. Domestic Studies

Ahmadzadeh et al. [2], studied the capital structure of the Bank Keshavarzi during ten years (1991-2000) and estimated its' cost of capital. The results of this study indicated that there was no relationship between capital structure and costs of the capital within this period and it showed that capital structure of this bank in 2000 was non-optimal.

Hasasyeganeh and Pouria Nasab [23] argued that the more active the shareholder is, the better supervision on the company's management performance could be exerted and the agency problems would be reduced. In addition, institutional investors, as the main owners, of the companies are responsible for effecting the company management to maintain a significant role in their investments.

Mahdavi and Maydari [35], after investigation of privatization experiments in socialist countries especially Czech, estimated the extent of the ownership focus in the stock exchanges and determined the profitability of different kinds of ownerships structures. The results demonstrated that in Czech and China, ownership focus has a positive effect on the company's' performance efficiency.

Rahchamani [52], also studied the role of the ownership structure and protection of the investors and shareholders' rights after privatization of the companies. The result exhibited that in countries which investors are supported less, the focus on the ownership is more and privatization and private ownership would cause a superior performance.

Mokarami [40] by presenting the modern structure in managing enterprises and creating values for all stakeholders, argued that the responsibility of the evaluation of the enterprise performance and existing managers are related to institutional stockholders.

3.2. Firm Investors

3.2.1. Foreign Studies

Cheung et al. [12] studied the relationship between market returns and accounting revenues for sample companies in Japan from 1975 to 1994. The results indicated that company's relationship between returns and revenues were negatively affected by the ownership level of the investment in real states, level of investments in other firms' stocks and financial leverages. However, the level of foreign ownership affects this relationship positively. The company ownership is the percentage of keeping stocks from all stock investments by the company and includes all kinds of the firms except those that are presented in the following sections.

Kapopoulos and Lazaretou [31] have also investigated the effects of ownership structure on the company's performance by studying 175 Greek companies. They concluded that more focus in ownership structure would be positively related to higher profitability of the firm; and for gaining a higher profitability, ownership with less scattering is required.

3.2.2. Domestic Studies

Rahman Seresht and Mazloomi [53] studied the relationship between companies' investors, management performance and their shares of ownerships for listed companies in the TSE. They investigated the role of the company's investors and attempted to reply to this question: Does the ownership structure of the organizations provide a convincing result for their different performances? The results revealed that different groups of the owners (real and legal person) did not maintain the same strength and congruencies to affect company's performances and generally the difference of ownership structures of the companies could explain some of the variations in the companies' performances.

Sinaie and Rezaian [57], by focusing on financial performances of the public corporations in TSE, attempted to review the capital structure and changes of the financial parameters within the companies in the kinds of ownership and industrial structures. They presented modern approaches in the development of the financial markets. Their findings illustrated that a strong relationship existed between companies' key variables –i.e. company size, profitability, development chances, tangible assets - and the capital structure of the companies.

Namazi and Shirzadeh [44] studied the effect of the capital structure on the profitability of the TSE companies in different industries. The results of their study exhibited that there was a positive relationship between capital structures and company's profitability; but this relationship was statistically weak and depended on the industry type and the definition of the profitability. In addition, optimal capital structure of different industries could be determined.

Nowravesh and Ebrahimi Kordlar [45] had also investigated the role of the company's investors in reducing informational asymmetry in the TSE. In this research, investment companies and other business institutions were defined as "investors companies". The results indicated that companies with higher percentages of the investors, would report more information concerning future profits and, as a result, one would observe more informational asymmetry in companies with lower investors.

3.3. Management Investors

3.3.1. Foreign Studies

Bhagat [9] studied the effects of the plans of sharing managers in the company's ownership and it's impacts on the shareholders' wealth. He concluded that this plan could increase share holders' wealth.

Murphy [42] and Jensen and Murphy [29] have also studied the relationship between managers' compensations and company's performances by expensing combinations of the measurable data and Black and Schools stock options models. The results of their studies indicated that there was a positive relationship between stock options and changes of the shareholders' possession.

Hill and Stevens [26] also investigated the relationship between the managers' rewards and accounting profits and stock prices in the New York Stock Exchange. They also studied the relationship between parts of the managers' rewards and low index annual stock revenues (the weak form of evaluating company's performances) and annual revenues without the relevant industry index (the strong form of evaluating company performances). Their study showed that there was a positive relationship between short-term reward managers' ownership and stock returns. And in those companies in which the manager had more stocks, a superior performance could be attained. In addition, the reward and ownership had more positive and significant relations with stock returns. In a time that managers' ownership was increased and most of his wealth was depended on the stock increase, managers' motivations for increasing stock returns would be enhanced as well.

Mishra et al. [39] have also investigated the firm values and its relationship with control structures. They studied a sample of 120 Norwegian companies and concluded that the relationship between family board of directors and company's values for newly established firms, companies with less board of director members and firms with one kind of stocks, is very strong.

Mcconaughy et al. [38] have also studied the effects of the family ownership on the company's capital structure and values. Their results indicated that firms which were governed by family structures had higher values and efficiency and also had fewer liabilities.

Anderson and Reeb [3] have also investigated the performance of the family companies. They found that the family companies had a superior performance in comparison with others. They also reported a non-liner relation between company's performance and percentages of the family ownerships; indicating that when family members are in the board of directors, a more favorable performance could be attained.

Enqvist [19] has investigated the relationship between management ownerships and shareholder's supervision with company's performance. By exerting the concept of "Q Tobin" for Swedish companies, he concluded that stockholders' supervision had negative impacts on the Q-Tobin.

Halpern et al. [24] studied the relation between management investors and company's values for the acquired firms. The results showed that there was a non-liner relation between moral hazard costs and management investors and they indicated that acquired firms could be divided based on management's investments. The division would be different according to the following criteria: 1) sources of the wealth gains, 2) managerial resistance, 3) persons who acquire the firms and 4) how shareholders' objectives are being achieved.

Mueller and Spitz-Oener [43] interpreted the relationship between management ownerships (includes keeping stocks by the board of directors members) and the medium and small German private companies' performance with incentive criteria. In their search, they focused on economic units which were the most important sections of the German economy. They extracted a sample of 356 companies in the service segment which were related to business from 1997 to 2000. Their findings showed that in companies in which management ownerships percentage were more than 40%, the performance was improved.

Wang [61] in investigating family companies' ownership and profit quality, showed that family ownership would increase the relationship between users of the financial statements and internal organizations' members. He also concluded that high quality of profits may be resulted from true combinations of the family members and shareholders' interests.

Khan et al. [32] have also studied the mathematical relationship between management's stock ownership and companies' performance for Austrian companies' form 2000 to 2003. They found no evidence of non-liner relations between management's stock ownerships and Q-Tobin ratio. However, a significant negative relations between management stock ownerships and Q-Tobin ratio was found.

3.3.2. Domestic Studies

Poorhaydari and Hematy [51] studied effects of the confounding factors on profit management in the TSE. Consequently, the effect of the debt contracts, political costs, bonus and ownership plans in management's manipulation were investigated. The results showed that: 1) there was no significant and positive relations between stockholders' equity and profit manipulation, 2) by increasing the company's size, motivations for more profit would increase, 3) in firms with more staffs, for decreasing political pressures, manager would decrease profit and 4) there was a insignificant relationship between bonuses and ownerships and profit manipulations.

Mashayekh and Esmaele [36] also studied the relationship between profit quality and some aspects of the managing capital structures including ownership percentages of the board of director's members and numbers of managers in 135 companies accepted in the TSE during 2002 to 2003. The results showed that with 95 percent probability, there was no relation between profit quality ownership percentages of the board of director's relationship and accrual items and ownership percentages of the board of director's members. In addition, the number of managers and ownership percentages of the board of directors' members did not exhibit a significant role in improving profit quality of the TSE companies.

Sinaie [56] investigated the effects of companies' internal factors on the formation of the capital structure of the TSE companies and concluded that particular characteristics of the companies would affect financial structure of the companies.

3.4. Foreign Investors

3.4.1. Foreign Studies

Foreign investments are the percentage of stocks by keeping the foreigners. This includes foreign partners, foreign financial institutions, foreign nations and Iranian non-residents. The results showed that positive effects existing between foreign ownerships of the company's performance, basically was related to the companies with bigger investments and higher commitment and longer investments.

Cheung et al. [12] studied the relationship between market returns and accounting revenues for a sample of Japanese companies from 1975 to 1995. Their findings indicated that the strength of the returns-relationships would negatively affect company's ownership level, level of investments in real estates, level of investments in other companies investments and financial leverages; but foreign ownerships' level would positively affect this relations.

Aydin et al. [5] studied whether Turkish companies with foreign ownerships did obtain a significantly superior performance. They employed T-test, operating margin variables, returns on assets, returns on equity and pertinent information relating to all companies in the Istanbul Stock Exchange for 2003 and 2004. The results showed that companies with foreign ownerships actually did experience superior returns on assets in comparison with the ones with domestic ownerships. These finding also supported the hypothesis that foreign ownerships would improve company's performance.

3.4.2. Domestic Studies

So far, there has been no empirical study concerning the effects of the foreign investors' ownership on the TSE Company's performances. The major reason for this situation could be related to the existence of a few numbers of these investors as the main owners in the TSE companies.

In sum, from the whole preceding internal and external literature reviews, the following tentative general conclusions may be inferred:

1). Firm's ownership structure affects the performance of the corporations. More specifically, there is a significant relationship between the institutional ownership structure and the performance of the companies.

2). Different ownership structures, (private or government) could lead to different corporate performances.

3). Private ownership structures would enhance corporate performances. This relationship is particularly holds for the family companies.

4. Research Method

In this study, the role of the different "ownership structures" on the performances of the TSE companies will be investigated for the first time. Hence this study's research plan is based upon the one shot ex-post plan [1] and [59]. This plan is exerted when the researcher attempts to study the subjects after its occurrence without any control group and furthermore the manipulation of the independent variables are impossible.

4.1. Research Hypotheses

The objective of this research is to identify financial effects of the various ownership structures on the performances of the TSE companies. Consequently, this study, is based upon the results of the domestic and foreign studies which were reviewed in previous sections. It posits one main hypothesis and five subs-hypotheses as follows:

4.1.1. The Main Hypothesis:

There is a significant relationship between "ownership structure" and the "performances" of the TSE companies.

4.1.2. Sub Hypothesis

1. There is a significant relationship between "institutional ownership" and the "performances" of the TSE companies.
2. There is a significant relationship between "company's ownership" and the "performances" of the TSE companies.
3. There is a significant relationship between "company's managerial ownership" and the "performances" of the TSE companies.
4. There is a significant relationship between "foreign ownership" and the "performances" of the TSE companies.
5. There is a significant relationship between "private ownership" and the "performances" of the TSE companies.

4.2. Research Variables

In this research, four independent variables were considered: 1) institutional investors, 2) corporate shareholding, 3) managerial shareholding and 4) foreign investors, shareholding. These variables are in fact representing current and various ownership structures in Iran, in that the first one is related to the government structure and the last three are demonstrating private ownerships. The measurement of these variables was based upon the following definitions:

Foreign: Foreigners' Share Holding is equity shares held by foreigners as the percentage of total equity shares. These include foreign collaborators, foreign financial institutions, foreign nationals and non-resident Iranians.

Institutional investors: Governments and financial institutions' share holding is equity shares held by the government companies which is measured by the percentage of total equity shares. These includes insurance companies, mutual funds, financial institutions, banks, central and state government firms, state financial corporations and other government bodies.

Corporate shareholding: corporate share holding is equity shares held by corporate bodies which is determined as a percentage of total equity shares. These include corporate bodies excluding institutional managerial and foreign investors.

Managerial shareholding: Managers' shareholding is equity shares held by directors of the firms and includes shares held by the family members of the directors (see e.g., [40] and [35]).

This classification has also been adopted by Kumar [34]. In addition, each of these variables has been extensively exerted in the literature including the following studies:

Institutional investors: Tsaia and GU, [60], Fernando et al. [20], Cornett et al. [13], Elyasiani and Jia, [18].

Corporate investors' shareholding: Imam and Malik, [28], Kapopoulos and Lazaretou [31] and Cornett et al. [13].

Managerial shareholding: Himmelberg, et al. [27], Enqvist [19], Chen [11], Rose [55], Halpern et al. [24], Mueller and Spitz-Oener [41], Khan et al. [32], Cornett et al.[14] .

Foreign investors' shareholding: Barbosa and Louri, [8], Douma et al. [16], Aydin et al. [5].

The dependent variable of this study is "the value of the firm" which is represented by the performances of the companies. The performance was measured by the following two traditional accounting variables: 1) Return on Assets (ROA) and 2) Return on Equity (ROE),

$$ROA = \frac{PBDIT}{TA} \quad (1)$$

PBDIT = Profit before depreciation, interest expense and taxes
TA = Total Assets
and 2) Return on Equity (ROE)

$$ROE = \frac{PBDIT}{EC} \quad (2)$$

EC = Equity Capital
And also by the two contemporary market variables-i.e. 1) Q-Tobin's average and 2) Market to Book Value Ratio (MBVR),

$$Q - Tobin = \frac{TB + MV}{TA} \quad (3)$$

TB = Total Borrowings
MV= Market Value (Equity)
TA = Total Assets

$$MBVR = \frac{TB + MV}{BV} \quad (4)$$

BV= Book Value

These variables have also been adopted by Kumar [34], among others.

The major reason for selecting preceding accounting variables is that they maintain a straight relationship with the firm's strategies and performances. For example, %80 of the studies that have identified the significant variables affecting company's performances, have utilized "ROA" as a profound variable [62]. However, in order to examine companies' performances, accurately and comprehensively, considering merely accounting performance evaluation variables is not sufficient since they are based upon historical cost basis and hence some market evaluation criteria, which determine the current situation and value of the firm's performances, should be expended. In addition, these variables have been exerted frequently in the related literature, including the followings: Return on Assets (ROA); Randoy and Goel [54], Enqvist [19], Chen [11], Douma et al. [16], Krivogorsky [33], Omran et al. [47], Cornett et al. [47] and Elyasiani and Jia, [18].

Return on Equity (ROE): Bianco and Casavola [10], Krivogorsky [33], Aydin et al [5] and Omran et al. [47].

Q-Tobin's Average: Randoy and Goel [54], Enqvist [19], Chen [11], Rose [55], Douma et al. [16], Tsaia and GU [60], Imam and Malik [28], Omran et al. [47], Fernando et al. [20], Cornett et al. [14] and Elyasiani and Jia, [18].

Market to Book Value Ratio (MBVR): Halpern et al. [18] and Krivogorsky [33].

In order to control the effects of extraneous variables on the performance of the companies, three control variables were also selected: 1) size of the company, 2) Debt Intensivity (Debt.Int) and 3) Capital Intensity (Cap.Int). These variables have also been utilized in various studies including Himmelberg, et al. [27] and Habib and Ljungquist [21] and [22]) and also were selected based upon the literature review made in section 2.

4.3. Model Buildings

In some research problems, especially the ones in which the researcher is seeking to predict the extent of a variable, determining the main variable (which is to be predicted) and the correlations and combination of predicting variables is extremely important. In essence, the method which combines the predicting variable is titled "multi- variant regression" [49].

The multivariate regression method consists of different forms and their difference is related to selecting the predicting variables. For determining the regression equation in this article, the following formula was extracted:

$$Y = a + b_1 x_1 + b_2 x_2 + \ldots + b_n x_n \quad (5)$$

Y: company's performance
a: Constant
$x_1, x_2, \ldots, x_n$: all independent variables used in this study
$b_1, b_2, \ldots, b_n$: coefficient of the achieved regressions for all variables in this study.

The statistical data could be managed via three ways: cross sectional, time series and panel approach. The panel data method is an approach for combining cross sectional observations within different time periods. In this study, considering the data type and analysis approach, the panel method [49] was exerted. By employing panel data a group of data which includes a great number of cross sectional variables (N) that is obtained during a time period (T) is collected. In this case, the number of observations are $N \times T$, that could be estimated by different models.

By exerting the panel data, efficient estimations could be determined. The general form of the panel model, which is based upon the "error components method", is obtained from the following formula [15]:

$$Y_{it} = \beta_1 + \sum_{j=2}^{k} \beta_j X_{jit} + \sum_{[=1}^{s} Y_p Z_{pi} + \delta_i + \varepsilon_{it} \quad (6)$$

In the above formula, Y is the dependent variable, X is the observed explanatory variable and Z is the unobservable explanatory variable which affects the dependent variable in each period. For a more unambiguous explanation of the panel method, these groups of variables are separated. In effect, t is the time duration and j and p are observed and unobserved variables. ε(it) shows estimated errors of the panel data, which holds for all different conditions relevant to error statements under the Gauss-Markov hypothesis and δt shows the changes of the fix statements during the time. This model is known as "two-sided panel data model" [15]. As Z variables are immeasurable, one could show the sum of them as α1. In this case, the above equation could be presented as follows:

$$Y_{it} = B_1 + \sum_{j=2}^{k} B_j X_{jit} + \alpha_i + \delta_t + \varepsilon_{it} \qquad (7)$$

In the above formula, $\alpha_i = \sum_{p=1}^{s} \gamma_p Z_{pi}$. If α_i is dependent on each of the X explanatory variables, estimation and analysis by this equation will be biased in relation to variables which are not estimated [15].

If the immeasurable variables are controlled by exerting Ordinary Least Squares (OLS) or Generalized Least Squares (GLS), then the variables have efficient estimations. One way for controlling is expending the fixed effects model. In the fixed effects model, the unobserved effects will enter into the fixed statement of the regression model. In this model, by employing virtual variables method or the deferential method, the effects of the unobserved variables could be controlled.

With different tests such as Hausman or the Breusch-Pagan Lagrange Multiplier (LM) test, one could select suitable estimates. After selecting a suitable model, the continuity of the time series and the reliability of the regression should be followed [7].

Based upon preceding explanations, this study's model is presented as below:

Performance$_{i\,t}$ = f (Foreign$_{it}$, Institutional$_{it}$, Corporate$_{it}$, Director$_{it}$, (4)

Ln Sale$_{it}$, DebtInt.$_{it}$, Cap.Int.$_{it}$) + α_i + δ_t + $\varepsilon_{\iota\tau}$

Performance$_{it}$ = α + β (Ownership)$_{it}$ + γX$_{it}$ + α_i + δ_ι + $\varepsilon_{\iota\tau}$ (5)

In this research, the followings were studied by the regression equation: 1) self correlations, 2) the amounts of determining coefficient, 3) the significance of the model and its coefficient.

For determining whether a regression model error statements were self correlated or not, the Durbin-Watson test was employed. In Durbin-Watson test the model hypotheses are [49]:

$H_0 : \rho = 0$

$H_1 : \rho \neq 0$

In this model, when ρ is positive, self correlation is positive and when ρ is negative, self correlation is negative and if ρ=0 there's no self correlation.

Determining coefficient is a criteria which explain the strength of the relationship between the dependent and independent variables. The amount of this coefficient, in fact, determines what percentages of changes of the dependent variables are explained by the independent variables.

The significance of the regression equation was determined by F-statistic and related hypothesis were as follows [49]:

$$H_0 : \beta_1 = \beta_2 = \cdots = \beta_k = 0$$

$$H_1 : \exists \beta_i \neq 0 : i = 1,2,\cdots,k$$

If H_0 is rejected (with 95 percent probability), the regression equation is significant. After implementing the regression significance test, the regressions of each of the coefficients should have been tested. The test hypotheses are presented below:

$H_0 : \beta_i = 0$ The population coefficient is zero

$H_1 : \beta_1 \neq 0$ The population coefficient is not zero

For testing these hypotheses, t test was employed. In this test (with 95 percent probability) if we couldn't reject H_0, it means that the considered coefficient isn't significant and its rejection means the opposite.

4.4. Population and Sample Selection

The population of this study includes all Tehran Stock Exchange (TSE) firms from 2003 to 2008 (5 years period. TSE was reopened in 1968. It is an open stock market which is controlled by the governmental organization. It is a member of World Federation of Exchanges and a founding member of the Federation of Euro-Asian Stock Exchanges. It is also one of the world's best performing stock exchanges and has been categorized as an emerging market. During the time period of the study, it encompassed about 430 companies in recent years the number of private ownership companies listed in TSE has been increased significantly. Due to the adoption of the so called "principle 44".

However, the following conditions were considered for selection of the firms based upon the nature of the TSE market and this study:

1. Firms listed in the TSE up to the end of 2008.
2. Their financial year ended in the end of each year.
3. Their book value of the stockholders equity was not negative in any year.
4. They had a continual activity during the study period and their stocks were traded actively.
5. They shouldn't have changed their financial year during the study's period.
6. They shouldn't have stopped their activities during the time period of the study.
7. Their financial information required for this study would be available from 2002 to 2008.
8. They should not be listed as an investment company.
9. They should be profitable throughout the period of the study.

Considering preceding limitations, 66 companies were identified. Consequently, their information were gathered from the TSE computer web and Dena-sahm, Sahra and Tadbirpardaz software's.-three main software which revealed data pertaining to the TSE companies.

4.5. Data Collection Method

In this study, for data and information collection, the library and archival method [59] was also employed. In the library section, theoretical basis were gathered from the Persian and English journals and books (see references). Research data were gathered by means of the sample company data with reference to their financial statements, notes to financial statements, weekly and monthly reports of the stock exchange and by employing Dena-Sahm, Sahra and Tadbirpardaz software.

4.6. Test of the Reliability

At first, reliability of the continuity of the dependent variables as well as control variables was studied. Reliability of the study variables showed that variables mean and variances during the time period of the study and the covariance of the variables during different years were stable. As a result of exerting these variables in this model, we did not have a spurious regression. For the final investigations, the unit root tests, Levin, Lin and Chu, Im, Pesaran and Shin and Philips Perron tests, were expended [48]. Each of this test variable was conducted under two different methods: 1) the fixed amount approach and 2) the trend amount approach.

5. Findings

Table 1 shows the descriptive statistics of the study.

Table 1. The Descriptive Statistics of the Variables of the Study

	ROA	ROE	QTOBIN	MBVR	SIZE	DEB	CAP
Mean	0.157240	0.525822	2.347166	8.034859	12.36420	0.664307	1.683878
Median	0.132065	0.450956	1.549900	5.189585	12.18973	0.664722	1.487572
Maximum	0.692751	3.777655	40.21069	202.7036	17.62304	0.940159	8.711818
Minimum	0.006044	0.033216	0.293129	0.394061	9.399306	0.225208	0.418849
Std. Dev.	0.103535	0.394593	3.309204	13.38217	1.267601	0.132212	0.936429
Skewness	1.878153	3.046605	7.339826	10.24180	1.105596	0.475943	3.482627
Kurtosis	8.307626	20.05267	72.55957	139.8714	6.143799	3.301086	20.91898
Jarque-Bera	581.3600	4508.910	69492.86	263358.8	203.1266	13.70517	5082.064
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	51.88926	173.5214	774.5647	2651.504	4080.186	219.2213	555.6796
Sum Sq. Dev.	3.526742	51.22647	3602.824	58918.13	528.6413	5.750951	288.4998
Observations	330	330	330	330	330	330	330

Table 2 and Table 3 disclose necessary information concerning the reliability test of the ROA variable under the fixed amount approach and the trend amount approach respectively, just as a sample. Similar tests were conducted for ROE, Q-Tobin, MBVR, Size, debt and capital under the fixed amount approach and also the trend amount approach. The results of these tests indicated that their P-values were lower than 0.05 and hence, these variables were stable and their weighted average and standard deviations were also statistically stable during the period of the study.

Table 2. The Reliability Test of the ROA Variable Based Upon the Fixed Amount Approach

Panel unit root test: Summary
Sample: 2003 2008
Exogenous variables: Individual effects
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett Kernel
Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Observation
Null: Unit root (assumes common unit root process)				
Levin, Lin and Chu t*	-21.3227	0.0000	66	264
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-4.46307	0.0000	66	264
PP- Fisher Chi-square	206.772	0.0000	66	264
Null: No unit root (assumes common unit root process)				
Hadri Z-stat	15.8611	0.0000	66	330

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality

Table 3. The Reliability Test of the ROA Based Upon the Trend Approach

Panel unit root test: Summary
Sample: 2003 2008
Exogenous variables: Individual effects, individual linear trends
Automatic selection of maximum lags
Automatic selection of lags based on SIC: 0
Newey-West bandwidth selection using Bartlett Kernel
Balanced observations for each test

Method	Statistics	Prob.**	Cross-sections	Observation
Null: Unit root (assumes common unit root process)				
Levin, Lin and Chu t*	-60.9418	0.0000	66	264
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-2.86473	0.0021	66	264
PP- Fisher Chi-square	236.369	0.0000	66	264
Null: No unit root (assumes common unit root process)				
Hadri Z-stat	79.1349	0.0000	66	330

** Probabilities for Fisher tests are computed using a Chi-square distribution. All other tests assume normality

For studying each hypothesis 4 different models based upon each of the dependent variables for performances- Return on Assets (ROA), Return on Equities (ROE), Q-Tobin and Market Book Value Return (MBVR) – were defined and estimated. Then, the results of these 4 models for each hypothesis were investigated separately and finally the overall outcome for each hypothesis was presented.

5.1. First Hypothesis

In testing the first hypothesis, at the beginning, the relationship between "institutional ownership" and ROA along with the designated control variables- size of the company, debt structure and the amount of capital- were examined. The results are shown in Table 4.

Then, the same procedure was followed for other dependent variables. A summary of the results are presented in Table 5.

Table 4. The Relationship between "Institutional, ROA and Control Variables

Dependent Variable: ROA Method: Pane EGLS (Cross-section weights) Sample: 2003-2008 Cross-sections included: 66 Total panel (balanced) observations: 330 Linear estimation after one-step weighting matrix				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INS	-0.020231	0.005121	-3.950550	0.0001
SIZE	0.006927	0.001912	3.622742	0.0003
DEB	-0.285504	0.022289	-12.80936	0.0000
CAP	-0.025984	0.004279	-6.072670	0.0000
C	0.308119	0.025345	12.15698	0.0000
Weighted Statistics				
R-squared	0.788479		Mean dependent var.	0.255734
Adjusted R-squared	0.785875		S.D. dependent var.	0.196811
S. E. of regression	0.091072		Sum squared residual	2.695565
F-statistic	302.8720		Durbin-Watson stat.	1.803290
Prob. (F-statistic)	0.000000			
Un weighted Statistics				
R-squared	0.201000		Mean dependent var.	0.157240
Sum squared residual	2.817868		Durbin-Watson stat	1.359648

Table 5. The Results of the Relationship between "Institutional Ownership" and 4 Models of Performance

R-Squared	Durbin-Watson statistics	Coefficient symbol	Significance of coefficient (t)		Significance of all model (F)		Independent variable	Dependent variable
			P –Value	Accepted Or rejected	P –Value	Accepted Or rejected		
%78/8	1/80	negative	0/000	accepted	0/000	accepted	Institutional ownership	ROA
%84/9	1/82	negative	0/000	accepted	0/000	accepted	Institutional ownership	ROE
%73	1/82	negative	0/002	accepted	0/000	accepted	Institutional ownership	Q-Tobin
%79/9	1/90	negative	0/000	accepted	0/000	accepted	Institutional ownership	MBVR

From Table 5 with respect to 4 applied performance models, it can be inferred that because the independent variable of the institutional ownership coefficient in all 4 models is negative and significant, thus generally there is a negative relationship between institutional ownership and company's performance. This means that considering the high level of R^2 and the independent variable of the institution ownership coefficient in all 4 models, the higher the institutional ownership, the weaker is the company's performance – hence, the first hypothesis is accepted. This finding is similar to other studies (Ahmadzadeh et al. [2] and Mokarami [40] as far as the existence of the significant relationship; is concerned. However, in regard to the kind of the relationship, the finding is different from some studies such as Tsaia and GU [60], Cornett et al. [14] and Mahdavi and Maydari [35].

The reason for this finding that the institutional ownership and company's performance is significantly and negatively related, could be related to situations in which institutional investors don't expend enough motivations to attempt for improving firm's performances and gaining profits. Additionally, in most cases, the major objective of the institutional investors is not extracting profits and obtaining high profitability, rather their goal, is protecting society from foreign invasion, establishing disciplines and security in the society, offering public services and fundamental facilities. It is also possible that some of these companies have benefited from government's supports such as subsidiaries. Hence, it seems that for obtaining profit gains and a financial superior performance, one should pay attention to owners' viewpoints and thoughts. It means that if the company desires accessing to profitability and a favorable performance, it should move towards private investors' companies.

5.2. Second Hypothesis

In approaching the second hypothesis a similar procedure, just like the preceding approach for the first hypothesis, was adopted. Table 6 illustrates the results' summary.

Based upon information presented in Table 6, one could conclude that because company's ownership coefficient in all four models is significant and positive (at $\alpha = 0.5$), there is a positive relationship between company's ownership structure and performances. Since R^2 is high and the independent variable of the company's ownership coefficient is significant and positive, when company's ownership is increased, a superior company's performances would be attained. Thus, the second hypothesis is accepted. These results are in agreement with most of the previous studies [31,44,45,53] and is inconsistent with some other like Cheung et al. [12].

Table 6. The Results of the Relationship between "Company Ownership" and 4 Models of Performance

Dependent variable	Independent variable	Significance of F model		Significance of t coefficient		Coefficient symbol	Durbin-Watson Statistics	R- squared
		Accepted Or rejected	P-value	Accepted Or rejected	P-value			
ROA	Company ownership	accepted	0/000	accepted	0/000	positive	1/81	%81
ROE	Company ownership	accepted	0/000	accepted	0/003	positive	1/87	%83/1
Q-Tobin	Company ownership	accepted	0/000	accepted	0/000	positive	1/90	%72/3
MBVR	Company ownership	accepted	0/000	accepted	0/001	positive	1/96	%80/9

These groups of investors are potentially the sources of effects on external organization's strategies and firm's performance. This issue is also emphasized by Fifer and Salanisc [53]. They argued that ownership is a facility making power which is fundamental in the organization. From this viewpoint, ownership type of an organization, should affect companies' performances and strategies. Viewing relevant models presented by these two researchers, an organization is not only a collections of groups with different profits, but also are markets in which the power and control are exchanged and companies' power is focused around sensitive and rare resources in which capital is one of them [53]. Thus, institutions which have investments in other companies’ subjects such as capital structures and establishing strategy and performances of owned companies could be potentially effective and being in the board of directors could also be helpful. The ownership ratio has its own role as well. Hence, one could conclude that company's ownership maintains positive relations with firm's performance models.

By changing companies’ ownership structure and combining all ownership forms, one could expect that firms’ behavior and performance be reduced and changed as well. Considering this issue is important from different aspects. First, the board ownership and its characteristics, could affect the company's financial performance. Long-term focus on special subjects such as long-term investments period for research, market development and products are also very necessary for the economic life of the enterprises. And with this, one could gain the necessary quality and capability and thoughtful investors could think about short - term goals. This fact is also very important because of its effect on companies' investments on research, development and creativity.

Thus, with respect to the second hypothesis, which is in the field of private investors, the results of this study revealed that in entrance of the company's investors, the dominated thought on company's performance is profit gain and superior performance. The results revealed that company's ownership holds a significant and positive relationship with company's performances. This means that by effective presence of the company's ownership in the companies' ownership structure, the company's performance will be improved. Because this type of investors are following profits and obtaining superior performances, they gain from company’s ownership structure and they attempt to meet this goal. Another reason is that, in this case, the ownership structures are more focused and hence the goal of gaining profitability would cause more supervision on the company's performance. Also, in this condition, companies would report more information about their performance and future profits, because they have unambiguous and widespread necessities for reporting.

5.3. Third Hypothesis

In approaching the third hypothesis, a similar approach like preceding hypothesis was adopted. Table 7 reveals a summary of the results.

Table 7. The Results of the Relationship between "Managerial Ownership" and 4 Models of Performances

Dependent variable	Independent variable	Significance of F model		Significance of t coefficient		Coefficient symbol	Durbin-Watson Statistic	R-squared
		Accepted Or rejected	P-value	Accepted Or rejected	P-value			
ROA	managerial ownership	accepted	0/000	accepted	0/000	negative	1/81	%93/4
ROE	managerial ownership	accepted	0/000	accepted	0/000	negative	1/89	%86/8
Q-Tobin	managerial ownership	accepted	0/000	accepted	0/010	negative	1/96	%77/1
MBVR	managerial ownership	accepted	0/000	accepted	0/037	negative	1/87	%71/5

As Table 7 illustrates, generally one could conclude that the relationship between managerial ownership and company’s performance is negative, because by considering four models, the managerial ownership coefficient is negative and significant. Since R^2 is high and the independent variable of the managerial ownership coefficient is significant and negative in all four models, one could conclude that when managerial ownership is increased, the company's performance tend to get weaker. These results are consistent with Khan et al. [32]. However, they are inconsistent with the findings of Bhagat [9], Mcconaughy et al. [38], Anderson and Reeb [3] and Mueller and Spitz-Oener [41]. A reason for this finding could be the fact that all companies with managerial ownerships in our samples are family companies, indicating the main ownership of these firms are belong to one family or a group of family. Considering the congruency of this group of owners with each other, they don’t provide true and real results to externals and smoothing information may be attempted.

5.4. Fourth Hypothesis

With respect to the fourth hypothesis, since the number of foreign investors was very limited in the TSE and there was no information related to foreign investor's ownership in our study, no result was found. In effect, presenting a reliable performance evaluation model was not possible.

5.5. Fifth Hypothesis

For testing this hypothesis, the relationship between private ownership structure (consisting of "company ownership" and "managerial ownership") and control variables (size, debt and capital) were examined. A selected summary of the results are presented in Table 8.

Table 8. The Relationship between* "Private Ownership" Structure and 4 Performance Models of Performance

Dependent variable	Independent variable	Significance of F model		Significance of the coefficient		Coefficient symbol	Durbin-Watson Statistic	R-squared
		Accepted Or rejected	P-value	Accepted Or rejected	P-value			
ROA	Private ownership	accepted	0/000	accepted	0/000	negative	1/81	%85/4
ROE	Private ownership	accepted	0/000	accepted	0/000	negative	1/85	%85/6
Q-Tobin	Private ownership	accepted	0/000	accepted	0/755	negative	1/94	%72/9
MBVR	Private ownership	accepted	0/000	accepted	0/756	positive	1/87	%81/0

* Private Ownership Consists of the "Company Ownership" and "Managerial Ownership"

Based upon 4 presented models, the independent variable of "the company ownership" coefficient was positive and significant in all four models. Thus, the relationship between company's ownership and company's performance was positive. Since R^2 is high and the independent variable of the company's ownership coefficient is positive and significant, if this kind of ownership is increased, the company's performance will be improved. On the other hand, because the independent variable of the "managerial ownership" coefficient was significant and negative in all 4 models, generally there is a negative relationship between managerial ownership and company's performance. Since the amount of R^2 is high and the coefficient of the independent variable of the managerial ownership is negative and significant, one could ascertain that as managerial ownership increases, the company‘s performance gets weaker significantly.

Now, if one wants to conclude the general role of the "private ownership" as a whole, only in the fourth model, which is based upon the MBVR, the company‘s performance is enhanced. In the rest of the models, coefficients are, however, in such a way which indicate that company‘s performance tend to get weaker. But, this result is reached just by a quick overview and with a deeper consideration, one could not conclude the preceding point based upon positive and negative coefficients. For a valid conclusion, the number of companies should be equal for both arriving at a firm "company‘s ownership" and "managerial ownership"; otherwise one could not jump to a clear and straight forward results. Hence, it could be ascertained that in "private ownership", if the company‘s ownership increased, the result is favorable.

Table 9 indicates the findings for the "institutional ownerships" and "private ownerships". Considering Table 9 and four presented models, the coefficient of the "institutional ownership" in all four models is negative and significant. Hence, in can be inferred generally that the relationship between "institutional ownership" and company's performances is negative. As R^2 is high and the coefficient of the independent variable of the "institutional ownership" increases, the company’s performance gets significantly weaker. On the other hand, because the coefficient of the independent variable of the "managerial ownership" as a representative of "private ownership" in all models is also negative and significant, then generally, the relationship between "managerial ownership" and the company's performances is negative. R^2 is high and the coefficient of the independent variable of the "managerial ownership" is significant and negative in all four presented models. Thus, when managerial ownership increases, the company's performance get tends to significantly weaker. However, with respect to the “company ownership", just in the models based on the accounting variables (i.e., ROA, ROE) coefficients are significant and negative. And in the models based on the "market variables" (i.e., Q-Tobin and MBVR), the coefficient is not significant. These results disagree with the second hypothesis. However, generally speaking, the main hypothesis is accepted. This finding implies that there is a significant relationship between company's structure and their performances. This result agrees with almost all previous studies and disagrees with some studies like Mashayekh and Esmaele [36].

In sum, comparing the "institutional ownership" and "private ownership" (except for the ROE model), the weaknesses of the company's performance is stronger in the "institutional ownership". Hence, the fifth hypothesis is generally accepted. But, one could not ascertain whether private ownership increases or decreases the performance, because it just reveals that there is a significant relationship. This result agrees with the findings of the most previous studies; but from the type of relationship viewpoint, disagrees with the results of some studies like Earle [17], Omran et al. [47] and Rahchamani [52].

Although there are some similarities and shared views in activities of the private firms and governmental companies, the motivations and behaviors of the private firms are completely different from the governmental companies. According to the International Bank's research, the stock investment rate in governmental industries returns is one third of the private industries. In other words, private ownerships, overall, would lead to a higher performance from both aspects of the quality and economic variables compared to the governmental ownership [25].

Table 9. The Results of the Relationship between "Institutional and Private Ownership" Structure and 4 Models Performance

Dependent variable	Independent variable	Significance of F model		Significance of t coefficient		Coefficient symbol	Durbin-Watson Statistics	R-squared
		Accepted Or rejected	P-value	Accepted Or rejected	P-value			
ROA	Institutional and ownership	accepted	0/000	accepted	0/000 And 0/000	negative	1/81	%85/8
ROE	Institutional and ownership	accepted	0/000	accepted	0/000 And 0/000	negative	1/86	%85/1
Q-Tobin	Institutional and ownership	accepted	0/000	accepted	0/038 And 0/000	negative	1/92	%72/9
MBVR	Institutional and ownership	accepted	0/000	accepted	0/036 And 0/000	negative	1/95	%81/3

6. Concluding Remarks and Discussion

The results of this study demonstrated that different ownership structures of the firms would actually lead to different financial performances. In general, private structures would lead to significant performances. Thus, there is a significant relationship between company's ownerships structure and company's performance. In the setting, in which both "institutional ownership" and "private ownership" structures were presented, the results illustrated that when ownership is governed by the institutional investors' type, the firm's performance will tend to get weaker than the private ownerships structure. With respect to private ownerships, however, it could be ascertained that there is just a significant relationship; but one could not infer the type of the relationship. This means that generally, one cannot ascertain whether private ownerships would actually lead to a superior performance or not.

In settings in which private ownerships were divided into sub classes–company's managerial and company's ownership–the results need to be analyzed in more details. They revealed that the existence of the company's investors in the company's structure would lead to a superior performance. This means that the relationship between groups of investors and company's performance is significant. However, if one considers managerial investors in the company's structure, the company's performance would be weaker. Finally in terms of the statistical sampling of this study, we couldn't observe any information which demonstrate the existence of the foreign investors in the company's foreign companies in Iran.

In effect, the significance of this study are as follows:

1). It provided an ex-post empirical evidence concerning the relationship between the structure of the company and its performance. Thus, it extended current knowledge concerning contemporary issues of the corporate governance.

2). It extricated the role of the governmental and / or privatization in the firms' performance process. In effect, it unambiguously demonstrated the usefulness of the privatization empirically.

3). It identified the most effective and appropriate forms of the firms' structures, (private or institutional) which affect the corporations' performances, among different structures.

4). It provided valid empirical evidence concerning the role of the corporate governance in the TSE Market. Given the internal and external validity of this research, the results would also be useful at the international level and thus, it would contribute to extending current knowledge in the growing field of the corporate governance.

7. Suggestion for Future Studies

There are different subjects in this field that could be important for future studies. Therefore, we suggest, the following issues be studied in more depth:

1. The effect of the industry on the ownership structure and company's performance relationships.
2. The investigation of other dependant variables of the study-the ownership structure- and its effect on company's performances.
3. The employment of other performance evaluating variables.
4. Investigation of the effects of the main economic variables such as inflation, oil prices and currency exchange rates on the ownership structure and performance relationships.
5. Studying and testing the relationship between ownership structures and company's performances for short –term periods (less than a year).
6. Studying and testing the effects of the ownership structures on the performance of loss maker companies in comparison with profitable companies by deployment of virtual variables.
7. Analyzing the effect of political problems and elections' effects on the company's performances.

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Earnings Persistence and Stock Prices: Empirical Evidence from an Emerging Market

1. Introduction

According to International Accounting Standards Board (IASB) (1989), the basic purpose of financial reporting is to provide capital market participants with accounting information that can be used for informed and efficient investment decision making. The area of study aimed at exploring the relationship between available accounting information and its consequent use in pricing of financial assets is broadly categorized as value relevance research. Ever since the publication of pioneering work of Ball & Brown (1968) and Beaver (1968) who demonstrated that the information content of accounting earnings is reflected in stock returns, relevance of accounting information as an indicator of market value has attracted considerable attention. Value relevance studies attempt to empirically investigate the relationship between disclosed accounting information and stock market values (or changes in value) so as to assess the usefulness of such information for pricing of assets by investors. According to *Holthausen and Watts* (2001), a variable is said to be value relevant if it exhibits the predicted association with a measure of market equity value.

Research on value relevance studies was further embraced in the revolutionary work of Ohlson (1995, 1999) and Feltham & Ohlson (1995, 1996) who devised a structured model of firm value linking it with accounting data. The model introduced the innovations of linear information dynamics (LIM) which postulated the mechanism of time series behavior and linked current information with future abnormal earnings. The work of Ohlson (1995,1999) and Feltham-Ohlson (1995,1996) had a profound effect on value relevance literature post 1990's with modified versions of the model been tested successfully in a number of studies and applied in varied markets with different characteristics in the last two decades. Although different empirical studies have produced varied results regarding the degree of association between accounting variables and firm value, the findings over the years have converged towards the belief that basic fundamental accounting variables (viz. earnings, book value and cash flow) approximate pricing of firm particularly well.

Although the prior literature examining the persistence of earnings and earnings components is immense in developed markets (US, UK, Canada etc.), little is empirically known about the same in emerging markets where accounting and institutional settings are entirely different from those of mature capital markets. Consequently, one would be cautious in generalizing research findings in developed markets to emerging markets given the extensive use of accrual accounting, weak investor protection and low share-ownership concentration (Pincus *et al.* 2007). India as one of emerging markets presents an interesting case where institutional and accounting structures justifies the need for empirical investigation of earnings persistence and value relevance to determine stock valuation. In the 1990s Indian Government has introduced the economic liberalization to move the economy to free market economy. Privatization program was initiated and in order to enhance the reliability of the market, the Indian government established the Securities and Exchange Board of India (SEBI) in 1992, a regulatory body resembling the Securities and Exchange Commission (SEC) in the United States, to protect the interest of investors and to promote the development of securities market. However, Indian stock exchange is characterized by low trading volumes and the prominence of unsophisticated investors. Financial statements remains the main source of information available to investors in Indian capital market as listed firms do not disclose earnings forecasts. Further the financial analysts industry is still at a developing stage with small presence of foreign fund houses and consequently most transactions in Indian stock markets are made based on accounting data, especially, aggregate earnings. Resultantly, earnings fixation tends to be high with investors failing to attend separately to the cash flow and accrual components of earnings. Till now, only a few empirical studies on value relevance of financial statements exist in India with no published study using the Ohlson model. This study contributes in filling the gap in the literature by examining the persistence ability of accounting variables, namely abnormal earnings, book value, accruals and cash flows over a period of time and their valuation relevance in Indian scenario using a set of Indian listed companies. The study further explore and analyze the links between the forecasting relevance (with respect to next-period abnormal earnings), persistence (stationary first degree Autoregressive (AR1) process) and valuation relevance of earning components (accruals and cash flows).

This study aims to extend and enrich the extant literature on value relevance studies in several ways. The study provides a theoretical valuation framework of Ohlson model, identify its key features in the context of other valuation models and review the numerous empirical studies based on it undertaken in developed markets. Using the emerging market setting of India, the study puts the theoretical model to empirical test so as to determine the relevance and persistence of accounting information using linear information dynamics framework pioneered by Ohlson. The findings of our study generally conclude that in case of India, only abnormal earnings and book value are relevant for explaining the market value of equity with earning components (accruals and cash flows) holding little value relevance for investors. The findings confirm that investors are fixated on earnings in India capital market and fail to attend separately to the cash flow and accrual components of earnings while undertaking their investment decisions. Consequently, this may create an incentive for managers in Indian-listed firms to engage in earnings management to meet or beat earnings thresholds in order to enjoy positive market performance.

The remainder of the paper is organized in the following way. Section 2 discusses the literature review; Section 3 describes the research design and hypothesis. Section 4 details the empirical result and Section 5 concludes with summary of findings.

2. Literature Review

Genesis of Value Relevance studies

Within the realms of accounting discipline research, capital market research has emerged as a significant discipline over past decades and attracted extensive academic research and interest. This area of research started gaining prominence in 1960's from the seminal works of Ball *et al.* (1968) and Beaver (1968) who were forefathers to the theory that accounting information impacts equity prices by providing information and are value relevant to financial investors in their pricing and asset allocation decisions. Ball *et al.* (1968) in their study of US firms over 1946-66 investigated the usefulness of existing accounting numbers by examining their information content and timeliness. The results of the study provide evidence that accounting income of a particular year captures one half or more of all information available about an individual firm. The evidence also suggests that annual accounting numbers is not a useful timely indicator as share prices reflect more prompt information. Beaver (1968) in his seminal research finds that both trading volume and return volatility tend to increase during the earnings announcement week thereby establishing the information content of earnings announcement. According to Beaver (1968), although earnings announcement allays uncertainty and bridges the gap between beliefs, it leads to increase in trading volumes from participants who have assumed position based on their pre-earnings announcement beliefs.

Post 1960's, after the seminal work of Ball *et al.* (1968) and Beaver (1968) which embraced an information view of value relevance, most of the studies during the next three decades were typically conducted and referred to as information content studies. However in 1990's after Ohlson (1995, 1999) came up with his breakthrough work, the interest in value relevance research intensified again with most of the studies distancing themselves from information view and adopting measurement view of value relevance. Unlike information view where return was the only metric, both price and returns were used as metrics under measurement view (Easton, 1999). While price based studies tested the ability of financial statements to summarize the events affecting the firm upto a specified date, return based studies looked at the ability of accounting information to capture events affecting the firm over the return interval. Most of the studies under measurement view examined the value relevance of earnings, book values or combinations of two. Beyond 1990's the literature indicates a number of value relevance studies using different forms of Ohlson model. The various studies, performed in different markets, although indicates conflicting results as to whether there is an increasing or decreasing trend in the value relevance of accounting data, none of the them disapprove that a relationship exists.

Valuation Theories and Models

Theoretically, the intrinsic value of an asset is a function of expected payoffs that are received over the holding period discounted at an appropriate opportunity cost. When we talk of equity valuation, these expected payoffs take the form of dividends or earnings and/or cash flows and the opportunity cost becomes cost of equity (or cost of capital) for the firm. The genesis of intrinsic approach to valuation was laid down by Williams (1938) which is one of the early texts on investment theory and is reminiscent of the NPV approach commonly used in capital evaluation techniques. In empirical literature we have seen a plethora of financial valuation models which talk about determinants of a firm's market value and helps in investment decision making.

Dividend Discount Model (DDM)

As discussed earlier, the theoretical value of a firm is the sum total of stream of payouts (in this case dividends) that are expected to be received in future and market value of equity at the end of the forecast horizon. Now if we make an assumption of infinite horizon, the dividend discount model can be theorized as the present value of expected future dividends (PVED) discounted at an appropriate rate of return. Mathematically:

$$V_t = \sum_{i=1}^{\infty} \frac{E_t[DIV_{t+i}]}{(1+r_{t+i})^i}$$

where V_t is the firm's intrinsic value of common equity at time t, $E_t(DIV_{t+i})$ is the expected future cash dividend in period $t+i$ conditional on information available at time t, and r is the cost of equity in period $t+i$.

Hence, looking at the above mathematical formula, firm value can be defined as a function of expected dividends and applicable discount rates. Now, the problem arises since estimating dividends for infinite periods have practicability issues. To do away with this problem, Gordon (1962) suggested a way wherein he simplified the model by making certain assumptions on dividends and discount rates. Under GGM (Gordon Growth Model), if the cost of equity remains constant through time and dividends grow geometrically at a constant rate g and g<r (r being cost of equity), the DDM equation can be reduced to

$$V_t = \frac{DIV_{t+i}}{r - g^D}$$

Although the above stated model did away with the practicability issues, it inherently suffered from some drawbacks. This model worked well for companies which were in mature stage or where growth rates were generally stable. For companies which are growing at high growth rates or where firms are in early growth stages and not paying dividends, the model fails to find the right market valuations. Generally the market value of such firms is usually higher than indicated by the above models. Also as shown by Miller & Modigliani (1961), under the assumption of no taxes and transaction cost, value of firm does not get affected by dividend payouts (dividend irrelevance theorem). As a result of these drawbacks, various other models began to emerge which did away with assumptions of dividend models.

Residual income (abnormal earnings) valuation model

Residual income valuation (RIV) model, which has its genesis in the dividend discount model, combines the dividend discount model with clean surplus relation and expresses the value of a firm as current book value plus the present value of infinite residual (abnormal) earnings. Mathematically:

$$V_t = BV_t + \sum_{i=1}^{\infty} \frac{E_t[x_{t+i}^a]}{(1+r)^i}$$

where V_t is the intrinsic value of common equity at time t, BV_t is the book value of common equity at time t, $E_t[x_t^a]$ is the expected future residual (abnormal) income in period $t+i$ conditional on information available at time t, and r is the cost of equity, indicated as a constant.

Residual income as defined by Ohlson (1995) is the amount of net income (profit) in excess of capital charge on the book value of equity. Mathematically:

$x_t^a = x_t - (r_t * BV_{t-1})$

where x_t^a is the residual income at time t, x_t denotes net income for the period ending at time t, r is the cost of equity, and BV is the book value of common equity at time $t-1$.

A basic assumption of residual income valuation (RIV) model is the clean surplus relation theory. According to clean surplus relation (CSR) theory, income for a period is equal to net dividends plus the change in book value of equity. Under clean surplus accounting, all revenues, expenses, gains and losses pass through the income statement thereby ensuring clean surplus. This basically means that all changes in the book value of equity during a fiscal period are reflected in that period's net income or dividends distributed to common shareholders. Mathematically:

$BV_t = BV_{t-1} + x_t - D_t$

Where BV_t is the book value of common equity at time t, x_t the net income for the period t, and D is the cash dividend paid for period t.

The Ohlson (1995) model

Ohlson (1995) model, which formalizes the relation between accounting variables and firm value, is basically an extension of residual income valuation (RIV) or abnormal earnings model. The model constitutes a solid theoretical framework for market valuation based on fundamental accounting variables (future earnings, dividends and book value). Using the assumption of the LIM , PVED and CSR, Ohlson (1995) allows the following closed-firm value relation to be stated:

$P_t = BV_t + \alpha_1 x_t^a + \alpha_2 \nu_t$

where: P_t = equity value of firm at time t

BV_t = book value at time t

x_t^a = abnormal earning at time t

v = 'other information' at time t

$\alpha_1 = \omega / (R_f - \omega) \geq 0$

$\alpha_2 = R_f / (R_f - \omega)(1 + R_f - \gamma) > 0$

The above equations of Ohlson (1995) thus expresses equity value as a function of three components i) Current Book value ii) capitalized current residual income, and (iii) capitalized value implied by other information. In his work, Ohlson (1995) considers the discount rate as risk neutral or risk free rate. Also one of the assumptions made is that of persistency or autocorrelation of abnormal earnings. Ohlson assumes that abnormal earnings follow a first-degree AR(1) process. The model also assumes that there is another variable v_t (other information) which impacts forecasting of future abnormal earnings.

The Ohlson (1999) model

Ohlson (1999) model (extension of Ohlson (1995) model) develops the concept of transitory earnings and contrasts the source of earnings to "core" (or recurring) earnings. According to Ohlson, transitory earnings possesses certain characteristics which distinguishes them from core or recurring earnings. The three major attributes of transitory earnings are : 1) Unpredictability: Transitory earnings are unpredictable in the sense that current transitory earnings are irrelevant with regards to influencing subsequent transitory earnings 2) Forecasting irrelevance: Current transitory earnings are irrelevant while forecasting earnings for next period or subsequent year 3) Value irrelevance: transitory earnings are not incrementally informational while estimating present value of firm's expected dividends.

Using the assumptions of present value of expected dividends, clean surplus relation and linear information dynamics, Ohlson (1999) presents a generalized version comprising following four equations:

$$x_{t+1}^{a} = \omega_{11}x_t^a + \omega_{12}x_{2t} + \gamma_1 .v_t + \varepsilon_{1t+1} \quad (1)$$

$$x_{2t+1} = \omega_{22}x_{2t} + \gamma_2 .v_t + \varepsilon_{2t+1} \quad (2)$$

$$v_{t+1} = G.v_t + \varepsilon_{3t+1} \quad (3)$$

$$P_t = b_t + \alpha_1 x_t^a + \alpha_2 x_{2t} + \beta.\ v_t \quad (4)$$

where x_t^a abnormal earnings is defined as earnings less a normal return on equity book value. x_2 in above model implies transitory earnings (the model applies to any component of earnings). P_t is market value of equity at time *t*. ω_{11} implies persistence of abnormal earnings, ω_{12} is the incremental effect of accruals or cash flows on abnormal earnings, ω_{22} implies persistence of accruals or cash flows; α_1 is the incremental effect of abnormal earnings on market value of equity and α_2 is incremental effect of transitory earnings on market value of equity. v_t represents vector of *K* random variables representing other information; γ_1 and γ_2 are two *K* dimensional vectors of fixed constants, and *G* is a square matrix of size *K* x *K*. In equation (4), β is a *K* dimensional factor. Also it can be shown that the parameters γ_1 and γ_2, *G* do not effect α_1 and α_2; they still are $\alpha_1 = \omega_{11}/ (R_f - \omega_{11})$ and $\alpha_2 = \omega_{12} R_f / (R_f\text{-}\omega_{22}) (R_f\text{-} \omega_{11})$.

Empirical Evidence of Value Relevance Studies

Beyond 1990's, the literature indicates a number of value relevance studies in both developed and emerging countries using different forms of Ohlson's model examining the relationship between accounting variables and firm value. For instance Hayn (1995) examines the value relevance of accounting earnings in explaining stock returns in US and finds positive association. Similarly Sloan (1996) in his study of a set of industrial firms in US finds that accrual component of earnings is less persistent than cash flow component of earnings in explaining earnings performance. However stock prices act as if investors are fixated on aggregate earnings and fail to distinguish between different levels of persistence of two components of earnings. Dechow *et al*. (1999) in a study involving US firms over a period of 20 years (1976-1995) finds that the linear information model (LIM) proposed by Ohlson (1995) is reasonably empirically descriptive and provides a useful framework highlighting the relationship between current accounting variables and future abnormal earnings. Similar evidence is reported by Frankel and Lee (1998) in their study involving 20 countries including Australia, Japan, South Korea and Thailand. Barth *et al.* (1999) examines the differential ability of accruals and cash flows components of earnings that affect their relation to firm value by using annual data from 1987-1996 using generalized version of Ohlson (1999) model and finds that accruals and cash flows are incrementally informative regarding future earnings and market values. Graham and King (2000) further examines the value relevance of book value per share and current residual income in Indonesia, Malaysia, Philippine, South Korea, Taiwan and Thailand and finds that coefficients of these variables are statistically significant for all the countries. Chen *et al.* (2001) examines the relationship between accounting information, earnings and book value, and stock price in the Chinese stock market from 1991-1998 and finds that accounting information as reflected in the income statement and the balance sheet is value-relevant to domestic investors (A-share market) in the Chinese stock market. Shamy and Kayed (2005) examines the value relevance of earnings and book values under the Kuwaiti accounting system (compliant with IFRS) using Ohlson (1995) framework and show that while earnings and book values jointly and individually are positively and significantly related to stock prices, incremental information content of earnings is greater than that of book values. Subramanyam and Venkatachalan (2007) examines the relative importance of earnings and operating cash flows in equity valuation and finds superiority of earnings in explaining security returns over cash flows. Similar evidence is reported by Habib (2008) who examines the relative information content of earnings and cash flows in New Zealand context. Pirie and Smith (2008) finds that both equity book value and earnings, summarizing the balance sheet and income statement respectively, have significant explanatory power with respect to market prices and managers are justified in using the accounting system as a primary source of information for monitoring financial performance in Malaysia. Vishnani and Shah (2008) examine the value relevance of financial statements of listed companies in India and find that financial statements have negligible value relevance as far as stock market reactions are concerned. Saeedi and Ebrahimi (2010), in contrast to earlier studies, do not find any value relevance for earnings and cash flows in explaining stock returns in Iranian context. Similarly, Akbar *et al.* (2011), in contrast to earlier studies, finds that cash flows have incremental value relevance compared to that of earnings and funds flow in UK. Ganguli (2011) in his study involving Indian companies tests empirical validity of Ohlson (1995) and Feltham and Ohlson (1995) models and finds value relevance of abnormal earnings and book value in explaining market value of equity with cash flows showing no such evidence.

In summary, while empirical studies regarding the relationship between accounting variables and firm value in developed countries provided mixed and contradictory evidence, there are a few studies which empirically examine this relationship in emerging (transition) economies such as India. It is, therefore, necessary to examine the relationship between accounting variables and firm value in India as an example of emerging economies.

The Indian Context

Post liberalization in 1990's, India financial system has evolved into a well developed and competitive structure with increased levels of financial intermediation, integration of domestic markets and further deepening of financial markets. Resultantly, the presence of multinational firms and foreign institutional investors has increased, as financial liberalization led to free movement of capital across the borders. Financial reporting in India is monitored by the provisions of the Companies Act, 1956, pronouncements of the Institute of Chartered Accountants of India (ICAI) and in some cases stock exchanges listing agreements. The accounting standards in India are formulated by Accounting Standard Board (ASB) constituted by ICAI in 1977. However, ASB is now a recommendatory body only and the ultimate authority of making accounting standards mandatory vests with the Ministry of Corporate Affairs (MCA) in consultation with the National Advisory Committee on Accounting Standards (NACAS). Till date, MCA has notified 35 IFRS converged Indian Accounting Standards (called Ind AS) without notifying the applicability date. For certain categories of companies like electricity companies and insurance companies etc., the accounting process and procedures including format of financial statements are laid down in the governing acts of such companies.

In order to enhance the reliability of the market, the Indian government established the Securities and Exchange Board of India (SEBI) in 1992, a regulatory body resembling the Securities and Exchange Commission in the United States, to protect the interest of investors and to promote the development of the securities market. Indian stock market today is comparable to the international benchmarks in terms of stocks listed, investor base and transaction costs. BSE (Bombay stock exchange), established in 1875, is Asia's first stock exchange and one of India's leading exchange groups. BSE is the world's largest exchange in terms of listed securities (over 6,000 stocks) and commands a total market capitalization of USD 1.32 trillion. According to world federation of exchanges, BSE is also the third largest exchange in terms of index options trading.

Given the increasing degree of globalization and integration of Indian stock market with the rest of the world, value relevance studies assumes significant importance as it can provide an insight into the relevance and reliability of financial statements in India.

3. Research Methodology and Hypotheses

Research Design

To develop the hypotheses for studying the persistence and valuation relevance of abnormal earnings, book values, cash flows and accruals, we utilize a generalized version of Ohlson model which comprises of following four equations. The basic structure of the model is analogous to the "other information" model of Ohlson (1995). One can interpret x_2 as Ohlson's other information, *v,* in those models.

:

$$x^a_{t+1} = \omega_{11}x^a_t + \omega_{12}x_{2t} + \omega_{13}BV_t + \varepsilon_{1t+1} \quad (1)$$

$$x_{2t+1} = \omega_{22}x_{2t} + \omega_{23}BV_t + \varepsilon_{2t+1} \quad (2)$$

$$BV_{t+1} = \omega_{33}BV_t + \varepsilon_{3t+1} \quad (3)$$

$$MV_t = BV_t + \alpha_1 x^a_t + \alpha_2 x_{2t} + u_t \quad (4)$$

where x^a_t (abnormal earnings) is defined as earnings less a normal return on equity book value. x_2 in above model implies transitory earnings (the model applies to any component of earnings and can be either accruals or cash flows). MV_t and BV_t are market value of equity and book value of equity respectively at time *t*. ω_{11} implies persistence of abnormal earnings; ω_{12} is the incremental effect of accruals or cash flows on abnormal earnings, ω_{13} is the incremental effect of lagged book value of equity on abnormal earnings; ω_{22} implies persistence of accruals or cash flows, ω_{23} is the effect of lagged book value of equity on accruals or cash flows; ω_{33} signifies persistence of book value of equity; α_1 is the incremental effect of abnormal earnings on market value of equity and α_2 is incremental effect of accruals or cash flows on market value of equity.

The Hypotheses

H1 – Abnormal earnings follow an AR (1) process. Accrual and cash flow components of earnings help in forecasting future abnormal earnings incremental to abnormal earnings and book value: Equation (1) in above Ohlson generalized model describes the autocorrelation or persistence of abnormal earnings. Abnormal earnings are said to be transitory if $\omega_{11} = 0$. If abnormal earnings are not entirely transitory, then higher the ω_{11}, the more shall be the persistence (or predictability) of abnormal earnings. Thus if abnormal earnings are positively autocorrelated, $\omega_{11} \neq 0$. Our null hypothesis is therefore $\omega_{11} = 0$.

In our model, x_2 is either accrual or cash flow from operations. The coefficient on the earnings component (x_2), ω_{12}, reflects the incremental effect that the earning component has on the forecast of next period abnormal earnings. Now if any component of earnings (accrual or cash flow) exhibit forecasting irrelevance i.e. it does not aid in forecasting next period abnormal earnings, ω_{12} shall equal zero. We therefore further test the null hypothesis that $\omega_{12} = 0$.

H2 – Accrual and Cash flow components of earnings follow an AR (1) process: Equation (2) in Ohlson generalized model describes the autocorrelation or persistence of that particular earning component (accrual or cash flow). Earning components (accrual or cash flow) are said to be transitory if $\omega_{22} = 0$. If earning components are not entirely transitory, then higher the ω_{22}, the more is the persistence (or predictability) of the earning component. Thus if earning components (accrual and cash flow) are positively autocorrelated, $\omega_{22} \neq 0$, separately, for each component (accrual and cash flow). Our null hypothesis is therefore $\omega_{22} = 0$. Equation (1) and (2) further includes book value of equity which allows for the effects of conservatism to manifest themselves (Feltham and Ohlson (1995, 1996)).

H3 – Book value of equity follow an AR (1) process: Equation 3 in Ohlson generalized model describes the persistence of book value of equity. Book value of equity is said to be transitory if $\omega_{33} = 0$. If book value of equity is not entirely transitory, then higher the ω_{33}, the more persistent (or predictable) is the book value. If book value is positively autocorrelated, $\omega_{33} \neq 0$. Thus our null hypothesis is $\omega_{33} = 0$. Equation (3) preserves the triangular information structure of the generalized version of Ohlson's model.

H4 – Accrual and Cash flow component of earnings enhances explanatory power for Market value of the equity incremental to Abnormal earnings and Book Value: Equation (4) is the valuation equation based on the information dynamics in equations (1) through (3). α_1 is the valuation multiple on abnormal earnings. If abnormal earnings have significant explanatory power of market value, then $\alpha_1 \neq 0$. We therefore test the null hypothesis that $\alpha_1 = 0$. Similarly i_1 is the valuation multiple on book value of equity. If book value of equity shows significant explanatory power of market value, then $i_1 \neq 0$. We therefore test the null hypothesis that $i_1 = 0$. α_2 is the valuation multiple on x_2, i.e., earning component in our model (accruals or cash flows). Similar to the interpretation of ω_{12} in equation (1), α_2 reflects the incremental effect that the earning component has on equity valuation. Now if an earning component (accrual or cash flow) does not have any significant explanatory power of market value incremental to abnormal earnings and book value, α_2 shall equal zero; otherwise $\alpha_2 \neq 0$. Thus we test the null hypothesis that $\alpha_2 = 0$.

Research Method – Panel Data Regression Estimation

The study uses fixed effect Panel data model which allows for intercept to vary across individual firms keeping the slope constant across. The study introduces two Linear Information Models, LIM 1 (Accrual system) and LIM 2 (Cash Flow system) for each earnings component separately (accruals and cash flows) using seemingly unrelated regression and permitting regression errors to be correlated across equations. The two systems of equations are:

LIM1: Accrual system

$$NI_{it}^{a} = \omega_{10,i} + \omega_{11}NI_{it-1}^{a} + \omega_{12}ACC_{it-1} + \omega_{13}BV_{it-1} + \varepsilon_{1it} \quad \textbf{(1a)}$$

$$ACC_{it} = \omega_{20,i} + \omega_{22}ACC_{it-1} + \omega_{23}BV_{it-1} + \varepsilon_{2it} \quad \textbf{(2a)}$$

$$BV_{it} = \omega_{30,i} + \omega_{33}BV_{it-1} + \varepsilon_{3it} \quad \textbf{(3a)}$$

$$MV_{it} = i_{0,\mathrm{i}} + i_1 BV_{it} + \alpha_1 NI_{it}^{a} + \alpha_2 ACC_{it} + u_{it} \quad \textbf{(4a)}$$

LIM2: Cash flow system

$$NI_{it}^{a} = \omega_{10,i} + \omega_{11}NI_{it-1}^{a} + \omega_{12}CFO_{it-1} + \omega_{13}BV_{it-1} + \varepsilon_{1it} \quad \textbf{(1b)}$$

$$CFO_{it} = \omega_{20,i} + \omega_{22}CFO_{it-1} + \omega_{23}BV_{it-1} + \varepsilon_{2it} \quad \textbf{(2b)}$$

$$BV_{it} = \omega_{30,i} + \omega_{33}BV_{it-1} + \varepsilon_{3it} \quad \textbf{(3b)}$$

$$MV_{it} = i_{0,\mathrm{i}} + i_1 BV_{it} + \alpha_1 NI_{it}^{a} + \alpha_2 CFO_{it} + u_{it} \quad \textbf{(4b)}$$

Variable Measurement and Definition

Abnormal earnings (NI^a) equals $NI_t - rBV_{t-1}$, where BV_{t-1} is equity book value for previous period and NI is net income before extraordinary items and discontinued operations for the current period. To calculate abnormal earnings (NI^a), we have set r (risk free rate) as 8%, which is consistent with average ten year treasury yield in India during the period studied. Accruals (ACC) is the difference between net income (NI) and cash flow from operations (CFO) i.e. ACC = NI-CFO.

Data and Sample

Source of Data

The underlying index of the empirical study is BSE (Bombay Stock Exchange) 30, which represent approximately 50 percent of the total market capitalization of Indian Equity Market thereby making it a reliable proxy of Indian market. The BSE index is based on free float market capitalization methodology and contains thirty largest stocks in the Indian equity market. To construct the data sample historical data have been taken from capitaline plus database. For our study, we have used the list of companies subsisting on 31 March, 2011 as BSE 30 is not a static index and new companies keep replacing older ones on the basis of market capitalization. The period of study is based on six year sample from fiscal year 2005-06 to 2010-11. A year for the purpose of sample classification starts from April of the year concerned and ends in March of the following year. For example, the fiscal year 2005-06 sample starts from April 1, 2005 and ends at March 31, 2006.

For a firm to qualify for inclusion in the sample, it must have (at the end of the fiscal year) all required data including, but not limited to, book values, prices, earnings and cash flows in the capitaline plus database. Cases with missing data have been eliminated. Further, following prior studies, all the variables of the study have been deflated by the number of outstanding ordinary shares at the end of the financial year. The number of outstanding shares has been obtained from capitaline plus database.

4. Empirical Results

Descriptive Statistics

Table I reports the characteristics for each of the variables used in this study. Panel A provides the descriptive statistics for the variables used in the models. Panel A reveals that, on average, market value of equity (MV) exceeds the book value of equity (BV), indicating that equity book value alone is insufficient to explain equity market value in India. The mean value of abnormal earnings (NI^a) is 32.32 with standard deviation of 28.60. Similarly cash flows from operations (CFO) have a mean value of 50.85 with a standard deviation of 80.79 and a median of 41.21. Panel A further reveals that, on median/mean basis, accruals

(ACC) are negative and cash flows are positive. This is consistent with depreciation expense being included in accruals but capital expenditures being included in investing cash flows. Also cash flow from operations (CFO) has a larger standard deviation than accruals (ACC).

Panel B shows the correlation matrix for the set of independent variables. Abnormal Earnings (NI^a) are significantly positively correlated with cash flow from operations (CFO). Cash flow from operations significantly positively correlates with book value per share (BV). On the other hand, accruals (ACC) are significantly negatively correlated with cash flow from operations (CFO).

Results of Panel Data Estimation

Abnormal Earnings Equation

Table II, Panel A and B, presents regression summary statistics corresponding to the abnormal earnings equations (1a) and (1b) under LIM 1 and LIM 2 for all firms (based on Panel data regression). The coefficient estimates, *t* statistics, and adjusted R^2 values are presented in each Panel of Table II.

With regards to our first research hypothesis, the results (Panel A) reveal that coefficient on lagged abnormal earnings, ω_{11}, is positive and significant for the dataset (0.53). The regression results implies that abnormal earnings exhibit persistence or stationary AR(1) process, as such abnormal earnings of a particular year is significantly related to previous period abnormal earnings. Thus we reject the null hypothesis that $\omega_{11} = 0$ in case of LIM 1. Panel A further shows that accruals are not incrementally informative regarding prediction of future abnormal earnings. Thus we reject forecasting relevance of accruals, i.e., we accept the null hypothesis that $\omega_{12} = 0$ in case of LIM 1.

Panel B reveals inference consistent with those of accruals in Panel A. Panel B reveals that coefficient on lagged abnormal earnings, ω_{11}, is positive and significant for the dataset (0.50). We therefore reject the null hypothesis that $\omega_{11} = 0$ in case of LIM 2. The results also reveal that cash flows are not significantly incremental informative regarding future abnormal earnings. Thus we accept the null hypothesis that $\omega_{12} = 0$ in case of LIM 2. This implies that inclusion of one year lagged cash flows as a variable does not help in forecasting future abnormal earnings incremental to abnormal earnings and book value thereby rejecting forecasting relevance of cash flows.

Finally the coefficient on lagged book value, $\omega_{13,}$ is significant both in case of accruals and cash flows thereby suggesting its incremental informative relevance in explaining future period abnormal earnings.

Accruals and Cash flows Autoregression results

Table III, Panel A and B, presents regression summary statistics corresponding to the earnings components (accruals and cash flows) equations (2a) and (2b) for all firms.

With regards to our second research hypothesis, the results in Table III (Panel A) reveals that for accruals, ω_{22}, AR(1) process is not stationary for the empirical dataset. The regression results imply that the accruals do not exhibit persistence; as such accrual of a particular year is not related to previous period accrual in a statistically significant manner. The estimated coefficient on lagged accrual, $\omega_{22,}$ is negative (-0.13) and insignificant (-0.38). Thus we accept the null hypothesis that $\omega_{22} = 0$ in case of LIM1.

Panel B reveals inference consistent with those of accruals in Panel A. Panel B reveals that for cash flows, ω_{22}, AR(1) process is not stationary for the empirical dataset; as such cash flow of a particular year is not related to previous period cash flow in a statistically significant manner. We therefore accept the null hypothesis that $\omega_{22} = 0$ in case of LIM 2 also.

Book value Equation

Table IV presents regression summary statistics corresponding to the book value of equity equations (3a) and (3b) for all firms. With regards to our third research hypothesis, the results reveal that for book value, ω_{33}, AR(1) process is stationary for the empirical dataset. The regression results imply that the book value of equity follows AR(1) process or exhibit persistence; as such book value of equity of a particular year is related to previous period book value in a statistically significant manner. Thus we reject the null hypothesis that $\omega_{33} = 0$ in case of LIM 1 and LIM 2.

Market Value Equations

Table V, Panel A and B, presents regression summary statistics corresponding to the valuation equations (4a) and (4b) for all firms. We address our fourth hypothesis by estimating the relation between equity market value and book value, abnormal earnings, and the earnings components (accruals and cash flows).

Regarding the fourth hypothesis, Table V, Panel A, reveals that coefficient on abnormal earnings, (α_1) and book value (i_1) is positive and significant i.e. they have significant explanatory power of market value in case of LIM 1. We therefore reject the null hypothesis that $\alpha_1 = 0$ and $i_1 = 0$ in case of LIM 1. Panel A further reveals that α_2, the coefficient on accruals, is not significantly different from zero for all firms. We therefore accept the null hypothesis that $\alpha_2 = 0$ in case of LIM 1. This implies that the accrual component of earnings do not enhance the explanatory power for market value of the equity incremental to abnormal earnings and book value in case of Indian dataset examined.

Panel B reveals inference consistent with those in Panel A. Panel B reveals that for LIM 2, coefficient on abnormal earnings and book value is positive and statistically significant. We therefore reject the null hypothesis that $\alpha_1 = 0$ and $i_1 = 0$ in case of LIM 2. The results further reveal that α_2, the coefficient on cash flows, is not significantly different from zero for all firms. This indicates that the cash flow component of earnings is incrementally valuation irrelevant. We therefore accept the null hypothesis that $\alpha_2 = 0$ in case of LIM 2. This implies that cash flow component of earnings do not enhances explanatory power for market value of the equity incremental to abnormal earnings and book value.

Overall the empirical findings provide us with evidence that in case of Indian markets, aggregate (or abnormal) earnings are the relevant earnings construct for valuation and the second earnings component (accrual and cash flow) is irrelevant. We further demonstrate that besides earnings, book value plays an important role in setting investment expectations of investors. Consistent with Sloan (1996), these results suggest that stock prices in Indian stock market act as if investors fixate on aggregate earnings, failing to distinguish fully between the different properties of the accrual and cash flow components of earnings. Consequently, firms with relatively higher (lower) levels of accruals can experience higher (lower) levels of stock returns.

5. Summary and Concluding Remarks

One of the main research areas in accounting and finance is so-called value relevance research that aims to determine empirically the relationship between disclosed accounting information and stock market values. Although prior literature examining the persistence of earnings and earnings components is immense in developed markets (US, UK, Canada etc.), little is empirically known about the same in emerging markets where accounting and institutional settings are entirely different from those of mature capital markets. This study contributes in filling the gap in the literature by examining the persistence of earnings (and earning components) and their valuation relevance in Indian scenario for a period of six years. Based on a sample of Indian listed firms, the findings provide evidence on the construct of persistence and value relevance of earnings and book value of equity in Indian context. This evidence is consistent with prior empirical findings on persistence and value relevance of earnings and book value reported in developed and emerging markets to date (Barth *et al.*, 1999; Dechow *et al.*, 1999; Ganguli, 2011). With regards to the forecasting relevance (with respect to next-period abnormal earnings), persistence and valuation relevance of earning components (accruals and cash flows), the evidence suggest that the earning components (accruals and cash flows) do not add to any value relevance over and above abnormal earnings and book value in explaining market value of equity. Further, both earnings components (accruals and cash flows) fail to show persistence and forecasting ability (or relevance) in explaining next period abnormal earnings in case of Indian dataset examined.

Overall, the findings confirm that investors are fixated on earnings in India capital market and fail to attend separately to the cash flow and accrual components of earnings while undertaking their investment decisions. Therefore, Indian investors who neglect this distinction are overly optimistic about the future prospects of firms with high accruals, and overly pessimistic about the future prospect of firms with low accruals. The results provide consistent evidence that accounting information, especially earnings, is value-relevant in the Indian capital market. These findings might indicate that competing information sources such as earnings forecasts, firm research by financial analysts, management conference calls, etc. are far less prevalent in India as compared to developed markets. The significant role of aggregate earnings in Indian capital market may create an incentive for managers in Indian-listed firms to engage in earnings management to meet or beat earnings thresholds in order to enjoy positive market performance. Accordingly a potential policy implication of above analysis is that stock markets in India needs complementary information sources other than published accounting reports to become more informationally efficient.

Avenues for further research could include analysis of various components of accruals (discretionary and non discretionary) and their association with cash flows and market values over historical period. Furthermore, the sub samples can be analyzed with respect to association of various individual components of accruals and market value. Also persistence of various accounting variables can be tested using more than 1 year lags.

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Professional Biography: The author has worked extensively in Indian Equity and Debt Markets with companies like JPMorgan and Max Life Insurance. Before joining IMT (Institute of Management Technology) Ghaziabad as Assistant Professor, the author was managing funds of USD 100 million in the capacity of Portfolio Manager covering both Equity and Debt markets. The author is an MBA Finance and has recently submitted its doctorate in finance.

Table I: DESCRIPTIVE STATISTICS
(SAMPLE OF 805 OBSERVATIONS, FY 2005-06 to 2010-11)

Panel A: Descriptive Statistics

Description	Variable	Mean	Median	Std dev
Market value	**MV**	871.77	671.1	753.52
Book Value	**BV**	232.80	192.35	180.17
Cash Flow from Operations	**CFO**	50.85	41.21	80.79
Abnormal earnings	**NI^a**	32.32	26.21	28.60
Accruals	**ACC**	-2.04	-2.31	71.44

Panel B: Correlation Matrices Between Variables

VARIABLES	*Price*	*BV*	*CFO*	*NI^a*	*ACC*
Price	1.00				
BV	0.52	1.00			
CFO	0.28	0.33	1.00		
NI^a	0.69	0.54	0.45	1.00	
ACC	0.05	0.01	-0.89	-0.03	1.00

Table II: Summary Statistics from Panel Data Regressions of Abnormal Earnings on Lagged Abnormal Earnings and Earnings components (Accruals and Cash flows).

Panel A: Accruals: $NI_{it}^{a} = \omega_{10,i} + \omega_{11}NI_{it-1}^{a} + \omega_{12}ACC_{it-1} + \omega_{13}BV_{it-1} + \varepsilon_{1it}$
Dependent Variable: $\mathrm{NI}_{\mathrm{it}}^{\mathrm{a}}$

Method: Fixed Effect Panel Regression
White heteroskedasticity-consistent standard errors & covariance

R-square: 74%

Variable	***Coefficient***	***t-Statistic***	***Prob.***
NI_{it-1}^{a}	*0.5321*	*4.042***	*0.0001*
ACC_{it-1}	*-0.0126*	*-0.4866*	*0.6276*
BV_{it-1}	*0.0695*	*5.866***	*0.0000*

*** Significant at 5% level*

Panel B: Cash Flows: $NI_{it}^{a} = \omega_{10,i} + \omega_{11}NI_{it-1}^{a} + \omega_{12}CFO_{it-1} + \omega_{13}BV_{it-1} + \varepsilon_{1it}$
Dependent Variable: $\mathrm{NI}_{\mathrm{it}}^{\mathrm{a}}$

Method: Fixed Effect Panel Regression
White heteroskedasticity-consistent standard errors & covariance

R-square: 74%

Variable	***Coefficient***	***t-Statistic***	***Prob.***
NI_{it-1}^{a}	*0.5052*	*4.037***	*0.0001*
CFO_{it-1}	*0.0261*	*0.9238*	*0.3578*
BV_{it-1}	*0.0683*	*6.955***	*0.0000*

*** Significant at 5% level*

Table III: Summary statistics from Panel Data Regression of Earning Components (Accruals and Cash Flows)

Panel A: ACC_{it} = $\omega_{20,i}$ + $\omega_{22}ACC_{it-1}$+ $\omega_{23}BV_{it-1}$ + ε_{2it}
Dependent Variable: ACC_{it}

Method: Fixed Effect Panel Regression
White heteroskedasticity-consistent standard errors & covariance

R-squared: 17%

Variable	*Coefficient*	*t-Statistic*	*Prob.*
ACC_{it-1}	*-0.1327*	*-0.3831*	*0.7022*
BV_{it-1}	*0.0731*	*2.503***	*0.0136*

*** Significant at 5% level*

Panel B: CFO_{it} = $\omega_{20,i}$ + $\omega_{22}CFO_{it-1}$+ $\omega_{23}BV_{it-1}$ + ε_{2it}
Dependent Variable: CFO_{it}

Method: Fixed Effect Panel Regression
White heteroskedasticity-consistent standard errors & covariance

R-squared: 17%

Variable	*Coefficient*	*t-Statistic*	*Prob.*
CFO_{it-1}	*0.0152*	*0.0452*	*0.9640*
BV_{it-1}	*0.0850*	*1.5988*	*0.1123*

Table IV: Summary statistics from Panel Data Regression of Book value of Equity

$BV_{it} = \omega_{30,i} + \omega_{33}BV_{it-1} + \varepsilon_{3it}$
Dependent Variable: BV_{it}

Method: Fixed Effect Panel Regression
White heteroskedasticity-consistent standard errors & covariance
R-squared: 72%

Variable	*Coefficient*	*t-Statistic*	*Prob.*
BV_{it-1}	*0.7874*	*16.93***	*0.0000*

*** Significant at 5% level*

Table V: Summary Statistics from Panel Data Regressions of Market Value of Equity on Book Value, Abnormal Earnings and Earning Components (Accruals and Cash flows)

Panel A: $MV_{it} = i_{0,i} + i_1 BV_{it} + \alpha_1 NI_{it}^{a} + \alpha_2 ACC_{it} + u_{it}$
Dependent Variable: MV_{it}

Method: Fixed Effect Panel Regression
White heteroskedasticity-consistent standard errors & covariance
R-squared: 66%

Variable	***Coefficient***	***t-Statistic***	***Prob.***
BV_{it}	*1.3068*	*3.133***	*0.0022*
NI_{it}^{a}	*12.714*	*4.596***	*0.0000*
ACC_{it}	*0.7432*	*1.7288*	*0.0868*

*** Significant at 5% level*

Panel B: $MV_{it} = i_{0,i} + i_1 BV_{it} + \alpha_1 NI_{it}^{a} + \alpha_2 CFO_{it} + u_{it}$
Dependent Variable: MV_{it}

Method: Fixed Effect Panel Regression
White heteroskedasticity-consistent standard errors & covariance
R-squared: 66%

Variable	***Coefficient***	***t-Statistic***	***Prob.***
BV_{it}	*1.3574*	*4.662***	*0.0000*
NI_{it}^{a}	*13.300*	*4.512***	*0.0000*
CFO_{it}	*-0.6501*	*-1.4998*	*0.1367*

*** Significant at 5% level*

MANAGERIAL OWNERSHIP AND FIRM PERFORMANCE: THE INFLUENCE OF FAMILY DIRECTORS AND NON-FAMILY DIRECTORS

Hasnah Kamardin

ABSTRACT

Purpose – *The main purpose of the study is to examine the influence of family directors on the firm performance of public listed companies (PLCs) in Malaysia. This study provides empirical evidence on the agency problems between controlling shareholders and minority interests in the concentrated ownership setting.*

Design/methodology/approach – *Samples of the study are 112 PLCs in year 2006. Two measures of firm performance are used: return on assets (ROA) and Tobin's* Q. *Managerial ownership refers to the percentage shareholdings of executive directors with direct and indirect holdings. It was further categorized into family ownership and non-family ownership.*

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Findings – *In relation to ROA, managerial ownership is found positively significant. The results also show that the positive relationship between managerial ownership is contributed by the managerial-non-family ownership. In relation to Tobin's* Q*, the results show a U-shape with turning point at 31.38% for managerial ownership and 28.29% for the managerial-family ownership. The results found significant and positive relationships between managerial ownership and both measures of firm performance which indicates that managerial ownership and family ownership yield greater efficiency.*

Research implications – *The study highlights the effects of corporate governance on ROA and Tobin's* Q *are somewhat different. It provides some evidence on the need to use appropriate measure of firm performance. The significant relationship supports the argument of Chami (1999), Fama and Jensen (1983), and DeAngelo and DeAngelo (1985) and empirical evidence of Lee (2004) that family ownership enhances monitoring activities.*

Originality/value – *Differentiating the types of managerial ownership into family and non-family categories enriches our knowledge about who actually contributes to the improved performance.*

Keywords: Corporate governance; managerial ownership; firm performance; Malaysia

INTRODUCTION

Poor corporate governance is partially a cause of the Asian financial crisis in 1997 (Mitton, 2002; Thomas, 2002). Johnson, Boone, Breach, and Friedman (2000) found that during the crisis, corporate governance variables explained a greater proportion of the variation in exchange rates and stock market performance than did other economic variables. In Malaysia, weak corporate governance is found to be associated with corporate performance (Abdul Samad, 2004). In addition, Credit Lyonnais Securities Asia (CLSA) in the year 2000 ranked Malaysia as one of the 10 worst emerging countries in terms of corporate governance. Poor corporate governance is argued to be the result of poor implementation of corporate governance reforms. Indeed, a research by the Credit Lyonnais Securities Asia (CLSA) Emerging Market in collaboration with Asian Corporate Governance Association (ACGA) on corporate governance in Asian countries reported the inconsistency between law reforms and implementation. Comparatively, Malaysia had the highest score (9 out of 10) in law reforms but among the five lowest Asian countries (score 3.5 out of 10) in the implementation of corporate governance.

Malaysian regulators have taken various efforts to strengthen corporate governance (Susela, 2003) as a firm's performance is related to its corporate governance practices (Brown & Caylor, 2009; Durnev & Kim, 2005). These efforts are essentially taken to instil confidence and trust of the existing and potential investors to invest in good governance firms. Among the efforts is the launching of the code of corporate governance to listed companies by the Malaysian Institute of Corporate Governance (MICG) in 1999, which was then followed by the revamp of Listing Requirements by the Bursa Malaysia in 2001. The code puts heavy emphasis on board structure to make sure the board functions effectively. Among the recommended items in the code is that the Board of Directors (BOD) and Audit Committee (AC) should compose a majority of independent directors, as outside directors are said to play their roles in line with the interests of shareholders. The revamp of Listing Requirement (LR) by the Bursa Malaysia (formerly known by Kuala Lumpur Stock Exchange, KLSE) requires listed companies to adhere to the Listing Requirement and the Malaysian Code of Corporate Governance (MCCG). Whilst the changes in corporate governance are laudable, the mandatory requirements have however led companies to comply with the 'form' rather than the 'substance' of the corporate governance practices (Roberts, 2002; Sonnenfield, 2002).

Regulators have put heavy emphasis on companies to comply with the best practices of corporate governance after the Asian Financial Crisis in 1997. It is assumed that corporate governance mechanisms should provide sufficient fundamentals to lead to a better firm performance. The MCCG was revised in 2007, which among other amendments place importance on the board process (SC, 2007). BOD should implement a process to be carried out annually for assessing the effectiveness of BOD, of committees of the board and the contribution of each individual director. The revised code also provides criteria that should be considered by the nominating committee when recommending candidates of directorships. The proposed criteria include skills, knowledge, expertise and experience; professionalism; integrity; and candidate's ability to discharge such responsibilities.

Corporate governance is defined as 'a set of mechanisms through which outside investors protect themselves against expropriation by the insiders, managers and controlling shareholders' (La-Porta, De-Silanes, Shleifer, & Vishny, 2000, p. 4). The aim of good corporate governance is geared to enhance the long-term value of the company. Corporate governance mechanisms are designed to reduce agency costs associated with the separation of ownership and control (Fama, 1980; Fama & Jensen, 1983; Jensen & Meckling, 1976) in modern companies. Expropriation of wealth is related to agency problem which takes a variety of forms such as transfer pricing, asset stripping, investor dilution, overpaying executives, diversion of corporate opportunities from the firm and installing unqualified family members in managerial positions (Jensen & Meckling, 1976; Johnson et al., 2000). It occurs when insiders use the company's profits to benefit themselves rather than outside investors.

Corporate governance mechanisms can be categorized into internal and external controlling mechanisms. The key external controlling mechanisms are managerial labour markets, market for corporate control, debt and concentrated shareholding by blockholders (Ali & Sanda, 2001). Two important internal corporate governance mechanisms are BOD and directors' shareholding. Due to the weak market control in emerging countries, internal corporate governance mechanisms play a vital role in corporate governance of emerging markets (Lei & Song, 2004).

Other than the issues of board characteristics, ownership structure is also considered to have influence on the decisions made by the managers. Lemmons and Lins (2003) posit that firm's ownership structure is a primary determinant of the extent of agency problems between controlling insiders and outside investors. Managerial ownership is used as a means to enhance control in public listed companies (PLCs) in Malaysia (Claessens, Djankov, & Lang 2000; KLSE-PWC, 1999). In addition, family ownership is shown to be significantly correlated with managerial ownership. Given the scenario above the main objective of this study is to examine the influence of family directors on the firm performance of PLCs in Malaysia. It also intended to examine the influence of board attributes on firm performance.

CORPORATE GOVERNANCE CHARACTERISTICS IN MALAYSIA

Corporate governance in Malaysia is greatly influenced by ownership structure which has been found to have impact on board composition, board practices and board decisions (Tan, 2005). Shareholding in Malaysian PLCs is highly concentrated in the hands of a few numbers of shareholders (Abdul Samad, 2004; La-Porta et al., 2000). A majority of the companies have ultimate controlling owner, either individual or family (Ishak & Napier, 2006). As of December 1998, Abdul Samad (2004) reported that the mean of the first largest shareholding was 30.30% and that of the five largest shareholding was 58.84%, which accounted for more than half of the voting shares. About 71.4% of companies (Main Board and Second Board) were under majority ownership, having a shareholding of more than 50%, and were controlled by their five largest shareholders. The percentage shareholding by type of five largest shareholders is dominated by nominees followed by non-financial companies and government. It shows that Malaysian PLCs were dominated by large shareholders, and thus protection of minority shareholders may be a problem in Malaysia. In fact, minority shareholders are practically powerless to prevent large shareholders from implementing their plans for the company.

The significant means of enhancing control in Malaysia is through pyramid-holding, cross-holding and managerial ownership (Claessens et al., 2000). There is significant participation of owners in management with 33% of them involved in management (KLSE-PWC, 1999). The concentrated shareholding in PLCs is also dominated by family. Eighty-five per cent (85%) of the sample companies of Claessens et al. (2000) had their CEO, board chairman or vice-chairman from a controlling family. The percentage of family control is 57.5% and 67.2%, at 10% cut off and 20% cut off, respectively. Family also has the highest control in large companies (35%) and smaller companies (84%). Apart from that, there is an increase in the importance of shareholdings by the state holdings (Claessens et al., 2000), institutional holdings (Joher, Ali, & Nazrul, 2006) and foreign ownership (Suto, 2003) in Malaysian corporations.

CORPORATE GOVERNANCE AND FIRM PERFORMANCE

Agency theory is widely used to examine the relationship between internal corporate governance mechanisms and firm performance from the economic and finance perspective. The main concern is to protect the shareholders' interests by focusing on the role of outside directors to monitor top management (Fama, 1980; Fama & Jensen, 1983) and provide services to top management (Wan & Ong, 2005). Due to the potential agency problems from managers, having small board size, majority of independent outside directors in the BOD, independent board leadership (separate titles for Chairman and Chief Executive Officer [CEO]), and significant shareholding in managerial ownership (MOWN) are expected to provide better monitoring and better protection of shareholders' interests.

Empirical evidence on the effects of board composition and board leadership on firm performance shows contradicting findings. While some studies found no relationship between outside directors and firm performance (e.g. Abdullah, 2004; Baysinger & Hoskisson, 1990; Hermalin & Weishbach, 1988), negative relationships between outside directors and firm performance were also noted which contradict the assumption of the agency theory (e.g. Agrawal & Knoeber, 1996; Bhagat & Black, 1999; Weir & Laing, 2001; Yermack, 1996). Other studies, on the other hand reported positive relationships (e.g. Weir, Laing, & McKnight, 2002). Interestingly, Haniffa and Hudaib (2006) found that the relationship between board composition and board leadership on firm performance depends on the type of firm performance measures used (accounting measures vs. market-based measures). Studies on the relationship between ownership structure and firm performance also note conflicting results. There is evidence of non-linear relationship between managerial ownership (MOWN) and firm performance (Ali & Sanda, 2001; Chee & Md Taib, 2005; Faccio & Lasfer, 1999; Hermalin & Weishbach, 1991; Mat Nor, Mohd Said, & Redzuan 1999; McConnell & Servaes, 1990; Morck, Shleifer, & Vishny, 1988; Short & Keasey, 1999). But most findings show that managerial ownership (MOWN) is related to firm performance which entrenches at higher percentage of managerial ownership. An exception is noted in the findings of Chee and Md Taib (2005) who found that managerial ownership at the higher percentage aligned with the interests of outside shareholders. In the East Asian countries characterized by concentrated ownership, previous studies have shown that controlling shareholders and family controlled firms were found to be associated with higher performance (Joh, 2003; Wiwattanakantang, 2001; Yammeesri, Lodh, & Herath, 2006). These findings are somehow contradicting with the findings in the western countries (characterized by diffused ownership) where the alignment of interests occurs at the lower percentage of managerial ownership. Several reasons are cited for the differences such as the studies were conducted in different institutional governance (diffused vs. concentrated ownership) and different shareholders' protection (low vs. high protection).

It has been suggested that a study on the relationship beyond board composition and board structure should be conducted in order to better understand firm performance (Finkelstein & Mooney, 2003; Leblanc, 2004; Wan & Ong, 2005). Considering these recommendations, this study includes other board attributes (board characteristics and board process) as suggested by Zahra and Pearce (1989).

ATTRIBUTES OF BOD

Zahra and Pearce (1989) identify four attributes of BOD which lead to good performance of firms: board composition, characteristics, structure, and process. The board composition refers to the board size and the mix of director types (insiders vs. outsiders). The emphasis on board composition proxied by independent directors has shown contradicting results. With highly concentrated ownership in Malaysia, independent directors might not be able to play their roles effectively as they might be under management control. Outside directors having interests in the companies (non-independent non-executive directors [NINE]) would have more incentives to enhance firm performance. Board characteristics consist of two components which are directors' background (age, educational background, values and experience) and board personality. Multiple directorships and board knowledge are used as proxies of board characteristics, and frequency of board meetings or percentage of meeting's attendance are used as a proxy of board process in this study. Board structure refers to the dimensions of board's organization which include types of committees, committee membership, flow of information and board leadership. Board process is referred to the approach the board takes in making decisions. Vafeas (1999) used frequency of board meeting to proxy the board process.

The current study adapts all the board attributes suggested by Zahra and Pearce (1989). Table 1 provides summary of the board attributes used in the study.

Board Size

According to Section (S) 122 of the Malaysia's Companies Act, 1965, a company should have at least two directors. The act does not specify the maximum numbers of directors in a company. However, according to the MCCG, size of board should reflect the interests of other shareholders other than the significant shareholders. The subjective condition often

Table 1. Conceptualization of Board Attributes.

Attributes	Explanations
Composition	Board size and types of directors (outside directors)
Characteristics	Directors' background (board experience/knowledge)
Structure	Dimensions of board's organization (board leadership)
Process	Approach the board takes in making decisions (frequency of board meetings)

requires the BOD to exercise judgement in determining the appropriate board size.

Board size is used as a proxy of CEO domination on BOD. Larger board makes domination by the CEO becomes more difficult and directors are able to exercise their power in governing the corporation, thus larger board is preferable. However, as board size increases, it may be difficult to reach decisions timely because of the existence of rival factions and cliques that may slow the proceedings. Thus, large boards are less likely to function effectively because CEOs have sufficient power to control operations and decisions (Jensen, 1993). Board size of more than 10 directors is considered as excessive (Lipton & Lorsch, 1992) which may lead to negative effect on firm performance. Empirical studies on the influence of board size on corporate governance found mixed results. Yermack (1996) studies of the U.S. companies found an improved return on assets (ROA) and is related to small board size. Conyon and Peck (1998) also found a negative association between board size and firm performance. Mak and Li's (2001) study of Singaporean companies found that Tobin's *Q* was associated with small board size. Empirical evidence on the earnings management studies has shown a mixed result on the effectiveness of board size in monitoring the earning management activities. Abdul Rahman and Mohamed Ali (2006) found smaller boards were effective in monitoring earnings management in Malaysian companies whilst Peasnell, Pope, and Young (2001) and Xie, Davidson, and DaDalt (2003) found larger boards were associated with less earnings management activities. Abdullah (2004), on the other hand, found no association between board size and accounting profits. Following agency theory, small board size is predicted to lead to enhanced performance.

H1. There is a negative relationship between board size and firm performance.

Board Leadership

There have been concerns about the role duality or the 'dominant personality', where the CEO is also the chairman of the board. The concern is that no one individual should have unfettered powers. For the PLCs in Malaysia, the MCCG recommends a separate role for the CEO and chairman. If the combined roles are opted, there should be a strong independent element on the board. Companies can still pursue the role duality of CEO;

however, they have to disclose the information and reasons for adopting it in the annual reports. The role duality is common in small companies and in family controlled companies.

From an agency theory perspective, independent board leadership is necessary to prevent managerial entrenchment. Given that one of the board's central functions is to monitor the performance of top management, allowing the CEO to fulfil both roles would compromise the system of checks and balances. Moreover, if the purpose of the board is to represent the interests of the shareholders, CEO holding both roles would have conflict of interests. Fama and Jensen (1983) point out that the board is not an effective device for decision control unless it limits the decision discretion of individual top managers. Thus, independent board leadership would enhance the monitoring ability of the board (Jensen, 1993). Having independent leadership would reduce agency problems and thus enhance firm value (Fama & Jensen, 1983; Lei & Song, 2004; Rechner & Dalton, 1991). Rechner and Dalton (1991) examined the relationship between independent board leadership and organizational performance (ROE, ROI, profit margin). They found that firms with independent leadership consistently outperformed the CEO duality firms.

Brickley, Coles, and Jarrell (1997) argue that the separation of the roles has larger costs (agency costs of controlling the behaviour of outside chairman, information costs, cost of changing the succession process, etc.) than the benefits (separating decision management from decision control) for most large firms. They found that almost no major firm in their study (1988 data) had an independent outsider as chairman. Rather, in almost all cases the chairman is either the former employee or a person with special ties to the firm. In case of independent leadership, chairmen are people with detailed knowledge of the company and have relatively high shareholdings. They did not find evidence that CEO duality structure is associated with inferior performance. Thus, they argue that the combining titles of CEO and chairman (CEO duality) is indeed efficient and generally consistent with shareholders' interests for the typical large U.S. companies.

In the Asian countries, studies on the relationship between board leadership and firm performance produced mixed results. In Singapore, Wong and Yek (1991) found significant positive relationship between CEO duality and modified Tobin's *Q*. They also found that on average the modified Tobin's *Q* of firms with CEO duality is higher than those firms with independent leadership. They suggested that one possible explanation for the finding is that CEO duality is often associated with high shareholdings.

A similar finding is also found in Tan et al.'s study (2001) which shows that CEO duality had positive relationship with Tobin's *Q* during the crisis (1997 financial crisis). Their findings highlight the influence of environment the firm is operating in. The benefits of CEO duality during crisis by having more unified corporate responses and strong and decisive leadership style outweighed the potential agency problems. Haniffa and Hudaib (2006) found the relationship between board leadership and firm performance depends on the type of measurement used for the firm performance. They found CEO duality was not significantly related to Tobin's *Q* but had a significant negative relationship to ROA. The result supports the argument that giving too much power to one person is detrimental to the firm.

H2. There is a positive relationship between independent board leadership and firm performance.

Board Composition

Within corporate governance structure, non-executive directors (NEDs) have an important position to monitor the management and executive directors. NEDs are seen as the check and balance mechanism to enhance board's effectiveness. NEDs are expected to bring independence into the board and add to the diversity of skills and expertise of the directors (Abdullah, 2004). The role of outside directors (NEDs) in the BOD is vital as business adviser and 'watchdog' to ensure managers act in the interests of outside shareholders.

NEDs consist of independent directors (INE) and non-independent directors (NINE), and they are not full-time directors. The non-independent non-executive directors (NINE) is not independent as they could have business and management arrangements with the company or other relationships including family relationships with other directors (Cheah, 2003). They might have more incentives to monitor management decisions as underperformed firm performance would hurt them directly (Lorsch, 1995).

Previous studies on the relationship between NEDs and firm performance are not supporting the agency theory. A special report on NEDs by The Economist (20 March 2003, pp. 71–73) cautions that the independent directors alone may not behave independently and thus compromise their objectivity and loyalty to the shareholders. The report further highlights a special breed of NEDs who are non-independent, the so-called 'gray' or affiliated directors. Apart from being non-executive, an affiliated director is usually an ex-employee, related to the firm's controlling family, an interlocking director, or a professional with significant business or family ties with the firm (Klien, 1998). As most of the gray or affiliated directors owns significant shares in the companies, their incentives to get involved and engaged in corporate governance are higher (Roberts, McNulty, & Stiles, 2005). In addition, since affiliated directors have prior associations with the firm, they often have deeper knowledge of the firm and its industry than independent directors, and thus shareholders may feel affiliated directors instead of independent directors are better serving them.

Studies in the United States by Hermalin and Weisbach (1988) and Baysinger and Hoskisson (1990) found no association between NEDs and firm performance. Agrawal and Knoeber (1996) highlighted the persistent negative significant relationship between independent directors (INE) and firm performance for both analyses using Ordinary Least Square (OLS) and Two Stage Least Square (2SLS) regression. Yermack (1996) also found negative association between INE and firm performance. Bhagat and Black (1999) examined the effect of different types of BOD (inside[1] directors, affiliated[2] directors, independent directors) on firm performance to see whether there are differences of performance between firms with INE majority compared to firms with non-majority. Based on the board composition they measured majority independent board (INDEP) as proportion of INE minus proportion of inside directors. They found that INE has significant negative relationship to firm performance. They also found no evidence that boards with majority independent directors performed better than boards with more insiders than independent directors. In addition, they also found that firms with supermajority independent boards were less profitable than other firms. Studies in the United Kingdom also reveal inconclusive results where no significant relationship was found between the NEDs and firm performance (Baysinger & Hoskisson, 1990; Weir & Laing, 2001).

Evidence in the Asian countries also reveals inconclusive results on the relationship between board composition and firm performance. The NEDs had a negative significant relationship to firm value. Abdullah (2004) found no significant relationship between NEDs and accounting performance measured in ROA, ROE, EPS and profit margin.

In summary, most findings of the relationship between independent directors and firm performance found either a negative (significant) relationship or insignificant relationship. The non-independent non-executive directors (NINE), having interests in a company, would have more incentives to enhance firm performance compared to the independent directors. The need to explore the other potential contribution of NEDs, which are the non-independent non-executive directors (NINE), as proxy for the affiliated directors is also addressed by Klein (1998), Roberts et al. (2005) and Wan Hussin, Che Adam, Lode, and Kamardin (2005).

H3. There is a positive relationship between the proportion of non-independent non-executive directors (NINE) and firm performance.

Multiple Directorships

Haniffa and Hudaib (2006) define multiple directorships as directors sitting on more than one board. In the United States, a director holding less than three multiple directorships is often considered as the best practice. 'Busy directors' are defined as directors holding three or more directorships (Ferris, Jagannathan, & Pritchard, 2003; Sarkar & Sarkar, 2005).

In Malaysia, multiple directorships are found to be common among listed firms in Malaysia (Haniffa & Cooke, 2002). This practice is not surprising given the high limit of directorships allowable to directors. According to the Bursa Malaysia Listing Requirement, BOD are allowed to have a maximum of ten (10) directorships in PLCs and fifteen (15) directorships in non-listed companies.

Previous studies have shown that directors of larger firms have more multiple directorships as larger firms have wider contracting environments, thus requiring negotiations with more parties (Booth & Deli, 1996). Directors of larger firms are perceived to have more skills because of the size and complexity of the operations they oversee (Ferris et al., 2003). Differences in higher permissible limits on multiple directorships between developed countries and developing countries are driven by various factors such as supply constraints in managerial labour markets of many developing countries, lesser nature of tasks required in the developing countries and smaller company sizes (Sarkar & Sarkar, 2005).

Ferris et al. (2003) using various measures of multiple directorships (directorship per director; maximum number of directorships held by any one member of a firm's board; percentage directors having three or more directorships; average directorships held by outside directors; and maximum numbers of directorships held by any executive director to examine the impact of busy directors on firm performance) found that directorship per director had a significant and positive relationship to market-to-book value. Sarkar and Sarkar (2005) used median of directorship of independent directors and executive directors in India and found a positive and significant relationship between multiple directorships by independent directors and Tobin's Q but negative and significant relationship between multiple directorships by executive directors and firm performance (Tobin's Q and market-to-book value).

Studies of multiple directorships in Malaysia are limited and can be found in Tan (2005) and Haniffa and Hudaib (2006). Both studies measured multiple directorships as percentage of directors having more than one directorship in public companies. Tan (2005) found multiple directorships to be positively correlated with ownership concentration and to have a significant and positive relationship to ROA. Haniffa and Hudaib (2006) found no significant relationship to ROA but a significant and negative relationship to Tobin's Q. The negative relationship to Tobin's Q suggests that having directors sitting on more than one directorship is detrimental to the firm's performance.

H4. There is a negative relationship between multiple directorships and firm performance.

Director Knowledge

Nicholson and Kiel (2004) view a board as '… a bundle of intellectual capital that enables it to enact a role set …' (p. 449), which is fundamental to transform inputs into organizational performance. The knowledge acquired by BOD is assumed to improve the quality of actions taken. Previous studies in management associate relevant experience and knowledge on certain tasks (Carpenter & Westphal, 2001; Spliker & Prawitt, 1995). Zander (1994) found CEO age and tenure are associated with CEO experience. In terms of manager characteristics, CEO age and CEO tenure are commonly associated with experience, not the entrance scores or graduate degrees. Carpenter and Westphal (2001) provide evidence that BOD, having experience in a particular situation or having specific expertise, would be likely to affect their roles in monitoring managers.

From another perspective, long tenure tends to foster 'cohorts' within an organization (Pfeffer, 1983). For a board, long tenure among directors can mean increased social cohesion and the ability to reach consensus quickly based on shared experience. The factors that create consensus produce obstacles to independent thinking. Long tenure is likely to be associated with higher commitment to status quo. The high social cohesion is expected to lead to a reluctance to challenge the status quo (Wiersema & Bantel, 1992).

Wiersema and Bantel (1992) examined the relationship between top management teams and corporate strategic change. Their findings showed higher team tenure is associated with changes in corporate strategy. Bantel and Jackson (1989), on the other hand, examined the relationship between social composition (age, tenure, educational background and functional background) of the top management teams and innovation adoptions in the United States. They found an average tenure and innovation adoptions are not significant.

H5. There is a relationship between director knowledge and firm performance.

Board Process

Board process refers to decision-making activities of the board (Kula, 2005). It is assumed that the approaches taken by the board in making decisions are influenced by the frequency of board meetings (Vafeas, 1999). All major issues and decisions are discussed and made at formal board meetings. It is argued that the relationship between frequency of board meetings and firm performance is not clear. There are costs associated with board meetings such as managerial time, travel expenses and directors' meeting fees. Benefits associated with board meetings include more time for directors to confer, set strategy and monitor management.

As BODs hold other directorships in other companies, frequency of board meetings is considered important in improving the effectiveness of a board. Vafeas (1999) found larger boards and boards of firms with many standing committees had more meetings. In relation to firm value, he found that firms that meet more frequently are valued less by the market. The frequency of board meetings was higher during poor firm performance, and firms having more frequent meetings are followed by improvement in operating performance in the following years.

H6. There is a relationship between the board process and the firm performance.

Managerial Ownership (MOWN)

MOWN is considered an important governance mechanism to help control agency problem (Jensen & Meckling, 1976) and place greater effort to enhance firm wealth. MOWN works as direct incentives for managers to act in line with shareholders' interests (Weisbach, 1988). The greater the percentage of stocks owned by top managers, the more likely managers will make decisions consistent with maximizing shareholders' wealth. Singh and Davidson (2003) found that larger MOWN aligns the interests of shareholders and management which is positively related to higher asset utilization efficiency that reflects lower agency costs. Other empirical evidence on the role of MOWN in reducing agency problem has shown that the relationship between MOWN and firm performance is non-linear (Ali & Sanda, 2001; Mat Nor et al., 1999; McConnell & Servaes, 1990; Morck et al., 1988; Short & Keasey, 1999; Wong & Yek, 1991). These studies found that above certain level of ownership, managers may get entrenched, which may result in decreased firm performance. Morck et al. (1988) found positive relationship between MOWN and Tobin's *Q* occurs for MOWN 0% to 5% and beyond 25% ownership. Negative relationship occurs for MOWN 5–25% ownership. They suggest that the negative relationship is the effect of wealth constraints on MOWN. The entrenchment effect is supported by the presence of a founding family in an older firm.

Malaysian studies on the relationship between board ownership and firm performance are found in Ali and Sanda (2001), Chee and Md Taib (2005), and Mat Nor et al. (1999). Mat Nor et al. (1999) findings were consistent with Morck et al. (1988). Ali and Sanda (2001) found higher turning points (curvilinear relationship), positive relation for MOWN less than 36.7% and negative relation when MOWN exceeds 36.7%. Chee and Md Taib (2005) also found a curvilinear relationship but a U-shaped curvilinear. They found positive relation when MOWN is higher which supports the convergence-of-interest hypothesis.

Family ownership refers to the percentage of company's shares held by family members out of the total shares outstanding (Anderson, Mansi, & Reeb, 2003; Villalonga & Amit, 2006). La-Porta et al. (2000) defines family controlled firms based on a threshold of 20% and at least two members are on the board. Chen and Jaggi (2000) and Mishra, Randoy, and Jenssen (2001) use a threshold of 10% to determine family controlled firms. Villalonga and Amit (2006) use a smaller threshold of 5% to determine family controlled firms. Family ownership exceeding certain threshold would qualify it to gain family control over a firm. However, a family can also gain control even having less ownership in a firm. This is achieved through pyramidal structure (voting right) (La-Porta et al., 2000). Thus, family ownership is related to family controlled firms and non-family controlled firms.

Family controlled firms are governed differently from non-family controlled firms (Chami, 1999; Lee, 2004; McConaughy, Walker, Henderson, & Mishra, 1998; Mishra et al., 2001). Family controlled firms are fundamentally different than public corporations which tend to use different strategies and rely on control systems compared to non-family controlled firms. Family controlled firms are very much governed by family traits which do not exist in non-family controlled firms. Chami (1999) develop a theory of family business which explains the dynamics of family. He shows that family values (e.g. trust and altruism) can create 'an atmosphere of love for the business and a sense of commitment'. Nepotism and favouritism are held in check by the need for the family business to compete and succeed in the product and capital market. McConaughy et al. (1998) found that both founders and their descendants run their firms more efficiently than CEOs without family ties as founding family firms are characterized by transparent economic conditions and strong social relationship between owners and managers which lead to higher firm performance.

Family controlled firms are argued to pursue maximization of sales and shareholder's value well (Thomsen & Pedersen, 2000). Mishra et al. (2001) found a positive association between founding family controlled and firm value, which is consistent with a study in Singapore by Tan, Chng, and Tan (2001). The association between founding family CEOs and firm value is stronger among younger firms and firms with smaller boards. They suggest that founding family CEOs can enhance firm performance when family influence does not create shareholder entrenchment. In terms of board structure, they found that outside director representation does not improve corporate governance in founding family controlled firms. They argue that '… once the commitment is in place, the need for outside board monitoring is diminished and the inside directors who know the marketplace may be more valuable to these firms …' (p. 255). In Asian countries, Wiwattanakantang (2001) found controlling shareholder and family controlled firms are associated with higher performance in Thailand.

H7. There is a positive relationship between managerial ownership (MOWN) with firm performance.

H7a. There is a positive relationship between managerial-family ownership (MFOWN) and firm performance.

H7b. There is a positive relationship between managerial-non-family ownership (MNFOWN) and firm performance.

RESEARCH METHODOLOGY

Operational Definition and Measurement of Variables

Data for the internal corporate governance, ROA and control variables were gathered from the annual reports (KLSE, 2004–2006). Share prices of companies were searched in the Thomson database. Details of data search and measurements used are explained in the following paragraphs.

Information on the board size, board composition, board leadership, directors' tenure and multiple directorships were searched in the sections of company information and directors' profiles of the companies' annual reports.

Change of directors during the financial year required the researcher to determine which director to be considered as in most cases, a new director is also nominated in the same financial year. In determining which director to be considered, as this would also affect the directors' tenure and multiple directorships, this study adopted the requirement by the Bursa Malaysia Listing Requirement to have directors attending at least 50% of the companies' meetings. Following that requirement, the cut-off period a director should be on the board in the financial year was determined to be at least six months. Director stays of less than six months on the board in the financial year were not considered.

For multiple directorships, only directorships in the PLCs were considered. This is due to the Bursa Malaysia Listing Requirement to disclose only multiple directorships in PLCs. In addition, not all companies voluntarily disclose directorships in private companies.

Information on the frequency of board meetings and percentage of meeting attendance was gathered from the Company's Corporate Governance Statement in the annual reports. Instead of considering only the quantity (frequency of meetings), this study also considered the quality of board process proxy by the percentage of directors' meeting attendance. The average percentage of directors' meeting attendance was determined based on the average frequency of meetings attended by the directors.

Managerial ownership refers to the percentage shareholdings of executive directors at year end with direct and indirect holdings. Managerial ownership was further categorized into the ownership that belongs to family members (MFOWN) and non-family members (MNFOWN). In determining type of managerial ownership either MFOWN or MNFOWN, first the researcher identified family members connected with the directors based on the directors' information in the Director Profile. A member of a director's family includes the spouse, parent, child (including adopted child or step child), brother, sister and the spouse of his child and spouse of his brother or sister (Section 122A of Malaysia's Companies Act 1965). Then the family shareholdings in the company are determined based on direct and indirect holdings. Non-linearity in the managerial ownership structure was addressed by using the quadratic terms in the function. For example, in this study, analyses of curve estimations for the quadratic terms on both ROA and Tobin's *Q* were conducted for managerial ownership (MOWN) and managerial-family ownership (MFOWN) as previous studies have indicated the presence of non-linear relationship. The significance of ANOVA table from the curve estimation would determine the use of quadratic terms. From the regression output, the turning point for each curvilinear was computed based on the coefficients ($-\beta_1/2\beta_2$), where β_1 is the coefficient of linear term and β_2 is the coefficient of non-linear term, quadratic term (Koh, 2003; McConnell & Servaes, 1990).

This study uses both measures of objective firm performance, Accounting-based performance (ABP) (ROA) and Market-based performance (MBP) (Tobin's *Q*), to see whether there are different effects (opposite directions) in the relationships between internal corporate governance and ROA and Tobin's *Q*. ROA was measured by earnings before interests and tax (EBIT) divided by the book value of total assets (ROA = EBIT/TA). EBIT is used to avoid the effect of firms' discretion choices of capital structure (Wiwattanakantang, 2001). The approximate Tobin's *Q* by Chung and Pruitt (1994) was adopted. The definition of debt includes short-term debt, related loans and long-term debt as suggested by the Bursa Malaysia. Thus, this study used book value of liabilities instead of debts as this definition was also used by Himmelberg, Hubbard, and Palia (1999) and Wiwattanakantang (2001). Differences of calculating Tobin's *Q* are as follows:

$$\text{Approximate Tobin's Q (Chung \& Pruitt,}\quad 1994) = (\text{MVE} + \text{PS} + \text{Debt})/\text{BVTA}$$

where

MVE = market value of equity, firm's share price × number of common stock outstanding,

PS = liquidity value of the firm's outstanding preferred stocks,
Debt = book value of long-term debt + Book value of current liabilities,
BVTA = book value of total assets.

Measurement for the approximation of Tobin's *Q* for this study is as follows:

$$\text{Tobin's Q} = (\text{MVE} + \text{BVLiabilities})/\text{BVTA}$$

In calculating the MVE, firm's share price is referred to the share price at the financial year end.

Firm size, leverage (debt ratio) and growth were used as control variables because firm performance may be affected directly or indirectly by factors related to the nature of the firm. Firm size was measured as the natural logarithm of book value of total assets. Leverage was measured as a ratio of total debt to total assets. Leverage was used to control risk associated with the firm. Growth referred to the sales growth measured by the percentage change of sales, averaged over the period 2004–2006. Table 2 summarizes the measurements used in the present study.

Standard or robust multiple regression was used in this study (Hair, Black, Babin, Anderson, & Tatham, 2006). The regression function for the study is as follows:

$$\begin{aligned}\text{FP} = \text{a}_0 + \text{a}_1(\text{BSIZE}) + \text{a}_2(\text{BLEAD}) + \text{a}_3(\text{NINE}) + \text{a}_4(\text{MDIR}) + \text{a}_5(\text{TEN})\\ + \text{a}_6(\text{BPROS}) + \text{a}_7(\text{MOWN}) + \text{a}_8(\text{Control Variables}) + \varepsilon\end{aligned}$$

where

FP firm performance, ROA or Tobin's *Q*,
BSIZE number of board members,
BLEAD independent board leadership, dummy '1' for CEO ≠ Chairman, '0' otherwise,
NINE proportion of non-independent non-executive directors,
MDIR percentage of directors having at least additional one directorship in another PLC or directorships per director,
TEN average of directors' tenure,
BPROS frequency of board meetings or percentage of meeting attendance,
MOWN percentage of executive directors' shareholdings; or MFOWN and MNFOWN.

Table 2. A Summary of Measurements of Firm Performance, Board Attributes, Managerial Ownership, Control Variables and Sources of Measures.

Variables	Definitions	Sources
FP	Firm performance is measured by ROA and Tobin's Q ROA = EBIT/TA Tobin's Q = (MVE + BVLiabilities)/BVTA	Pearce and Zahra (1991); Wiwattanakantang (2001)
BSIZE	Board size is the number of board members in a company	Bhagat and Black (1999)
BLEAD	Independent board leadership, dummy '1' if CEO ≠ chairman, '0' otherwise	Abdullah (2004)
NINE	Board composition is measured by the proportion of non-independent non-executive directors (NINE)	Bhagat and Black (1999); Klien (1998)
MDIR	Multiple directorships are: 1. the percentage (%) of directors having more than one directorship in public companies 2. directorships per director	Haniffa and Hudaib (2006); Tan (2005); Ferris et al. (2003)
TEN	Board tenure is a proxy for board knowledge which is measured as the average of board of directors' tenure in a company	Gottesman and Morey (2006)
BPROS	Board process is: 1. the frequency of board meetings, or 2. the percentage of BOD meetings attendance	Vafeas (1999); Ishak and Napier (2006)
MOWN	Managerial ownership structure: 1. MOWN, percentage (%) of executive directors' shareholdings, direct and indirect 2. MFOWN, percentage (%) of executive directors' shareholdings (MOWN) belongs to family members, at least two family members 3. MNFOWN, percentage (%) of executive directors' shareholdings (MOWN) belongs to non-family members 4. MOWN using piecewise method	McConnell and Serveas (1990); Morck et al. (1988); Wong and Yek (1991); Yammeesri et al. (2006)
FSIZE	Firm size is the logarithm of total assets	Agrawal and Knoeber (1996)
DEBR	Debt ratio is total debt to total assets	Wiwattanakantang (2001)
GROWTH	Growth is the sales growth measured by the percentage change of sales, averaged over the period 2004–2006	Wiwattanakantang (2001)

Sample Profile

The population of this study is companies listed on the main board of Bursa Malaysia for the year 2006. There was around 520 (excluding finance companies, PN4, PN17, companies listed after 2004) companies. 112 samples of the companies were randomly selected. Only the main board companies were selected in order to control for other factors that might influence performance of companies in other boards such as size differences and risks.

RESULTS OF THE STUDY

Sample Profile

Table 3 reports the sample profile of the study. With respect to sector, almost all sectors are covered in this study. Nearly 80% of the respondents come from four sectors namely Industrial Product (IP), Trading and Services (TS), Construction (CONST) and Property (PROP). Following Mishra et al. (2001) for the definition of family companies (at the cut-off 10% of family ownership), 42 companies fall under family controlled companies and 70 companies under non-family controlled companies.

Table 3. Sample Profile.

	Frequency	Percentage (%)
Industry type		
Consumer product (CP)	9	8.00
Industrial product (IP)	28	25.00
Trading and services (TS)	28	25.00
Technology (TECH)	3	2.70
Infrastructure (INFRA)	1	0.90
Construction (CONST)	17	15.20
Property (PROP)	15	13.40
Plantation (PLT)	11	9.80
Types of control companies		
Family control companies	42	37.50
Non-family control companies	70	62.50

Descriptive Statistics of Variables

Table 4 presents descriptive statistics of the categorical variable. About 83.9% of the sample companies have different persons acting as CEO/MD and chairman of the companies. Even though the MCCG recommends companies to have independent leadership, some companies (about 16.1%) still choose to opt the combined leadership structure.

Table 5 presents descriptive statistics of the continuous variables. The average of board size (BSIZE) is 7.66. Board size of the sample companies in this study is not much different from that in the study by KLSE-PWC (2002) of eight directors. The average proportion of non-independent non-executive directors (NINE) in a company is 0.24. The proportion of NINE

Table 4. Descriptive Statistics for Categorical Variable.

	Frequency	Percentage (%)
BLEAD		
CEO = Chairman (0)	18	16.1
CEO ≠ Chairman (1)	94	83.9

Note: $N = 112$. BLEAD is independent board leadership given '1' for CEO and chairman are different persons, '0' otherwise.

Table 5. Descriptive Statistics for Continuous Variables.

Variables	Mean	SD	Skewness	Kurtosis	Min	Max
BSIZE	7.66	1.79	0.47	−0.22	4	13
NINE	0.24	0.18	0.27	−0.93	0.00	0.67
FMEET	5.79	2.20	1.90	4.15	4	15
PMEET (%)	93.70	5.48	−1.15	1.35	75.00	100.00
TEN	7.79	4.87	1.56	3.11	1.25	26.33
PMDIR (%)	48.43	27.82	0.11	−0.98	0.00	100.00
MMDIR	1.43	1.15	0.94	−0.05	0.00	4.67
MOWN (%)	23.80	23.06	0.34	−1.32	0.00	79.10
MFOWN (%)	15.40	22.41	1.03	−0.47	0.00	78.77
MNFOWN (%)	7.71	15.44	2.00	2.86	0.00	60.58
LGTA	20.40	1.25	0.70	0.26	17.93	24.46
DEBR	0.41	0.21	0.44	−0.26	0.02	1.00
GROWTH	21.18	56.48	7.34	65.54	−25.47	540.71
ROA	0.07	0.05	0.11	−0.47	−0.05	0.17
Q	0.92	0.38	1.60	3.36	0.27	2.45

Note: $N = 112$.

in this study is quite low compared to that in the study by PWC (2002) of average three NINE in a PLC.

Frequency meeting (FMEET) conducted is about 5.79 times per year with a minimum of four times to a maximum of fifteen times. The percentage meeting attendance of directors (PMEET) is quite high with the average of 93.70% and with the minimum of 75% and the maximum of 100%. By company, the average tenure (TEN) of directors serving on the board is about 7.79 years with a minimum serving of 1.25 year and maximum of 26.33 years. For multiple directorships (PMDIR), on average about 50% (48.43%) of the directors in a company have at least one additional directorship in other PLCs. This is quite high compared to Tan's finding (2005) of 31.41% with a sample year of 2001. The multiple directorships per director (MMDIR) in a company is 1.43. For managerial ownership (MOWN), on average executive directors hold 23.80% shareholdings with a minimum holding of 0% and a maximum holding of 79.10%. The average shareholdings are not much different from Chee and Md Taib (2005) of 24.96%. In terms of total assets (LGTA), on average the LGTA is at 20.40. The average debt ratio (DEBR) and growth (GROWTH) is 0.41% and 21.18%, respectively. For performance measures, the average ROA is 0.07 whilst the average Tobin's Q is 0.92.

Correlations among Variables

Table 6 presents the Pearson correlation matrix between corporate governance variables, control variables and firm performance. In general, all correlations are less than 0.80, thus there is no issue of multicollinerity between independent variables. Board size (BSIZE) is found positively correlated with firm size (LGTA) and the proportion of non-independent non-executive directors (NINE). However, board size is negatively correlated with the percentage of meeting attendance (PMEET), which means that companies with larger board size tend to have lower percentage of board meeting attendance. For board leadership (BLEAD), there is a positive correlation between board leadership and the proportion of non-independent non-executive directors (NINE) but a negative correlation between board leadership and the percentage of meeting attendance (PMEET). This means that companies with independent leadership tend to have more proportion of non-independent non-executive directors (NINE) but less percentage of meeting attendance (PMEET).

Table 6. Pearson Correlations between Corporate Governance Variables, Control Variables and Firm Performance.

	BSIZE	BLEAD	NINE	LGFMET	PMEET	LGTEN	PMDIR	MOWN	MFOWN	MNFOWN	LGTA	DEBR	GROWTH	ROA	*Q*
BSIZE	1.00														
BLEAD	0.15	1.00													
NINE	0.20**	0.25***	1.00												
LGFMET	0.14	0.14	0.42***	1.00											
PMEET	−0.31***	0.22**	−0.16	−0.17*	1.00										
LGTEN	−0.03	−0.07	−0.21**	−0.33***	0.25***	1.00									
PMDIR	−0.06	0.07	0.28***	0.40***	−0.12	−0.09	1.00								
MOWN	−0.08	−0.20**	−0.59***	−0.31***	0.08	0.17*	−0.30***	1.00							
MFOWN	0.02	−0.21**	−0.44***	−0.30***	0.01	0.19**	−0.33***	0.74***	1.00						
MNFOWN	−0.18*	−0.01	−0.29***	−0.09	0.14	0.01	−0.05	0.35***	−0.31**	1.00					
LGTA	0.29***	0.09	0.14	0.38***	−0.05	0.05	0.40***	−0.23**	−0.19**	−0.07	1.00				
DEBR	0.13	0.14	−0.13	0.21**	−0.10	−0.04	−0.01	0.13	0.05	0.11	0.33***	1.00			
GROWTH	0.09	−0.12	0.07	0.21**	0.04	−0.05	−0.07	−0.07	−0.02	−0.07	0.31***	0.04	1.00		
ROA	0.13	−0.16*	0.15	−0.05	0.11	−0.05	−0.20**	0.08	0.02	0.05	0.02	0.03	0.11	1.00	
Q	0.19**	0.06	0.19**	0.03	−0.04	−0.16*	0.05	−0.10	−0.10	−0.03	0.14	0.24***	0.19*	0.55***	1.00

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

The proportion of non-independent non-executive directors (NINE) is found negatively correlated with all ownership structure, managerial ownership (MOWN), managerial-family ownership (MFOWN) and managerial-non-family ownership (MNFOWN), but positively correlated with frequency of meetings (LGFMET). Having more meetings would suggest more expertise of NINE is required in the companies. Frequency of meetings tends to be more when more directors have multiple directorships (PMDIR). Directors with multiple directorships are more attached to larger companies. Higher managerial ownership (MOWN) tends to have higher managerial-family ownership (MFOWN) and higher managerial-non-family ownership (MNFOWN). However, there is a negative correlation between managerial-family ownership (MFOWN) and managerial-non-family ownership (MNFOWN). The results indicate that MFOWN and MNFOWN are substitute for each other.

Smaller companies tend to have higher managerial ownership (MOWN). The more complex the companies, the more frequency meetings will be held as suggested by the positive correlation between frequency meetings (LGFMET) and firm size (LGTA), debt ratio (DEBR) and growth (GROWTH). However, less frequency of meetings is held when there are more directors with longer tenure, more managerial ownership and more family ownership.

In relation to firm performance, ROA is found to be negatively correlated with multiple directorships (MDIR) and independent board leadership (BLEAD). This means that companies having more multiple directorships and separate leadership tend to have lower ROA. Tobin's Q is found to be positively correlated with board size, the proportion of non-independent non-executive directors (NINE) on the board, debt ratio and ROA.

Results of Regression Analysis

Table 7 presents the result of multiple regression analysis between corporate governance variables and ROA. Curve estimation is used to decide whether to use squared term of managerial ownership or not as previous studies have shown the presence of non-linearity relationship between managerial ownership and firm performance. The quadratic term of managerial ownership (MOWN) is used in regression analysis between corporate governance and Tobin's Q whilst the linear term of MOWN is used in the relationship with ROA.

Table 7. Multiple Regression Results between Corporate Governance and ROA.

	Expected Signs	Model 1		Model 2	
		B	*t*-value	*B*	*t*-value
Constant		−0.114	−0.980	−0.096	−0.822
LGTA	+	0.004	0.751	0.003	0.629
DEBR	−	0.010	0.454	0.011	0.469
GROWTH	+	0.001	0.121	0.001	0.167
BSIZE	−	0.002	0.876	0.003	1.045
BLEAD	+	−0.026	−2.086**	−0.028	−2.181**
NINE	+	0.097	3.135***	0.097	3.015***
PMEET	±	0.111	1.262	0.101	1.134
LGTEN	±	−0.006	−0.726	−0.005	−0.615
PMDIR	−	−0.042	−2.206**	−0.042	−2.152**
MOWN	+	0.043	1.803*		
MFOWN	+			0.031	1.160
MNFOWN	+			0.060	1.706*
R^2		0.187		0.185	
Adjusted R^2		0.106		0.095	
F-statistics		2.316		2.063	
Sig *F*-statistics		0.017		0.030	
N		112		112	

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

The results in both models show that the proportion of non-independent non-executive directors (NINE) is positively significant ($p < 0.01$). Board leadership (BLEAD) is significant in both models but with negative directions. This suggests that having different CEO and chairman leads to lower ROA. The multiple directorships (PMDIR) are significant ($p < 0.05$) with negative directions. For ownership variable, MOWN is found to be positively significant ($p < 0.10$) in Model 1. By differentiating managerial ownership into managerial-family ownership (MFOWN) and managerial-non-family ownership (MNFOWN) as in Model 2, the results show that the positive relationship between managerial ownership is contributed by the managerial-non-family ownership (MNFOWN) as shown by the positive and significant relationship ($p < 0.10$) between MNFOWN and ROA.

The results of the regression analyses between corporate governance and Tobin's *Q* are presented in Table 8, after excluding two outlier cases. In Model 1 the squared managerial ownership is used to measure the impact of managerial ownership on Tobin's *Q*. Curve estimation for quadratic forms shows a very weak U-shape with turning point at MOWN 31.38%.

Table 8. Multiple Regression Results between Corporate Governance and Tobin's *Q*.

	Expected Signs	Model 1		Model 2	
		B	*t*-value	*B*	*t*-value
Constant		1.449	2.20**	1.166	1.80*
LGTA	+	−0.195	−0.62	−0.014	−0.44
DEBR	−	0.681	4.20***	0.637	4.09***
GROWTH	+	0.099	2.39**	0.094	2.24**
BSIZE	−	0.030	1.80*	0.032	2.01**
BLEAD	+	−0.036	−0.47	−0.029	−0.39
NINE	+	0.327	1.43	0.439	2.12**
LGFMET	±	−0.356	−2.56**	−0.321	−2.31**
LGTEN	±	−0.048	−0.90	−0.024	−0.46
PMDIR	−	0.080	0.59	0.049	0.71
MOWN1	−	−1.259	−1.92*		
MOWN2	+	2.006	1.75*		
MFOWN1	−			−1.702	−2.91***
MFOWN2	+			3.008	2.70***
R^2		0.309		0.345	
F-statistics		4.560		4.660	
Sig *F*-statistics		0.000		0.000	
N		110		110	

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

The results show a decreasing value of Tobin's *Q* if MOWN is less than 31.38% and an increasing value when MOWN is more than 31.38%. MOWN is found to be significantly related to Tobin's *Q* ($p < 0.10$). The frequency of meetings (LGFMET) is also found to be significant with a negative direction ($p < 0.05$). Board size (BSIZE) is significant and positively related to Tobin's *Q* ($p < 0.10$). The proportion of non-independent non-executive directors (NINE) is positively related to Tobin's *Q* but the relationship is not significant.

In Model 2, the curve estimation shows that MFOWN has a significant U-shape ($p < 0.01$). There is a decreasing value in Tobin's *Q* for MFOWN less than 28.29% but an increasing value for MOWN more than 28.29%. Other significant variables in Model 1 are also found significant in Model 2. However, the proportion of non-independent non-executive directors (NINE) is found to be strongly significant in Model 2 ($p < 0.05$).

In both models, it is found that multiple directorships (PMDIR), independent board leadership (BLEAD) and board tenure (LGTEN) are not significantly related to Tobin's *Q*. For control variables, debt ratio is found to be very strongly significant ($p < 0.01$) with positive directions for all models. Growth is also significant ($p < 0.05$) with positive directions.

DISCUSSIONS AND CONCLUSIONS

In summary, the corporate governance variables that are significant to ROA are board leadership, non-independent non-executive directors, multiple directorships, percentage of meetings attended and managerial ownership. For Tobin's *Q*, the significant corporate governance variables are board size, non-independent non-executive directors, frequency of meetings and managerial ownership.

The findings indicate that the impact of corporate governance on ROA and Tobin's *Q* are somewhat different for multiple directorships, board size, board process, board leadership and types of managerial ownership. The impact is similar for the proportion of non-independent non-executive directors. Managerial ownership is found to be positively related to ROA and Tobin's *Q*. Use of quadratic terms shows that managerial ownership is significantly related at higher percentage of ownership. When managerial ownership is further classified into family owned and non-family owned, it is found that managerial-family ownership is positively related to Tobin's *Q* at higher percentage whilst managerial-non-family ownership is positively related to ROA.

The insignificant relationship between board size and ROA indicates that board size does not have any influence on ROA. However, the positive and significant relationship with Tobin's *Q* means that the market reacts positively with large board size indicating the benefits of larger board size to firm performance. Larger board size means more outside directors' representatives to foster careful decision-making and is conducive for effective monitoring by the BOD which leads to improved Tobin's *Q*. This suboptimal board size (about eight members) enhances communication and coordination between board members (Lipton & Lorsch, 1992).

The results of independent board leadership are negative and significantly related to ROA, but not significantly related to Tobin's *Q*. The negative and significant relationship with ROA shows that CEO duality does not deteriorate firm performance. The insignificant relationship with Tobin's *Q* is consistent with the result of Weir et al. (2002). Further analysis of the t-test indicates that CEO duality is more preferable to provide improved ROA as indicated by the higher mean of ROA for companies adopting CEO duality compared to companies adopting independent leadership. The results may be attributed to several reasons. In this study, the percentage of companies adopting CEO duality is 16.0% which is smaller than that in Haniffa and Hudaib (2006) who reported it at 25.7%. However, when additional analysis is done by measuring CEO duality as CEO and chairman are the same person or different persons but from the same family, it is found that the percentage of CEO duality increases to 27.7%. This indicates that PLCs have moved towards complying with the MCCG of having independent leadership and the nature of CEO duality practices may be higher. The positive and significant relationship between CEO duality and ROA indicates that benefits of having CEO duality practices outweigh the agency problems created as separation of roles contributes to larger costs to the companies such as information costs (Brickley et al., 1997). CEO duality practices would lead to more unified corporate responses and strong and decisive leadership style (Tan et al., 2001). In fact the market for corporate control and managerial labour market would have adequately disciplined the CEO to work for firm value. In addition, the positive correlation between CEO duality practices and managerial ownership indicates that companies with CEO duality tend to have higher managerial ownership. Thus, the incentives of CEO duality toward company sustainability would be more enhanced.

The results of NINE with both ROA and Tobin's *Q* support the agency theory of the role of outside directors to provide effective monitoring of the management and supplement resources needed to the management. The strength of the relationship is more evident with the ROA. The market also perceives that non-independent non-executive directors are capable of bringing improved performance to companies. The results of the present study are consistent with those of Klien (1998), Roberts et al. (2005) and Wan Hussin et al. (2005). The positive contribution of non-independent non-executive directors might be due to them having shareholdings in the companies (Klien, 1998; Roberts et al., 2005). Having interests in the companies provides incentives for them to work towards high performance. The results show that NINE are effective persons to monitor management actions and provide strategic tasks to the management. In addition, the high correlation between non-independent non-executive directors and frequency of meetings may suggest the greater involvement of non-independent non-executive directors in the process of company's decision making.

The result of the relationship between multiple directorships and ROA is significant in a negative direction whilst the result with Tobin's *Q* is insignificant. The result with ROA supports the busyness hypothesis which relates multiple directorships with overcommitted work. Findings with ROA support the argument that directors with multiple directorships have less time and attention to a firm (Ferris et al., 2003). The results of this study are in contrast to those of Haniffa and Hudaib (2006) and Tan (2005) who found positive relationship between multiple directorships and firm performance of PLCs in Malaysia. The results have practical implications to the current practices which allow directors to have up to 25 directorships (10 for public companies and 15 for non-public companies). The negative relationship between multiple directorships and firm performance highlights the serious concern of multiple directorships in the Malaysian PLCs. This finding is in line with the concern of Minority Shareholder Watchdog Group (MSWG) to limit the number of directorships of the independent directors (MSWG, 2009).

The insignificant relationship between board tenure as a proxy for director experience shows that board tenure does not matter for firm performance. The insignificant relationship is consistent with the finding of Wiersema and Bantel (1992), but contradicts Carpenter and Westphal's (2001). The results indicate that having longer tenure does not guarantee higher firm performance. Previous studies which show positive relationships investigated top management team's knowledge on certain tasks (Wiersema & Bantel, 1992) do not hold for directors.

The negative relationship between frequency of board meetings and Tobin's *Q* is consistent with Vafeas's (1999) finding. The results show that when more meetings are conducted the market would perceive the companies may be having problems and the BOD with the management team is working to solve them through frequent meetings (Vafeas, 1999). Frequent board meetings are found associated with information costs to directors with multiple directorships. Given the time constraint, frequent board meetings would lead to fewer meetings attended by directors, thus making meetings less effective and productive.

The results between board tenure and frequency of meetings with firm performance do not support the requirement of the revised MCCG to consider criteria such as skills, knowledge, expertise and experience when recommending candidates for directorships. As the criteria stated in the revised code are very general, thus further studies need to consider other measurements to represent skills, knowledge, expertise and experience of BOD.

The results with managerial ownership show that quadratic form of managerial ownership is more applicable to Tobin's *Q* while the linear form is more applicable to ROA. The significant and positive relationships between managerial ownership and both measures of firm performance (ROA and Tobin's *Q*) are supported. In this study, linear and non-linear forms of managerial ownership are significant with ROA and Tobin's *Q*, respectively, which indicates that the benefits of managerial ownership outweigh the costs of it. The results show that managerial ownership and family ownership yield greater efficiency. The significant relationship between managerial-family ownership and firm performance supports the argument of Chami (1999), Fama and Jensen (1983), and DeAngelo and DeAngelo (1985) and empirical evidence of Lee (2004) that family ownership enhances monitoring activities. The U-shaped curvilinear relationship of managerial ownership with Tobin's *Q* is consistent with Chee and Md Taib's (2005) finding which supports the convergence-of-interest hypothesis but inconsistent with other studies (e.g. Ali & Sanda, 2001; Mat Nor et al., 1999; McConnell & Servaes, 1990; Morck et al., 1988; Short & Keasey, 1999; Wong & Yek, 1991) which found a downturn curvilinear relationship. The entrenchment effect of managerial ownership at the high level of ownership is not supported.

For the quadratic forms of managerial ownership and managerial-family ownership with Tobin's *Q*, the U-shaped curvilinear relationship supports the convergence-of-interest hypothesis. This means that high managerial ownership and high family ownership would act as an effective mechanism for managers to maximize the shareholders' wealth considering their high ownership in the company's shares. However, precaution should be taken as managerial ownership and managerial-family ownership are not effective in enhancing firm performance at all levels of ownership. The results show that shareholdings below certain percentage of ownership (i.e. 31.38% for managerial ownership and 28.29% for managerial-family ownership) would result in decreasing value as managers have less incentive and this will lead them to shirk their responsibilities and engage in excessive use of company's assets (Jensen & Meckling, 1976). The significant results of managerial-family ownership are consistent with Tan et al. (2001), Thomsen and Pedersen (2000), and Wiwattanakantang (2001).

In terms of theoretical perspectives, results of the study highlights the use of non-independent non-executive directors as a measure of board composition has extended the understanding of the impact of the type of NEDs on firm performance and board performance. A positive significant relationship is in fact supportive of the role of outside directors in protecting the shareholders' interests.

This study also highlights that the effects of corporate governance on ROA and Tobin's *Q* are somewhat different. This study provides some evidence on the need to use appropriate measure of firm performance as argued by Haniffa and Hudaib (2006). That is, when studying firm performance, various measures of firm performance should not be considered as one variable. This study also uses two approaches to capture the effect of managerial ownership on firm performance. Differentiating the types of managerial ownership into family and non-family categories enrich our knowledge about who actually contributes to the improved performance. The results of the study consistently highlight the significant contribution of managerial-family ownership to Tobin's Q. The linear and quadratic forms of managerial ownership are also able to capture the effect of managerial ownership on firm performance.

NOTES

1. Refers to persons who are currently officers of the company.
2. Refers to former company officers, relatives of company officers and persons who are likely to have business relationship with the company.

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The Sarbanes-Oxley Act and cross-listed foreign private issuers

Xi Li
Hong Kong University of Science and Technology
Clear Water Bay, Hong Kong
Phone: 1-852-2358-7560
E-mail: acli@ust.hk

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The Sarbanes-Oxley Act and cross-listed foreign private issuers

I examine the short- and long-term impact of the 2002 Sarbanes-Oxley Act (SOX) on cross-listed foreign private issuers. Both short- and long-term test results suggest that the costs of SOX compliance significantly exceed its benefits and reduce the net benefits of cross-listings.

1. Introduction

In 2002, in the wake of a series of corporate scandals, the U.S. Congress by an overwhelming majority passed the Sarbanes-Oxley Act (SOX) to strengthen corporate governance and financial reporting. SOX aims to restore investor confidence in U.S. markets, which include U.S. companies, as well as the more than 1,300 foreign private issuers (FPIs) that have reporting obligations to the Securities and Exchange Commission (SEC). Hailed as the single most important piece of legislation on corporate governance, financial disclosure, and the practice of public accounting since the Great Depression (Hitt, 2002), SOX is also one of the most controversial business laws in U.S. history. Critics deplore it as a rushed political response to high profile corporate malfeasance that creates substantial net costs for issuers (Perino, 2003).[1]

My paper examines the short- and long-term impact of SOX on shareholders of cross-listed FPIs. FPIs are an important component of U.S. markets, accounting for about 20 percent of the common stocks listed on the NYSE. By cross-listing in the U.S., FPIs generally gain increased visibility, prestige, and trading liquidity. At the same time, their presence enhances the status of U.S. markets as the world's financial center. Because FPIs are usually of higher quality than other issuers in home markets, cross-listings provide an easy and inexpensive way for U.S. investors to diversify geographically. SOX appears, however, to drive FPIs away from U.S. markets.[2]

To assess the short-term impact of SOX, I compare the U.S. and home market stock returns of a comprehensive sample of cross-listed FPIs with the FPI-free home country index returns around 23 events related to the passage and implementation of SOX. Because SOX affects all U.S. listed issuers, U.S. stock market indexes are contaminated benchmarks for both cross-listed FPIs and U.S. issuers. To

[1] Various surveys of public companies indicate that the costs of compliance exceed the benefits. In addition to direct costs such as auditor expenses, indirect costs are likely to be much greater. Examples of indirect costs are distraction due to SOX compliance, exposure of proprietary information, reduction in the flexibility critical to robust growth, and overly risk-averse managers and independent directors.

[2] FPIs' varying backgrounds and potentially different mix of agency problems (as compared with diversely owned U.S. firms) likely make their compliance especially costly. Citing higher compliance costs, more FPIs go public only on home markets in the post-SOX period and many FPIs exit U.S. markets (Karmin and Lucchetti, 2006).

construct cleaner benchmarks, I create FPI-free home country indexes using all the firms in each foreign market, which are not affected by SOX. I also exclude the home market returns of FPIs with SEC reporting obligations for the period during which they are cross-listed or over-the-counter (OTC) traded in the U.S., as these returns are highly correlated with their U.S. returns, which are affected by SOX. I find aggregate abnormal returns for cross-listed FPIs of -10% on average in the U.S. and home markets, which suggests substantial destruction in the market value of FPIs during these events. The similar results in the U.S. and home markets that differ in market structure, investor sophistication and protection, and liquidity suggest that these differences and issues such as asynchronous trading cannot explain my results.

However, concerns could arise that these negative short-term market reactions are due to differences between FPIs that access U.S. markets and those that do not (e.g., size or growth opportunities), cross-sectional correlation and clustering of events, the measure of abnormal returns, or benchmark weighting schemes. Because all these concerns should affect both the event and non-event abnormal returns of a given FPI, to address them, I base my inferences on the empirical distributions and related bootstrapped *p*-values obtained by bootstrapping abnormal returns on non-event days during the 2002–2003 period. I find that these negative short-term reactions are significant at the 1% level.

To further ensure that these reactions are due to SOX, I conduct two additional short-term tests. First, I examine the event period reactions of both a sample of OTC-traded FPIs with SOX compliance and a sample of OTC-traded FPIs exempt from SOX compliance. If the reactions of cross-listed FPIs are due to SOX, only the former type of OTC-traded FPIs should react to SOX-related events. Given that OTC-traded FPIs may have less liquid trading in the U.S., I examine both their U.S. and home market reactions. These two types of FPIs differ from cross-listed FPIs and from each other. Therefore, different reactions may not prove that the reactions of cross-listed FPIs are due to SOX. Thus, I base my inferences for both types of FPIs on their own bootstrapped abnormal returns on non-event days. I find, in both markets, significantly negative event period reactions for OTC-complying FPIs and insignificant reactions for OTC-exempt FPIs.

Second, in cross-sectional analysis of the event period reactions of cross-listed FPIs, the reactions generally vary negatively with FPIs' governance quality (i.e., country-level corporate and securities laws and firm-level institutional monitoring). Given SOX's far-reaching impact on governance, this variation is expected and it provides further support that these reactions are due to SOX. Combined with the negative aggregate reactions, the generally negative relation suggests that SOX compliance is especially detrimental to better-governed FPIs. The reactions are also less negative if FPIs are more likely to go dark in the U.S.; that is, voluntarily delist and deregister to eliminate the SEC reporting obligations and in turn SOX compliance, suggesting that investors view escaping from SOX compliance favorably. Taken together, the short-term results suggest that SOX creates substantial net costs for cross-listed FPIs.

As for the long-term impact of SOX, I document three results using a comprehensive sample of going-dark FPIs during the 1995–2006 period.[3] First, many more FPIs go dark after the passage of SOX than in the pre-SOX period. Second, going-dark returns (i.e., abnormal returns around delisting and deregistration announcements) are negative before the passage of SOX but positive after its passage, with the difference being highly significant. Third, for the average FPI that goes dark in the post-SOX period, all FPI characteristics (e.g, governance quality and growth potentials) improve from the pre- to the post-dark phase, a finding not observed in the pre-SOX period. Although the first result is not a clear test of SOX as it may be explained by reduced growth potentials, increased agency problems, or increased compliance costs due to SOX, the last two results can only be consistent with the average FPI going dark in the post-SOX period to escape costly compliance. Otherwise, I should observe lower going-dark returns as shareholders vote with their feet to escape FPIs with increased agency problems and reduced growth potentials, as well as deterioration of governance quality and growth potentials from the pre- to the post-dark phase. The last two results indicate that the net costs created by SOX may have offset the net cross-listing benefits for the average going-dark FPI.

[3] For brevity, unless otherwise stated, I define "going dark" as going dark in the U.S. while maintaining home market listings and reporting obligations.

Short-term uncertainty or biases associated with short-term tests cannot explain either the long-term results or the combined results of the several short-term tests, whereas long-term global trends such as improved stock returns, liquidity, and governance in foreign markets are less likely to explain the short-term results. Overall, my short- and long-term results are consistent with each other and corroborate that SOX induces significant net costs, especially for better-governed FPIs.

My paper contributes to the long-standing fundamental debate on the impact of regulation (Landis, 1938; Coase, 1960; Stigler, 1964; Becker, 1968).[4] It also complements studies of SOX's impact on U.S. issuers by examining the law's impact on FPIs and by exploring SOX-related issues pertinent to several unique features of FPIs. In addition, it complements a few related studies of SOX's impact on cross-listed FPIs by providing more unambiguous and consistent evidence of SOX's negative effect. Its stronger inferences are attributable to more comprehensive and precise samples, a more thorough understanding of SEC rules on listings and registrations, and a broader set of unique features related to the impact of SOX. Further, I show that less than 20% of cross-listed FPIs have controlling shareholders. Although the broad literature on FPIs focuses on the controlling shareholder agency problems in firms with concentrated ownership, this finding suggests that future studies of FPIs should also examine the managerial agency problems in diversely owned firms.

The remainder of the paper is organized as follows. Section 2 provides a comparison with the literature. Section 3 describes the data, Section 4 presents the results, and Section 5 concludes.

2. Relation to the literature

Several contemporaneous studies examine SOX's impact on cross-listed FPIs. However, their evidence yields inconclusive inferences about the impact of SOX. For short-term impact, Litvak (2007) finds significantly negative event period reactions for a sample of cross-listed FPIs during mostly pre-SOX events. However, Litvak finds only a weak relation between these reactions and governance

[4] Evidence about the value of regulation is inconclusive. For example, evidence on the impact of mandatory disclosure requirements is mixed (see Healy and Palepu, 2001 for a review), resulting in calls to significantly modify or repeal U.S. securities market regulation (e.g., Palmiter, 1999).

characteristics. In addition, she finds significantly negative event period reactions for her sample of OTC-exempt FPIs. The last two results make it difficult to attribute the short-term reactions of cross-listed FPIs to SOX. As for long-term impact, Marosi and Massoud (2008) find a greater number of going-dark FPIs in the post-SOX period, but no difference in going-dark returns between the pre- and post-SOX periods, making it difficult to conclude that SOX has an impact. Hostak et al. (2013) focus on the pre-dark characteristics of non-Canadian FPIs voluntarily delisted in the post-SOX period. However, the lack of comparison between pre- and post-SOX periods makes it difficult to infer SOX's impact.

My paper provides more unambiguous evidence of the detrimental impact of SOX for two reasons. The first reason is the more comprehensive and precise nature of my analysis. For the short-term impact, my sample of cross-listed FPIs for event period reactions is 36% greater than that of Litvak (2007). In addition, Litvak (2007) includes few post-SOX implementation events in her analysis of short-term impact. My paper includes all of the major post-SOX implementation events (12 out of 23 SOX-related events), as well as a more comprehensive sample of pre-SOX events, as prior research emphasizes the importance of considering how law and regulation are implemented and enforced (Holthausen, 2009). In addition, my paper examines the prevalence of controlling shareholders in cross-listed and going-dark FPIs. For the long-term impact, I use evidence gathered after FPIs go dark in the U.S. and compares their pre- and post-dark characteristics to see how their behavior changes. Further, I find that more than half of the potential going-dark sample FPIs delist in home countries, become private, are acquired, or are financially distressed or liquidated within a year of U.S. delisting or deregistration. Unlike the other long-term studies, I eliminate these FPIs to obtain a more "pure" going-dark sample. If an FPI's motivation to go dark is only to escape U.S. compliance, it does not need to take such actions in home markets so soon. However, given the proximity in time of delistings or deregistrations in the U.S. and home markets, it is difficult to tell whether the going-dark effects are due to the removal of the U.S. or home listings and registrations. Also, financial hardship may have forced FPIs to quit doing almost everything inessential to survival, including listing and registration in the U.S., and exchanges often force distressed firms to delist, making these delistings unlikely to be voluntary. Distressed FPIs also have few filings by the time of U.S. deregistration, making it difficult to determine whether deregistration was voluntary.

The second reason is my more complete reliance on SEC rules on registrations and deregistrations in the research design. For example, the broad literature on FPIs treats all OTC-traded FPIs as exempt from SOX compliance. In reality, however, a large number of OTC-traded FPIs have to comply with SEC regulation. For example, about 35% of FPIs with SEC reporting and SOX compliance obligations are OTC-traded in 2001.[5] This more nuanced understanding of SEC rules may explain the insignificant reactions that Litvak (2007) finds for OTC-traded FPIs. As mentioned earlier, the insignificant reactions for OTC-traded FPIs make it difficult to attribute the short-term reactions of cross-listed FPIs to SOX.[6]

My paper complements the literature that finds mixed evidence about the impact of SOX on U.S. issuers (Jain and Rezaee, 2006; Zhang, 2007; Li et al., 2008; Chhaochharia and Grinstein, 2007; Marosi and Massoud, 2007; Leuz et al., 2008). FPIs are an important component of U.S. markets. However, conclusions in the literature about U.S. issuers may not be directly applicable to FPIs because the more concentrated ownership structure of FPIs means that they may face a different mix of agency problems. Further, several distinct features of FPIs make them a unique entity to examine the impact of SOX: cleaner benchmarks such as FPI-free home country indexes, the availability of two more comparable OTC control samples (OTC-traded U.S. issuers are tiny in size compared with listed U.S. issuers, whereas OTC-traded FPIs are relatively more comparable in size to listed FPIs), greater precision in identifying going-dark FPIs, the availability of the U.S. and home market reactions and of post-dark data, and a richer set of cross-sectional characteristics at both firm and country levels.

[5] A lesser-known fact by the broad literature on FPIs is that OTC-traded FPIs do not really have U.S. listings.

[6] I find significant reactions to SOX-related events on the part of all OTC-traded FPIs, similar to the results of Litvak (2007), if I pool my samples of OTC-traded FPIs with and without SOX compliance. Also, given that OTC complying FPIs are likely to be among the largest non-cross-listed FPIs, the size-matched samples for exchange-listed FPIs in Litvak (2007) are likely to include these FPIs, which should produce smaller event period reactions in magnitude for cross-listed FPIs as in her paper.

3. Data

3.1. The short-term impact of SOX: Abnormal returns around SOX-related events

The first part of my analysis examines the abnormal returns of all cross-listed FPIs around SOX-related events. I compile all legislative events before final passage of SOX from the Library of Congress' Bill Summary & Status for the 107th Congress on H.R. 3763 and S.2673. I collect all SEC rulemaking events related to implementation of SOX provisions in the post-SOX period from the SEC website on Sarbanes-Oxley rulemaking and reports (http://www.sec.gov/spotlight/sarbanes-oxley.htm). [7] The selection of events does not involve subjective judgments. I exclude SEC rules exclusively related to auditors, lawyers, and investment companies, as well as SOX provisions for which the SEC is not required to implement rules. Table 1 provides a complete list of events and summarizes each SEC rule and the exemptions applicable to FPIs. The final sample consists of 23 events, for a total of 82 trading days. The pre-SOX event sample is similar to those used in other studies of U.S. and foreign issuers.[8]

[Insert Table 1 near here]

I identify Level II and Level III American Depositary Receipts (ADRs) between January 1, 1999 and December 31, 2003 with share codes between 30 and 39 from the Center for Research in Security Prices (CRSP). I identify Canadian and Israeli firms directly listed in the U.S. with Compustat country codes 9 and 49. Combining the two samples produces the sample of cross-listed FPIs. I obtain information on country of incorporation from the Bank of New York Depositary Receipt Services and Compustat. Cross-checking with the SEC website yields corrections for several FPIs that incorporate in tax havens such as Bermuda. I identify OTC-complying FPIs from the SEC website. I also obtain the list

[7] The SEC usually first solicits comments on a proposed rule and then issues a final rule after the commenting period ends. The SEC also typically issues a press release, with a brief summary of the proposed or final rule, a few days before the official releases. Consultations with SEC staff indicate that detailed information about rules is unavailable until the official release dates. Thus, I include the dates of the press releases and official releases for both proposed and final rules. To the extent that final rules closely resemble proposed rules, or official release does not change investor expectations much relative to the press release, inclusion of all these dates only biases against finding any significant abnormal returns.

[8] I include event days (0, +1) for each event. The results are similar for alternative event windows.

of all OTC-traded FPIs from the Bank of New York Depositary Receipt Services, the OTC Bulletin Board, and the National Quotation Bureau's Pink Sheets.

For cross-listed FPIs, I obtain accounting data from Compustat, U.S. stock returns from CRSP, and home country stock returns from Datastream. For OTC-traded FPIs, I get U.S. and home country stock returns from Datastream. Specifically, I download data in U.S. dollars from Datastream for all the companies for which I can calculate at least one daily return from any country for the period between January 1, 1999 and December 31, 2003. I create an equal-weighted FPI-free home country index for each country.

A total of 658 FPIs are listed in the U.S. on January 1, 2002. I require sample FPIs to have returns on all 82 event days to maintain consistency in the cross-sectional regressions. I further require that FPIs be selected from the 49 countries examined by La Porta et al. (1998) to ensure availability of country-level governance variables. This yields a final sample of 524 cross-listed FPIs with U.S. return data.[9] Matching these FPIs by company name and country produces a final sample of 376 cross-listed FPIs with home country return data. Using similar requirements, I generate a final sample of 96 OTC-complying FPIs with U.S. return data and 164 with home country return data, as well as a final sample of 603 OTC-exempt FPIs with U.S. return data and 523 with home country return data. The differences between the U.S. and home samples are due to data availability.

3.2. The short-term impact of SOX: Variables used for cross-sectional analysis

The second part of the analysis examines cross-sectional variation in the event period reactions of cross-listed FPIs. The focus here is on country- and firm-level governance characteristics. I use four country-level corporate law measures from La Porta et al. (1998): *Shareholder rights*, which measures protection from corporate laws; *Judicial efficiency*, which is produced by Business International Corp. and measures law enforcement quality; *Rule of law*, which is produced by International Country Risk and assesses the law and order tradition; and *Accounting standard*, which is produced by the Center for

[9] I adopt these restrictions to generate a consistent sample. The results are stronger without the restrictions.

International Financial Analysis and Research (CIFAR) and measures disclosure quality via corporate financial reports. I take two securities law measures from La Porta et al. (2006): *Public enforcement*, which is an index of the characteristics and power of the main government agency supervising stock exchanges; and *Disclosure standard*, which is an index of disclosure requirements related to insider compensation and ownership, irregular contracts, major shareholders, prospectuses, and related-party transactions. I include two firm-level variables related to institutional monitoring: *II block* represents institutional blockholdings at the end of 2001 obtained from Form 20-F and proxy filings, and *Analyst coverage* is the number of analysts covering each issuer in 2001 from the Institutional Brokers' Estimate System (I/B/E/S).[10] For each of these variables, the larger the variable, the better the investor protection.

In addition to governance characteristics, I include several control variables. *Log (GDP)*, a common measure of country-level financial development, is the natural logarithm of average per capita gross domestic product (GDP) between 1999 and 2001 obtained from the World Bank's World Development Indicators database (www.worldbank.org). FPIs from countries with more developed financial markets should find raising capital in home markets easier. Thus, such FPIs should be less adversely affected if SOX compliance forces them to exit U.S. markets. *Non-II block* is the percentage of non-institutional blockholdings, obtained from Form 20-F and proxy filings.[11] *Log (TA)* is the natural logarithm of total assets and controls for firm size. SOX compliance is more costly for small firms if it entails a significant fixed cost. However, given the generally large size of cross-listed FPIs, this effect may not be pronounced. *PPEPCT* is property, plant, and equipment as a percentage of total assets, and it controls for information asymmetry. For example, a negative impact of SOX should be exacerbated by higher information asymmetry as measured by lower *PPEPCT*. *Sales growth,* one-year sales growth,

[10] Because I hand-collect shareholdings from Form 20-F and proxy filings, and these filings generally do not report owners of less than 5% and sometimes less than 10% of total shareholdings (especially for many Canadian issuers), the reported holdings in this paper are blockholdings. The holdings include cases in which related parties jointly possess blockholdings even if each individually owns less than 5%.

[11] *Non-II Block* represents the control rights of both insiders and outsiders such as management, family, and multinational corporations. Using cash flow rights or excluding outsiders without board representation does not change the conclusion but would result in a lower level of reported non-institutional blockholdings.

controls for growth opportunities. SOX compliance is likely to hurt high-growth firms by constraining financial and operational flexibility.

I also include four market friction measures. *Short sale*, which comes from Bris et al. (2007), is an indicator variable that takes the value of one when investors cannot sell shares short in a particular country and zero otherwise. Short-sale constraints are likely to reduce negative reactions. *Time zone,* the absolute number of time zones separating a country's main stock exchange from New York, controls for asynchronous trading. *Illiquidity*, the Amihud (2002) firm-level illiquidity measure for the U.S. market, is the average ratio of daily absolute returns to dollar trading volume on a given day (multiplied by 10^6). *Synchronicity,* a measure of information-based barriers proposed by Morck et al. (2000), assesses the extent to which stocks in a given country move together. No clear prediction can be made about *Illiquidity* or *Synchronicity*. For example, *Illiquidity* may deter large investors from investing and, therefore, hinder investor sentiment from being reflected in stock prices. However, it may also enable investors to influence stock price with less trading.

Part of the cross-sectional analysis also includes the going-dark probability obtained from a probit model that I describe in Subsection 4.2. The corporate and securities law measures are independent variables. If better-governed FPIs are more likely to go dark, that would suggest that SOX is excessively costly and may be forcing out better-governed FPIs. I also include non-institutional blockholdings. If SOX is detrimental to controlling shareholders, FPIs with such shareholders would be more likely and more easily to go dark, suggesting a positive coefficient estimate for this variable. I include four additional variables, *Cross-listing market cap, U.S. volume*, *Sales growth,* and *Log (TA)*, and expect negative coefficient estimates for all of them. *Cross-listing market cap* is the market value of equity from CRSP, which represents the market value of FPIs in the form of cross-listed shares in the U.S. divided by company market value from Compustat. Missing data are supplemented with data hand-collected from Form 20-F or proxy filings. *U.S. volume* is U.S. dollar trading volume as a proportion of FPIs' total trading volume in 2001. Negative coefficient estimates on the first three of the four variables would underscore the importance of U.S. markets to cross-listed FPIs. Because smaller firms can more easily go dark according to the SEC deregistration regulation, I expect a negative coefficient estimate on *Log (TA)*.

3.3. The long-term impact of SOX: The going-dark sample

To obtain the list of cross-listed FPIs that went dark over the 12-year sample period (1995–2006), I first compile all cross-listed FPIs between January 1995 and December 2005 using CRSP and Compustat.[12] The sample ends in 2005 to allow time for FPIs to deregister, because meeting the asset and shareholder requirements for deregistration usually takes some time after delisting even if FPIs intend to deregister sooner. In addition, an investigation of post-dark FPI characteristics requires several post-dark years. After I exclude cross-listed FPIs that delist due to mergers, bankruptcies, or liquidations according to CRSP delisting codes, I identify 141 FPIs that could have delisted voluntarily. Requiring sample FPIs to have filed Form 15 to deregister by the end of 2006 eliminates 12 FPIs.[13] I determine the earliest dates of delisting and deregistration announcements from press releases and newswire announcements, as documented by ProQuest and Factiva, or from SEC filings such as Form 6K and proxy statements. Examination of these documents reveals that many FPIs announce their intention to delist and deregister before the official delisting and deregistration dates. Examining these documents also eliminates 67 FPIs that delist in home countries, become private, are acquired, or are liquidated within a year of either official U.S. delisting or deregistration. I further eliminate six FPIs whose stock price is less than one unit of the home country currency at the time of announcement due to likely financial distress. These 73 eliminations (67 + 6) are an important distinction from Hostak et al. (2013) and Leuz et al. (2008). I exclude four more FPIs due to lack of return data. I obtain the home market stock returns for the final sample of 52 going-dark FPIs from Datastream.[14]

[12] Although OTC-complying FPIs can also go dark, I focus on the FPIs once listed on U.S. stock exchanges, due to data availability.

[13] For FPIs that filed multiple Form 15s, I use the date of first filing.

[14] The relatively small number of going-dark FPIs is consistent with the claim that exiting from U.S. reporting obligations is difficult for FPIs.

Going-dark FPIs are unique in that they continue to report to home country securities authorities, which allows me to obtain and compare their pre- and post-dark characteristics. I include five variables based on company financials in the six fiscal years around the going-dark fiscal year, from Worldscope, Form 20-F, or annual report filings.[15] *Tobin's Q,* a common measure of valuation, is the sum of total assets and market value of equity minus book equity, divided by total assets. *Sales growth* is the most recent year's sales growth and proxies for growth opportunities. *ROA* is earnings before interest, taxes, depreciation, and amortization (EBITDA) divided by total assets, and *ROE* is EBITDA net of interest expenses and preferred dividends and then divided by book equity. Both proxy for operating performance. Following Leuz et al. (2008), *Earnings management*, a measure of earnings quality, is the absolute value of accruals divided by the absolute value of operating cash flows. I also include three board characteristics and three blockholder variables obtained from Form 20-F or proxy filings, all drawn from the year before and the third year after going dark. *Board size* is the number of directors; *Non-executive directors* is the proportion of non-executive directors; and *Independent chairman* is an indicator for FPIs whose chairman is not also the chief executive officer (CEO). I also include *Largest holding*, the holding by the largest blockholder, as well as *II block* and *Non-II block*.

I include four analyst forecast-related characteristics from I/B/E/S, based on the 24 months of data around the going-dark months. *Forecast dispersion* is the 12-month average of the standard deviation of analysts' earnings forecasts. *Forecast error* is the absolute value of the 12-month average of actual earnings minus the median analyst forecast. *Forecast dispersion* and *Forecast error* are both deflated by the stock price at the beginning of the fiscal year. *Revision volatility* is the standard deviation of 12 monthly forecast revisions. Revisions are the current-month median forecast minus the previous-month median forecast. *Analyst coverage* is the number of analysts covering a given FPI. Following Lesmond et al. (1999), *Liquidity* is the proportion of days with zero returns during the 24 months surrounding the going-dark months. The data requirements for company financials and governance

[15] I use fiscal years 2005–2007 (2006–2007) as the post-dark years for FPIs that deregister in 2005 (2006) due to sample size concerns.

quality over several years further reduce the sample by three FPIs, which disappear from home country registrations less than two years after going dark.

3.4. Summary statistics

Table 2 reports summary statistics by country for the sample of cross-listed FPIs in the analysis of SOX's short-term impact. Panel A of Table 2 reports the mean and standard deviation of the measures of corporate and securities laws from La Porta et al. (1998, 2006) across all sample FPIs. For brevity, I do not reproduce these measures by country here. Panel B reports the mean of the rest of the variables across the firms within a country and for the whole sample. The sample FPIs are from 36 countries. Canada (139 FPIs), Israel (69), and the United Kingdom (66) have far more FPIs than any other country, as the country with the fourth-highest number of FPIs is France (23 FPIs). The sample FPIs are geographically diverse and somewhat diverse in legal origin, according to the classifications of La Porta et al. (1998). Prior studies have used some of these variables, but a few summary statistics are worth noting. Although approximately 17% (6 out of 36) of the sample countries have short-sale constraints, few sample FPIs (3%) are from those countries. About 44% of the total market cap and 31% of the total trading volume of sample FPIs are in the U.S., underscoring the importance of U.S. markets to these FPIs. Although controlling shareholders is prevalent in some foreign countries, average *Non-II block* for cross-listed FPIs is only about 9%.

[Insert Table 2 near here]

Given the paucity of comprehensive studies of the presence of controlling shareholders in FPIs after cross-listings, Panel C presents the distribution of non-institutional (non-II) blockholdings for all cross-listed FPIs in 2001 and for going-dark FPIs in the 1995–2006 period. The first two columns break down the distribution of non-II blockholdings for the 490 cross-listed FPIs used in cross-sectional analysis. Non-II blockholders are absent in 387 FPIs, and they own more than 20% in only 63, or 12.9% (= 63 / 490), of my sample FPIs. Although prior studies of FPIs in general have focused only on the controlling shareholder agency problem in firms with concentrated ownership, these results suggest that future studies of FPIs should also consider the managerial agency problem in diversely owned firms. Thus, I use agency problems to refer to both managerial and controlling shareholder agency problems throughout the rest of the paper unless otherwise specified. La Porta et al. (1998), by contrast, document an average ownership share of more than 45% on the part of the three largest owners in the ten largest non-financial domestic firms across 49 countries. The difference between my findings and theirs could be due to different sample periods or self-selection of FPIs (i.e., more diversely owned FPIs are more likely to cross-list, and FPIs reduce ownership concentration after cross-listing).

Columns 3–6 present the distribution of non-II blockholdings for the FPIs that go dark in the pre- and post-SOX periods. About 36% and 21% of going-dark FPIs have no non-II blockholdings in the pre- and post-SOX period, respectively, whereas about 55% and 63% of going-dark FPIs have total non-II blockholdings of greater than 20%. The higher proportion of going-dark FPIs with sizable non-II blockholdings than in the all-FPI sample suggests that controlling shareholders may play a significant role in going-dark decisions, as FPIs with large non-II blockholdings are unlikely to have gone dark without these blockholders' consent. The proportion of going-dark FPIs with controlling shareholders is not significantly different in the pre- and post-SOX periods at conventional levels. Further, the lack of substantial non-II blockholdings in many going-dark FPIs suggests that escaping from minority shareholder protections, even if sometimes present, may not be the only reason FPIs go dark.

4. Tests and results

4.1. The short-term impact of SOX: Abnormal returns around SOX-related events

This subsection examines the aggregate abnormal returns of a sample of cross-listed FPIs surrounding SOX-related events. Following Brown and Warner (1985), I measure abnormal returns with market model adjusted returns as follows:

$$A_{i,t} = R_{i,t} - \alpha_i - \beta_i R_{m,t}, \tag{1}$$

where $R_{m,t}$ is the day t return on the benchmark index, and α_i and β_i are ordinary least squares estimates of the market model estimation for the period between January 1, 1999 and December 31, 2001. Also, following the suggestion of Brown and Warner (1985), I use equal-weighted FPI-free home country indexes as benchmarks. While I provide the Brown and Warner (1985) *t*-statistic, I use bootstrapped *p*-values for inferences following Lo (2003) and Zhang (2007). Specifically, I draw non-event days over the 2002–2003 period equal in number to the duration of each event and calculate the cumulative abnormal returns on these non-event days. I repeat the drawing with replacement 10,000 times to obtain an empirical distribution for the event period abnormal returns. The one-tailed *p*-values are the proportion of the 10,000 abnormal returns drawn from non-event days that are greater than the event period abnormal returns. I double these proportions to obtain two-tailed *p*-values.

To track the development of SOX-related events, I divide them into three groups: pre-SOX events (Events 111), SEC proposed rule events (Events 12, 13, and 15–18), and SEC final rule events (Events 14 and 19–23). For brevity, the following discussion focuses on the aggregate abnormal returns and on the abnormal returns of the three groups of events.[16]

The trading periods for the U.S. and home markets are asynchronous for many FPIs. For example, when a SOX-related event is announced in the U.S., markets outside of the Americas are likely to respond to the news the next trading day, given their brief overlap in hours of operation, if at all, with U.S. markets. Asynchronous trading can be a problem in calculating U.S. abnormal returns for FPIs from countries outside of the Americas because the benchmark is FPI-free home country index. Thus, I match the U.S. returns of FPIs from the Americas on a given day with same-day FPI-free home country index returns and those of FPIs from other regions with next-day home country index returns.[17]

[16] I do not interpret the abnormal return of each event for two reasons. First, because the reaction to any event is likely to build on reactions to previous events, which in turn represents accumulated investor expectations up to the previous event, the reaction to any event says nothing about SOX-related legislation and implementation associated with the event. Second, selecting and interpreting events on the basis of anecdotal evidence can be arbitrary and controversial, and aggregate abnormal returns are much more important.

[17] Matching in different ways or adding up to three-day leading and lagging benchmark returns to Eq. (1) yields similar results.

Table 3 reports cumulative abnormal returns around SOX-related events for cross-listed FPIs in both the U.S. and home markets. It suggests a large and negative impact of SOX on cross-listed FPIs. The aggregate abnormal return is -9.63% for the U.S. sample of 524 cross-listed FPIs and -12.97% for the home sample of 376 cross-listed FPIs. Tracking the development of SOX-related events, the abnormal returns for pre-SOX legislative events are -9.55% and -11.05% in the U.S. and home markets, respectively, which suggests extreme investor pessimism about the significant costs imposed on FPIs by SOX. The abnormal returns for events related to the SEC's proposed rules are 3.59% and 2.11% in the U.S. and home market, respectively. The modest price rebounds in both markets indicate that the rules proposed by the SEC to implement SOX provisions raised some hope among investors that the SEC would be able to reduce certain costly SOX compliance requirements, moderating the damage caused by the passage of SOX. Most of the optimism fizzled, however, as the final releases of SEC rules yield abnormal returns of -3.67% and -4.04% in the U.S. and home market, respectively. The abnormal returns are all significant at the 1% level, according to both Brown and Warner *t*-statistics and the bootstrapped abnormal returns from the non-event period.[18] The proportion of the sample with negative reactions suggests that the results are not due to outliers.[19]

[Insert Table 3 near here]

These results are in line with the large negative abnormal returns for U.S. companies during events mostly leading up to the passage of SOX documented in Zhang (2007). Her sample events with significant reactions for U.S. issuers are roughly equivalent to Events 8–10 in my sample. Except for the insignificant reaction of Event 10, Events 8 and 9 are among my sample events with the largest reactions.

[18] In untabulated results, signed tests and signed rank tests on median abnormal returns, as well as binomial tests with the null hypothesis that the proportion of negative abnormal returns is 0.5, yield similar results.

[19] Including only proposed rule events or only press release events for the post-SOX implementation events yields similar results. Although the U.S. stock market indexes are contaminated benchmarks, I include them in the market model estimation in addition to the FPI-free home country indexes, given that they are likely to affect the stock returns of cross-listed FPIs to some extent. Either way, the conclusions are the same in untabulated results.

Unlike Zhang's results, however, the large number of events with large and significant abnormal returns suggests that the impact of SOX on cross-listed FPIs is not driven by a small number of events.[20]

The signs and significance are similar for the abnormal returns in the U.S. and home markets across most individual events, with only Event 1 having different signs for its insignificant reactions. At first glance, the aggregate abnormal returns in the U.S. markets seem to be smaller in magnitude. This difference is due to the relatively less negative reactions of U.S. sample FPIs without home market returns. In untabulated results, the aggregate U.S. abnormal return of these FPIs is -4.45%, whereas that of the other FPIs is -11.67%.[21] The magnitude of aggregate U.S. abnormal returns for the 376 FPIs with both U.S. and home market returns is only 1.30% smaller [= -12.97% – (-11.67%)], and this difference is statistically insignificant.

Because OTC-traded FPIs with SEC reporting obligations must comply with SOX and the OTC-traded FPIs without SEC reporting obligations are exempt from SOX compliance, SOX-related events should affect the returns of the first group in ways consistent with those of cross-listed FPIs but should not affect the returns of the second group. I therefore examine OTC-complying FPIs and OTC-exempt FPIs. Panel A of Table 4 shows the abnormal returns of OTC-complying FPIs as -5.45% and -5.17% in the U.S. and home market, respectively, both statistically significant at the 1% level according to bootstrapped *p*-values. In addition, the abnormal returns of FPIs without SOX compliance are -1.02% and -1.26% in the U.S. and home market, respectively, both statistically insignificant. The significantly negative reactions of OTC-complying FPIs and the little reactions of OTC-exempt FPIs to SOX-related events both support the conclusion that the significantly negative abnormal returns of cross-listed FPIs are due to SOX compliance.[22]

[20] Zhang (2007) finds four events with large and significant abnormal returns among her 17 sample events spanning from January to July 2002.

[21] Compared with other cross-listed FPIs, the FPIs that are in the U.S. but not the home country sample are much smaller. Their average total assets are $212 million, compared with $2.3 billion for other cross-listed FPIs.

[22] The abnormal return differences between cross-listed and OTC-exempt FPIs, and between OTC-complying and OTC-exempt FPIs, are significant at the 1% level. The much smaller magnitude of abnormal returns for OTC-complying FPIs in comparison with cross-listed FPIs may be due to the smaller firm size of OTC-complying FPIs. It would be much easier for the smaller OTC-complying FPIs to go dark as stipulated by the SEC deregistration

[Insert Table 4 near here]

4.1.1.Additional tests on abnormal returns around SOX-related events

I conduct robustness tests of inferences about the event period reactions of cross-listed FPIs. For brevity, I report only the aggregate abnormal returns across all 23 events. First, I create 36 equal-weighted country portfolios, using sample FPIs within each country, and evaluate their abnormal returns. This approach adjusts for within-country cross-sectional correlation. The first row of Table 4, Panel B shows that these abnormal returns are negative and significant at the 1% level in both the U.S. and home markets.[23] The second row of Panel B reports the results after excluding any Datastream daily return for cross-listed FPIs that exceeds 25% in absolute value, following Morck et al. (2000). I recreate the FPI-free home country index returns by trimming all the returns from Datastream. For consistency, because CRSP data also contain large daily returns, I trim the U.S. stock returns of cross-listed FPIs from CRSP. The results are similar to those in Table 3. Using other trimming thresholds does not affect the results. Thus, return outliers are unlikely to drive the results.

Directly listed Canadian and Israeli FPIs account for about 40% of the sample. Such FPIs could behave differently from ADRs (e.g., the SEC historically has given more exemptions to Canadian FPIs). The third row shows that my conclusions are robust to excluding these FPIs. I also use Morgan Stanley Capital International (MSCI) country indexes as benchmarks. The drawbacks of MSCI indexes are that they are value-weighted and that their inclusion of FPIs subject to SOX compliance makes them contaminated benchmarks for my purposes. However, these drawbacks allow for addressing concerns

regulation. Investors may also expect some SOX provisions to be implemented with a delay or exempted for the smaller OTC-complying FPIs.

[23] The abnormal returns are smaller in magnitude for country portfolios than those for Table 3. The difference is likely to result from the fact that the country portfolio analysis in Table 4 gives equal weight of 1/36 to each country portfolio and, thus, a weight of 1/(36N) to each stock in a country with *N* stocks. This weighting scheme means that FPIs from countries with a larger number of cross-listing would have a much lower weight than FPIs from countries with a smaller number of cross-listings. In comparison, each FPI is given an equal weight in the FPI-level analysis in Table 3. Because Table 2 shows that more FPIs are from countries with better governance and Table 5 reports that FPIs from countries with better governance have significantly more negative abnormal returns during SOX-related events, the country portfolio analysis effectively gives less weight to FPIs with more negative abnormal returns, thus reducing the magnitude of observed abnormal returns.

related to benchmark-weighting schemes and for estimating the lower bound of the magnitude of abnormal returns. The fourth row reports that the abnormal returns are still highly significant. Unsurprisingly, the magnitude of the abnormal returns is smaller than that in Table 3.[24]

The fifth row shows that when I use market-adjusted returns, $A_{i,t} = R_{i,t} — R_{m,t}$, to measure abnormal performance, the conclusions are not affected. The sixth row shows the results when I also use the cross section of market-adjusted returns during the event period, instead of those of the estimation period, to estimate its variance. Brown and Warner (1985) recommend using this procedure to control for potential variance increases during the event period. Because this procedure ignores the estimation period data, it has weaker power if variance does not increase substantially. Nonetheless, the abnormal returns are still significant at the 1% level.

Many other countries have also conducted legislative or code reforms of corporate governance. These reforms are generally in the spirit of SOX but more limited in scope.[25] Few legislative reforms elsewhere overlap with SOX-related events. In untabulated results, I find qualitatively the same results by excluding cross-listed FPIs on the days of their home reforms. Overall, my results hold for various robustness checks.

4.2. The short-term impact of SOX: Cross-sectional analysis

Given my finding in Subsection 4.1 that SOX has a detrimental effect on cross-listed FPIs, exploring which firms are more affected can be interesting. Given SOX's far-reaching impact on governance, if the abnormal returns around SOX-related events are attributable to SOX, I expect them to have significant relation with the firm-specific and country-level governance characteristics discussed in Subsection 3.2. I, however, have no prediction about the sign of the relation for a specific characteristic.

[24] Although MSCI country indexes are supposed to include about 85% free float-adjusted market capitalization in a country, gauging whether MSCI offers more far-reaching coverage of international stock markets than Datastream is difficult.

[25] See Appendix 2 of Li (2011) for details.

A positive (negative) sign for a characteristic would suggest that SOX has a relatively less detrimental impact on better-governed (worse-governed) FPIs along the dimension of that characteristic.

Anecdotal evidence suggests that better-governed FPIs suffer more from SOX. When Congress first introduced SOX in 2002, foreign companies and governments expressed grave concern about its application to cross-listed FPIs on the grounds that it could contradict or interfere with FPIs' home country regulation and substantially increase the cost of U.S. listings. Western European countries, which generally enjoy better governance, expressed the strongest resistance. Despite these objections, Congress granted the SEC only limited power to accommodate FPIs' home country requirements.

In Table 5, Panel A reports the results of cross-sectional analysis of the abnormal returns of individual FPIs on the 82 event days. I cluster standard errors within countries.[26] Given the different scales of independent variables, I focus on a variable's marginal effect, calculated as its coefficient estimate in Panel A of Table 5 multiplied by its standard deviation in Table 2, in my interpretation of the results. Marginal effects measure the percentage point change in abnormal returns given a one-standard deviation increase in a variable of interest.

[Insert Table 5 near here]

My discussion first focuses on the significant variables for U.S. abnormal returns in column (1), and then compares them to those for the home country abnormal returns in column (2). Three corporate law measures have highly significant impacts on the U.S. abnormal returns. *Shareholder rights* has a coefficient estimate of 5.31. Given a standard deviation of 1.37, its marginal effect is 7.27% (= 5.31 * 1.37%). Similarly, *Judicial efficiency* and *Rule of law* have marginal effects of -3.99% and -9.28%, respectively. Both securities law measures and both institutional monitoring measures have significant impacts on the U.S. abnormal returns. *Public enforcement* and *Disclosure standard* have marginal effects

[26] Additional analysis using bootstrapped *p*-values to gauge the significance level yields similar results.

of -0.07% and -5.67%, respectively.[27] *II block* and *Analyst coverage* have marginal effects of -0.30% and -2.61%, respectively.

The significant relation between the governance measures and the event period reactions of cross-listed FPIs are consistent with the idea that these event period reactions are attributable to SOX. All the significant governance measures are negatively related to abnormal returns except for *Shareholder rights*, which suggests that SOX is more detrimental or less beneficial for better-governed FPIs. When combined with the substantial decline in the market value of cross-listed FPIs, this generally negative relation suggests that SOX is more detrimental for better-governed FPIs. My results suggest that combined with existing regulatory and firm-level governance mechanisms in the U.S. and in home countries, these new measures related to SOX are likely to have pushed the level of investor protection beyond the optimum.

The coefficient estimates on the going-dark probability are positive and significant at the 10% level, which suggests that SOX imposes excessive costs and that FPIs that are more likely to go dark may be able to avoid these costs. *Non-II block* has a negative effect, which is likely due to SOX targeting managerial agency problems in diversely owned U.S. issuers and thus producing less effective and more costly solutions for cross-listed FPIs with relatively more controlling shareholder agency problems.

The results of governance-related variables shown in Column 2 for home market abnormal returns are similar to those for U.S. abnormal returns. Specifically, the differences are that disclosure standard is insignificant, that *Rule of law* and *Analyst coverage* are less significant, and that *Judicial efficiency* is more significant. Further, the statistically significant control variables are largely the same in Columns 1 and 2, and they have the expected signs. Financial development and short-sales restrictions reduce the negative event period reactions, and firms with greater information asymmetry and growth opportunity experience more negative event period reactions.[28]

[27] Because the governance variables are correlated, I also examine them individually. The results are similar, except that the coefficient estimate on *Accounting standard* is negative and significant at the 10% level.

[28] Because only 3% of the sample FPIs is from countries with short-sale constraints, the economic significance of short-sale constraints is much smaller than the magnitude of this coefficient estimate suggests. The insignificant impact of *Time zone* suggests that asynchronous trading between the U.S. and home markets should not affect the results of U.S. abnormal returns in Subsection 4.1.

I obtain the going-dark probability used in Panel A with a probit model whose dependent variable is an indicator that equals one for the 24 FPIs and the 18 FPIs with available data for my U.S. and home sample, respectively, that go dark by the end of 2006 and zero otherwise. In addition to producing the going-dark probability, this analysis yields some inferences about the determinants of FPIs' going-dark decisions. Panel B of Table 5 reports that all the statistically significant independent variables have coefficient estimates with predicted signs. Specifically, *Accounting standard* and non-institutional blockholdings have positive coefficient estimates, and *Cross-listing market cap, Sales growth,* and *Log (TA)* have negative coefficient estimates. Thus, firms with better accounting standard and more controlling shareholdings are more likely to go dark, and firms relying more on U.S. capital markets are less likely to go bark. Overall, the results in this subsection suggest that SOX is more detrimental to better-governed FPIs.

4.3. The long-term impact of SOX: Delisting and deregistration of cross-listed FPIs that go dark

This subsection examines firms' and shareholders' long-term responses in the years following the passage of SOX. It compares across the pre- and post-SOX periods the number of going-dark FPIs, their going-dark returns, and their characteristics such as governance, growth, and performance to determine whether SOX increases the cost of compliance substantially.

The top half of Table 6, Panel A reports the annual number of going-dark FPIs that delist or deregister. During the three and a half years leading up to the passage of SOX, 12 FPIs delist and 11 FPIs deregister voluntarily. By comparison, 38 FPIs delist and 40 deregister voluntarily in the three and a half years after passage. The substantial post-SOX increase in going-dark FPIs is consistent with the findings of Leuz et al. (2008) and Marosi and Massoud (2008). More FPIs decide to leave the U.S. market and regulatory regime after the passage of SOX.

[Insert Table 6 near here]

The growing number of going-dark FPIs is unlikely due to an increase in either total listings or delistings. The lower half of Table 6, Panel A presents annual numbers of new listings and delistings, as well as annual totals of cross-listed FPIs. Both delistings and total listings have declined after 2002. Meanwhile, going-dark FPIs as a percentage of delistings and of total listings increase in the post-SOX period, as shown in the top half of Table 6, Panel A. Further, new listings declined substantially in the post-SOX period. The 3.5-year periods preceding and following the passage of SOX have 292 and 156 new listings, respectively. Although listings and delistings may be affected by other factors, the overall evidence suggests that they are not driving the increase in going-dark FPIs in the post-SOX period.

The increase in going-dark FPIs in the post-SOX period cannot in itself reveal anything about the impact of SOX, due to possible alternative explanations discussed below. Thus, I further examine the going-dark returns and changes in FPI characteristics from the pre- to the post-dark phase. Those characteristics fall into the categories of operating performance, earnings and governance quality, institutional environment, liquidity, growth opportunities, and valuation.

The increase in going-dark FPIs in the post-SOX period could be due to more reduced growth potentials, more severe agency problems, or increased compliance costs due to SOX (Leuz et al., 2008). Compared with the pre-SOX period, if the explanation for FPIs going dark is increased compliance costs, I would predict both (1) relatively higher going-dark returns as FPIs escape costly compliance, and (2) similar or improved changes in all FPI characteristics from the pre- to the post-dark phase during the post-SOX period. In comparison, if the explanation for FPIs going dark is more reduced growth potentials, I would predict relatively lower going-dark returns as investors realize that future growth will be more subdued and worse changes in post-dark growth potentials but similar or improved changes in other FPI characteristics in the post-SOX period. If increased agency problems is the explanation, I would predict relatively lower going-dark returns as (minority) shareholders vote with their feet for fear of exploitation, worse changes in post-dark governance characteristics, and similar or improved post-dark changes in other characteristics in the post-SOX period.

Evidence from any of the above tests could be relatively weak because small samples do not allow controls for other effects with multivariate regressions and these are not mutually exclusive explanations. However, if the results from these largely independent tests are highly consistent with one explanation, I may be able to draw stronger inferences.

Panel B of Table 6 reports the value-weighted home market returns of going-dark FPIs at the delisting and deregistration announcements, adjusted by the returns of the respective MSCI home country indexes using a market model. The estimation period is the (-510, -11) event day window. The panel reports results for the periods before and after July 30, 2002, the date of SOX's final passage. It also provides the number of observations with positive abnormal returns.

I examine both delisting and deregistration abnormal returns because at the time of delisting announcements investors may expect going-dark FPIs to eventually deregister. FPIs also frequently announce their intention to deregister at the time of delisting. For 25 sample FPIs, the delisting and deregistration dates are separated by at least a month. I use home market returns because they are free of issues such as asynchronous trading and because FPIs are rarely traded in the U.S. after deregistration due to the lack of Rule 12g3-2(b) exemption (see Appendix A for details). Also, trading in the U.S. is usually limited prior to going dark. Most FPIs cite limited trading and liquidity in U.S. markets as the main reasons to go dark.

Panel B shows that the delisting and deregistration abnormal returns of going-dark FPIs are both negative in the pre-SOX period. The same returns in the post-SOX period are not only relatively higher than those in the pre-SOX period, but they are also positive. The abnormal returns are large in magnitude but generally statistically insignificant, possibly due to the small sample size. Tests indicate that the differences between abnormal returns in the pre- and post-SOX periods are significant at the 5% level. The number of positive abnormal returns for delistings (deregistrations) is three and 24 (three and 26) for the pre- and post-SOX period, respectively. Given that about half of my sample has different delisting and deregistration dates, my results are consistent with Leuz et al. (2008), who show that delistings and deregistrations are separate events. In untabulated results, I find similar results for different event windows around the announcement dates. Thus, the results for going-dark returns are consistent with the explanation of increased compliance costs due to SOX.

Panel C of Table 6 reports the median characteristics of FPIs before and after they go dark, as well as changes in these characteristics. To formally gauge the impact of SOX, Column 7 reports the significance level of the difference between changes in FPI characteristics from the pre- to the post-dark phase in the pre-SOX period in Column 3 and those in the post-SOX period in Column 6. Relative to going-dark FPIs in the pre-SOX period, those in the post-SOX period exhibit a larger reduction in non-institutional blockholdings, forecast dispersion, and revision volatility, a greater increase in *ROA*, *ROE*, and *Tobin's Q*, a smaller increase in earnings management, and a smaller reduction in liquidity from the pre- to the post-dark phase. Thus, going-dark FPIs in the post-SOX period exhibit more favorable changes on many dimensions.[29] These results are consistent with the explanation of increased compliance costs due to SOX.

To further gauge the impact of SOX, I compare the pre-dark characteristics of going-dark FPIs in the pre- and post-SOX periods (Column 1 versus Column 4). Better pre-dark characteristics in the post-SOX period would be consistent with increased compliance costs, not the two alternative explanations (more reduced growth potentials or more severe agency problems). This is the case for every pre-dark characteristic that is significantly different between the pre- and post-SOX periods as reported in Column 8 of Table 6: relatively better sales growth and operating performance, smaller magnitude of the largest blockholdings, forecast errors, forecast dispersion, and greater magnitude of institutional blockholdings. These characteristics show no sign of either reduced growth potentials or agency problems in the pre-dark phase during the post-SOX period.

[29] Although going-dark FPIs in the post-SOX period exhibit a smaller reduction in forecast errors and a smaller increase in growth opportunities, it is likely that these FPIs already have far superior growth opportunities and smaller forecast errors before going dark, leaving less room for further improvement. For example, the forecast errors of going-dark FPIs in the post-SOX period drop from about 0.27 to 0.18 between the pre- and post-dark periods, and those in the pre-SOX period drop from about 0.69 to 0.24. After a much deeper drop from a much higher level of forecast errors, going-dark FPIs in the pre-SOX period still exhibit much larger forecast errors than going-dark FPIs in the post-SOX period during the post-dark phase. For sales, in the pre-SOX period, after a steep pre-dark decline of about 34%, a 35% post-dark sharp increase would still not help fully recover the pre-dark decline in sales for going-dark FPIs. In contrast, the post-SOX period witnesses a mild pre-dark increase in sales for going-dark FPIs, and the increase experiences a substantial post-dark acceleration.

As a robustness check, I examine a sample that includes FPIs distressed at delisting but deregistered through the voluntary conditions. The untabulated results, including six additional such FPIs with available data, are qualitatively the same.

In summary, the results suggest not only that SOX imposes net costs on shareholders in going-dark FPIs, but also that the net costs more than offset the extant net benefits from cross-listing for these FPIs.[30] Although the evidence from any single test is relatively weak, the consistent results of all the independent tests jointly provide stronger inferences.

5. Conclusion

I examine the short- and long-term impact of the Sarbanes-Oxley Act on cross-listed FPIs. Both short- and long-term results suggest that the costs of SOX compliance significantly exceed its benefits and reduce the net benefits of cross-listings. The results also suggest a need to consider both managerial and controlling shareholder agency problems in the studies of cross-listings.

[30] Due to the small sample size, I conduct *t*-tests on mean abnormal returns, signed tests, and signed rank tests on median abnormal returns and binomial tests with the null hypothesis that the proportion of negative abnormal returns is 0.5. All the results in this subsection are similar. Although it is ideal to use cross-sectional regressions to control for other FPI characteristics, I find insignificant difference for most FPI characteristics examined above, probably due to the small sample size.

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Appendix A. How do FPIs acquire SEC reporting obligations and how can they go dark?

U.S. and foreign issuers listed or traded in the U.S. markets are required to comply with SOX provisions if they have Section 13(a) reporting obligations to the SEC. Under the current rules, an issuer attains Section 13(a) reporting obligations mainly by 1) listing on national securities exchanges and registering the securities under Section 12(b); 2) registering a class of equity securities under Section 12(g) either voluntarily or because it has 500 or more record holders and more than $10 million in total assets and, if an FPI, more than 300 U.S. beneficial holders; or 3) raising and registering debt or equity capital in the U.S. under Section 15(d).

Trading on Pink Sheets does not guarantee an exemption from the SEC. Under Rule 12g3-2(a), these FPIs are exempt from SEC reporting and other obligations if the number of worldwide record holders is below 300 (or with fewer than 500 worldwide record holders and less than $10 million assets). These FPIs are also exempt if the number of U.S. beneficial holders is below 300 (or with fewer than 500 U.S. beneficial holders and less than $10 million assets). To identify beneficial holders, issuers have to look through record holders such as financial institutions to determine ownership. Discussions with SEC staff indicate flexibility in the SEC's granting of exemptions. The SEC usually exempts FPIs if they do not substantially exceed the above thresholds, i.e., some FPIs that would have to register according to the above thresholds are exempt from registration. Under Rule 12g3-2(b), these FPIs are exempt if they furnish to the SEC on an ongoing basis information they have made public or distributed or are required to make public or distribute under the laws and regulation that they are subject to outside of the U.S. The exempt firms do not have to deregister because they have never registered.

Regarding the FPIs with SEC reporting obligations, the deregistration regulation changed with the passage of Section12h-6 and amendments to 12(g) in March 2007. Before the new regulation, if FPIs have raised capital in the U.S., as in case 3) above, they can only suspend, not terminate, their obligation to file periodic reports under Section 12h-3. They must always meet the asset and shareholder threshold requirements of 12(g) to avoid reporting. If FPIs have listed shares only in the U.S., as in case 1), they can terminate Section 12(b) reporting obligations by delisting. However, they are automatically subject to the 12(g) reporting obligations if they meet the criterion of 12(g). These delisted FPIs [under Rule 12g-4(a)], as well as reporting OTC FPIs (under 12h-3), can deregister only if they do not exceed the asset and shareholder thresholds.[31]

After deregistration, FPIs are not eligible for Rule 12g3-2(b) exemptions for at least 18 months according to Rule 12g3-2(d)(1). Rule 12g3-2(b) exempts FPIs from registration even if they exceed the asset and shareholder thresholds. The lack of exemptions creates two significant complications for

[31] Under Exchange Act Rule 12g-4(a)1, FPIs and U.S. issuers can deregister if they have fewer than 300 holders of record worldwide (or fewer than 500 worldwide record holders and with assets totaling less than $10 million). Under Exchange Act Rule 12g-4(a)2, FPIs can also deregister under the same conditions, except that the holders are defined as U.S. beneficial holders.

deregistered FPIs. First, these FPIs have to renew registration if they exceed the asset and shareholder thresholds within 18 months. Second, without Rule 12g3-2(b) exemptions, meeting Rule 15c2-11 requirements for trading on Pink Sheets is difficult. Because a market maker rarely quotes the shares of deregistered FPIs on Pink Sheets without the exemption, these FPIs usually have to wait 18 months before their shares can be traded in the U.S. again, even if they want to be traded on Pink Sheets.

The new 12h-6 issued in March 2007 provides a second way to deregister in addition to Rule 12g-4(a). It further allows all reporting FPIs [FPIs under 12(b), 12(g), or 15(d)] to deregister if the U.S. average daily trading volume (ADTV) of the class of securities in the U.S. over a recent 12-month period is no greater than 5% of the worldwide ADTV. Upon deregistration through 12h-6, FPIs are immediately eligible for Rule 12g3-2(b) exemptions. The amended 12(g) in March 2007 also allows 15(d) FPIs to deregister under asset and shareholder thresholds. The new regulation has also relaxed deregistration process in several other important ways.

In February 2008, the SEC issued proposed rules to further amend 12(g) to streamline the Rule 12g3-2(b) exemption process, as well as affording 15(d) FPIs immediate eligibility for Rule 12g3-2(b) exemptions upon deregistration through Rule 12g-4(a).

Examples of pre-SOX accommodations made by the SEC for foreign private issuers

Before the enactment of SOX, the SEC made considerable accommodations for FPIs. In general, governance issues were left to home jurisdictions, while reporting rules were applied with extensive reductions in requirements. Since 1979, the SEC has exempted FPIs from quarterly financial reports, Sections 14a–14c proxy rules, Section 14f tender offer rules, and Section 16 short swing profit rules. In 1999, the SEC adopted exemptive rules for cross-border and exchange offers, business combinations, and rights offerings related to the securities of FPIs. In 2000, the SEC exempted FPIs from Regulation Fair Disclosure (Regulation FD) when it was adopted. The SEC has also adopted procedures to accommodate the scheduling needs of FPIs and policies allowing for confidential treatment of filings that would be public for U.S. issuers. Further, the SEC has created separate forms with less disclosure for FPIs, instead of requiring that they file the same forms as U.S. issuers. For example, since 1979, the SEC has allowed FPIs to file Form 20-F instead of Form 10-K. Since 1982, FPIs can use Forms F-1, F-2, and F-3 for initial public offerings, instead of Forms S-1, S-2, and S-3. In 1985, when the SEC introduced Form S-4 for certain reclassifications, mergers, consolidations, and acquisitions, it allowed FPIs to file Form F-4. Canadian issuers have additional exemptions. Canadian firms file Form 40-F instead of Form 10-K. Since 1991, although still governed by U.S. antifraud rules, the top end of the Canadian market can use Canadian forms for registration.

Appendix B. Variable definitions

B.1. Variables used in cross-sectional regression analysis	
Shareholder rights	Strength of corporate laws to protect shareholder rights from La Porta et al. (1998).
Judicial efficiency	Efficiency and integrity of the legal environment from La Porta et al. (1998).
Rule of law	Law and order tradition assessment from La Porta et al. (1998).
Accounting standard	Index to determine the quality of financial disclosures from La Porta et al. (1998).
Public enforcement	Index of the characteristics and the power of the main government agency in charge of supervising stock exchanges from La Porta et al. (2006).
Disclosure requirements	Index of disclosure requirements from La Porta et al. (2006).
Log (GDP)	Natural logarithm of average per capita GDP for a country from 1999 through 2001 .
Log (TA)	Natural logarithm of total assets in millions of dollars.
PPEPCT	Property, plant, and equipment as a percentage of total assets.
Sales growth	One-year sales growth.
Cross-listing market cap	Market value of FPIs in the U.S. as a proportion of FPIs' total market value.
U.S. volume	U.S. dollar volume as a proportion of FPIs' total trading volume.
Non-II block	Percentage of stockholding by non-institutional blockholders.
II block	Proportion of a firm's common shares held by institutional blockholders.
Analyst coverage	Number of analysts covering each issuer from I/B/E/S.
Short sale	Indicator for countries prohibiting investors from selling shares short
Time zone	Absolute number of time zones separating a given country's main stock exchange from New York.
Illiquidity	Amihud (2002) stock illiquidity.
Synchronicity	Country-level measure of information-based barriers from Morck et al. (2000).
Going-dark probability	Predicted probability of FPIs voluntarily delisting and deregistering
B.2. Additional variables used in going-dark analysis	
Board size	Number of directors.
Non-executive directors	Proportion of non-executive directors.
Independent chairman	Indicator for FPIs with the chairman being different from the CEO.
Largest holding	Holding by the largest blockholder.
Earnings management	Absolute value of accruals divided by the absolute value of operating cash flows.
Forecast dispersion	12-month average of the standard deviation of analysts' earnings forecasts deflated by the stock price at the beginning of the fiscal year.
Forecast error	Absolute value of the 12-month average of actual earnings minus the median analyst forecast deflated by the stock price at the beginning of the fiscal year.
Forecast revision	Standard deviation of 12 monthly forecast revisions, with revisions being the current-month median forecast minus previous month median forecast.
Liquidity	Proportion of days with trading from Lesmond et al. (1999).
ROA	EBITDA divided by total assets.
ROE	EBITDA net of interest expenses and preferred dividends divided by book equity.
Tobin's Q	Sum of total assets and market value of equity minus book equity, divided by total assets.

Table 1.
Events pertaining to passage of the 2002 Sarbanes-Oxley Act and related Securities and Exchange Commission (SEC) rules

Event	Date	Description	Event window
1	1/17/2002	SEC chairman Harvey Pitt recommends establishing an accounting oversight board.	1/17–18
2	2/11–12/2002	Legislation to be introduced in the House.	2/11–15
	2/14/2002	Introduction of H.R. 3763 to the House.	
3	4/22/2002	Committee report issued on H.R. 3763.	4/22–26
	4/24/2002	House of Representatives passed H.R. 3763.	
	4/25/2002	Senate Judiciary Committee approves legislation.	
4	6/11/2002	Progress reported on Senate legislation.	6/11–13
	6/12/2002	Mark-up of Sarbanes bill to occur.	
5	6/18/2002	Senate Banking Committee approves S.2673.	6/18–19
6	6/25/2002	Introduction of S. 2673 to the Senate.	6/25–26
7	7/3/2002	Committee reports on S.2673.	7/3–5
8	7/8–12/2002	Senate deliberation on S. 2673.	7/8–17
	7/15/2002	Senate passed S. 2673. House introduced H.R. 5118.	
	7/16/2002	House passed H.R. 5118.	
9	7/19/2002	Conference committee meeting.	7/19–22
10	7/24/2002	Conference report issued.	7/24–26
	7/25/2002	Congress passed conference report. Bush reportedly will sign the bill.	
11	7/30/2002	Bush signed into law the Sarbanes-Oxley Act of 2002. Final rules to implement Section 304 (forfeiture of compensation and securities related profits) and Section 402 (prohibition on personal loans) became effective immediately.	7/30–31
12	8/2/2002	SEC approves and releases proposed rules to implement Section 302 (management certification of financial statements).	8/2–5
		SEC, in a departure from the original statute, decides to include foreign private issuers for Section 302 compliance as required by SOX.	
13	8/6/2002	SEC approves and releases proposed rules to implement Section 403(a) (accelerated insider transaction reports).	8/6–7
14	8/27/2002	SEC approves final rules to implement Sections 302 and 403(a).	8/27–30
		SEC releases final rules to implement Section 403(a).	
	8/29/2002	SEC releases final rules to implement Section 302.	
15	10/16/2002	SEC approves proposed rules to implement Sections 303 (prohibition of actions designed to improperly influence auditors), 404 (internal controls and procedures), 406 (code of ethics), and 407 (financial experts on audit committee).	10/16– 23
	10/18/2002	SEC releases proposed rules to implement Section 303.	
	10/22/2002	SEC releases proposed rules to implement Sections 404, 406, and 407.	
16	10/30/2002	SEC approves proposed rules to implement Sections 401(a) (disclosure of off-balance sheet arrangements), 401(b) (also called Regulation G, conforming to Generally Accepted Accounting Principles), and 306(a) (prohibition of insider trading during pension plan blackout periods).	10/30–31, 11/4–7
	11/4/2002	SEC releases proposed rules to implement Section 401(a).	
	11/5/2002	SEC releases proposed rules to implement Section 401(b).	

Table 1 – Continued

Event	Date	Description	Event window
	Exemptions:	*Section 401(a):* No exemption. Since FPIs file only annually with SEC, their cost should be lower. *Section 401(b):* Limited exemption for disclosure other than documents such as 20-F. *Section 306(a):* 1) Does not apply to management employee directors. 2) Use a different calculation (15%+50% tests) to determine insider trading prohibition.	
17	12/18/2002	SEC approves proposed rules to implement Section 403 (electronic filing of insider ownership reports).	12/18–21
	12/20/2002	SEC releases proposed rules to implement Section 403.	
18	1/8/2003	SEC approves and releases proposed rules to implement Section 301 (compliance with the audit committee requirements).	1/8–9
	Exemptions:	1) The rules do not apply to non-management employees on board, where board means supervisory or non-management board in two-tier board system. 2) The entire board can be designated audit committee without setting up separate committee. 3) Controlling shareholders can send one observation member to the audit committee. 4) Foreign government can send a representative to be one member of the audit committee. In 3) and 4), the member needs to be a non-management member. 5) Bodies such as board of auditors can substitute for auditor committee if requirements are met, e.g., as in Japan. 6) There is also an exemption for the board of a dual holding company.	
19	1/15/2003	SEC approves and releases final rules to implement Sections 306 (a), 401(b), 406, and 407.	1/15–16
	Exemptions:	*Section 406:* Disclose changes to code of ethics only in annual reports. *Section 407:* Foreign companies can disclose whether financial expert is independent later along with Section 301 requirements.	
20	1/22/2003	SEC approves final rules to implement Section 401 (a).	1/22–23, 1/28–29
	1/28/2003	SEC releases final rules to implement Section 401 (a).	
21	4/1/2003	SEC approves final rules to implement Section 301.	4/1–2, 4/9–10
	4/9/2003	SEC releases final rules to implement Section 301.	
	Exemptions:	1) Compliance by July 31, 2005, rather than 10/31/2004, the deadline for U.S. issuers. 2) Expanded exemption for dual holding company. 3) Amend Section 407 rules and set date of compliance to be July 31, 2005. If exemptions taken, need to disclose.	
22	4/24/2003	SEC approves final rules to implement Sections 303 and 403.	4/24–25, 5/7–8,
	5/7/2003	SEC releases final rules to implement Section 403.	5/20–21
	5/20/2003	SEC releases final rules to implement Section 303.	
23	5/27/2003	SEC approves final rules to implement Section 404.	5/27–28, 6/5–6
	6/5/2003	SEC releases final rules to implement Section 404.	
	Exemptions:	U.S. issuers must comply by 6/15/2004, whereas foreign issuers must comply by 4/15/2005.	

Table 2
Summary statistics

Panel A. Summary statistics of country-level measures of investor protection

	# of FPIs	*Shareholder rights*	*Judicial efficiency*	*Rule of law*	*Accounting standard*	*Public enforcement*	*Disclosure*
Mean	524	3.78	8.86	8.09	68	0.60	0.73
Standard deviation	524	1.37	1.46	2.09	8.52	0.21	0.17

Table 2 – Continued

Panel B. Mean of other independent variables across the firms within a country and for the whole sample

Country	# of FPIs	*Log (GDP)*	*Log (TA)*	*PPE-PCT (%)*	*Sales growth (%)*	*Short sale*	*Time zone*	*Illiquidity*	*Synchronicity*	*US cap (%)*	*US volume (%)*	*Non-II block (%)*	*II block (%)*	*Coverage*
Argentina	9	8.78	8.01	55.11	0.18	0	2	0.59	0.17	18.56	54.80	1.00	0	5.11
Australia	13	9.92	7.98	27.96	-13.59	0	15	0.15	0.02	11.04	15.32	3.42	1.75	1.54
Austria	1	10.12	8.84	59.42	-10.40	0	6	0.06	0.06	0.77	10.96	0	0	0
Belgium	1	10.05	9.28	34.89	11.88	0	6	0	0.07	17.46	16.69	0	0	0
Brazil	8	8.03	8.33	53.49	-9.06	0	2	0.09	0.24	28.97	41.72	16.17	0	8.75
Canada	139	10.02	6.07	38.00	26.44	0	0	0.29	0.14	86.27	42.82	16.60	1.91	10.32
Chile	19	8.44	7.17	52.23	-3.15	0	1	0.29	0.08	12.69	64.80	10.63	0.31	4.89
Denmark	2	10.34	6.64	25.14	-11.93	0	6	0.26	0.07	38.51	4.12	0	0	1.00
Finland	3	10.09	9.27	43.98	1.80	0	7	0.04	0.11	4.07	4.02	19.00	0	1.00
France	23	10.06	7.89	17.89	29.48	0	6	0.33	0.11	13.27	20.32	6.37	1.76	1.61
Germany	17	10.08	7.58	23.00	4.42	0	6	2.18	0.14	13.45	27.84	3.24	5.12	1.88
Greece	4	9.31	8.07	31.04	-7.49	1	7	0.28	2.30	9.63	7.64	0	0	0
Hong Kong	5	10.10	6.71	42.98	35.19	0	13	0.30	0.04	15.90	16.12	0	0	0.20
India	11	6.14	6.61	21.77	37.36	0	10.5	0.16	0.03	20.05	29.13	3.36	3.49	1.00
Indonesia	2	6.59	7.87	56.20	68.27	1	12	0	0	7.81	16.94			1.00
Ireland	9	10.20	7.54	17.98	19.35	0	5	0.17	0.04	47.62	73.94			7.78
Israel	69	9.75	4.53	16.24	-2.24	0	7	1.38	0.11	89.28	68.58	4.55	0.49	3.77
Italy	10	9.89	8.37	24.47	0.98	0	6	0.23	0.24	13.75	14.82	0	2.50	2.10
Japan	16	10.44	8.90	23.87	7.60	0	14	0.42	0.02	4.72	4.39	0.73	6.80	0.38
Mexico	22	8.68	7.73	42.06	7.07	0	1	0.35	0.51	26.46	51.06	21.94	0	5.77
Netherlands	15	10.11	8.87	22.51	1.05	0	6	0.11	0.14	12.22	9.41	19.60	5.87	3.93
New Zealand	3	9.57	7.49	62.69	4.18	0	14	0.25	0.03	6.65	11.20	0	0	1.00
Norway	5	10.55	9.06	58.50	5.06	0	7	0.37	0.08	2.32	2.67	10	0	0.20
Peru	2	7.63	7.11	53.35	-1.19	1	0	0.19	0.10	20.34	87.04	0	0	6.50
Philippines	2	6.88	6.68	80.01	-7.15	0	12	0.58	0.04	24.83	46.17	0	0	2.50
Portugal	2	9.31	10.25	31.37	18.67	0	5	0.07	0.09	2.60	0.42	0	18.00	0
Singapore	2	9.97	7.21	59.59	-57.59	1	13	0.04	0.73	5.07	47.92	0	0	10.50
South Africa	5	7.91	7.19	69.44	-1.20	0	6	0	0.04	21.85	43.56	0	22.20	1.60
South Korea	7	9.26	9.31	49.42	19.30	1	14	0.83	0.03	13.87	12.67	2.43	0.57	1.29
Spain	7	9.60	10.93	26.93	19.55	0	6	0.04	0.19	5.29	7.41	1.86	0.86	2.57
Sweden	7	10.19	8.23	17.53	16.94	0	6	0.21	0.13	4.17	6.97	36.02	0	5.14
Switzerland	11	10.49	8.86	14.34	3.23	0	6	0.05	0.14	3.22	4.79	0.64	0	1.27
Taiwan	5	9.45	8.23	57.12	-31.18	0	13	0.06	0.04	5.13	7.31	2.80	0	2.20
Turkey	1	7.87	8.17	50.19	-19.69	0	7	0.01	0.06	2.63	4.77	0	0	0
United Kingdom	66	10.13	7.80	21.87	15.60	0	5	0.40	0.10	10.98	13.13	3.48	4.52	2.14
Venezuela	1	8.42	8.64	72.76	15.60	1	1	0	0.01	45.36	93.07	0	0	9.00
Mean	524	9.70	7.03	31.14	12.34	0.03	4.79	0.49	0.15	43.71	30.91	8.81	2.35	4.93
Standard deviation	524	0.82	2.54	25.96	74.50	0.18	4.25	1.90	0.21	44.17	31.22	23.24	7.56	7.68

Table 2 – Continued

Panel C. Sample distribution of non-institutional blockholdings for all the cross-listed FPIs in 2001 and for all the going-dark FPIs over the 1995–2006 period

	All cross-listed FPIs in 2001		Going-dark FPIs			
			Pre-SOX period		Post-SOX period	
	(1)	(2)	(3)	(4)	(5)	(6)
Range of blockholdings	*N*	% of sample	*N*	% of sample	*N*	% of sample
0%	387	79.0	4	36.4	8	21.1
0% – 10%	22	4.5	0	0.0	0	0.0
10% – 20%	18	3.7	1	9.1	6	15.8
20% – 30%	13	2.7	1	9.1	2	5.3
30% – 40%	5	1.0	0	0.0	0	0.0
40% – 50%	7	1.4	0	0.0	2	5.3
> 50%	38	7.8	5	45.5	20	52.6
Total	490	100	11	100	38	100

See Appendix B for variable definitions.

Table 3
Abnormal stock returns of cross-listed foreign private issuers (FPIs) around 2002 Sarbanes-Oxley Act (SOX)-related legislative and implementation events

	U.S. return – FPI-free home index			Home return – FPI-free home index		
Event number	Abnormal return (%)	t-stat.	% of negative return	Abnormal return (%)	t-stat.	% of negative return
Total (1-23)	-9.63 ***	-8.63	68.5	-12.97 ***	-10.68	75.3
Pre-SOX (1-11)	-9.55 ***	-10.34	70.8	-11.05 ***	-13.07	71.0
Proposed rule (12-13, 15-18)	3.59 ***	3.08	50.6	2.11 ***	3.07	40.2
Final rule (14, 19-23)	-3.67 ***	-6.13	61.5	-4.04 ***	-6.58	58.2
1	0.11	0.53	49.6	-0.43	-1.86	49.5
2	0.11	1.50	50.0	0.23	1.72	36.2
3	-2.55 ***	-6.92	67.7	-2.11 ***	-6.02	63.8
4	-1.61 ***	-4.06	59.5	-1.48 **	-5.60	60.1
5	-1.13 **	-4.31	63.7	-0.45	-1.15	49.7
6	-0.82	-2.04	53.2	-0.26	-0.65	52.1
7	1.03 *	3.39	43.7	0.05	0.11	49.5
8	-2.97 ***	-9.76	68.7	-3.60 ***	-11.65	66.0
9	-2.26 ***	-12.51	69.3	-3.46 ***	-20.14	74.5
10	-0.69	-0.35	50.4	-0.38	-0.14	52.9
11	1.21 **	4.98	44.3	0.86	3.57	35.9
12	-1.99 ***	-8.76	64.1	-1.72 ***	-8.75	58.5
13	1.75 ***	9.80	35.5	1.26 **	7.69	45.5
14	-0.43	-2.33	60.5	-1.27 **	-4.79	58.5
15	1.00 ***	0.64	53.1	0.69 **	0.34	42.0
16	3.66 ***	7.03	41.4	2.59 ***	7.45	30.6
17	-1.03 **	-3.18	61.1	-0.70 *	-1.95	60.9
18	0.21	-0.45	53.8	-0.01	-0.11	52.7
19	-0.64	-3.91	62.4	-0.11	-1.35	54.5
20	-1.78 ***	-4.71	61.1	-1.43 ***	-5.11	62.8
21	1.08 **	3.76	44.8	0.54	2.24	35.4
22	-3.55 ***	-10.46	73.9	-3.28 ***	-9.73	68.6
23	1.64 ***	4.11	44.1	1.51 ***	4.69	33.0
Number of observations	524			376		

***, **, and * indicate that estimates are significant at the 1%, 5%, and 10% level, respectively, according to the bootstrapped abnormal returns on the non-event days during the 2002 to 2003 period.
t-stat. is the Brown and Warner (1985) *t*-statistic during the SOX-related events.
Abnormal returns are based on market model adjusted returns with the period from January 1999 to December 2001 as the estimation period.

Table 4
Additional tests on abnormal stock returns around 2002 Sarbanes-Oxley Act (SOX)-related legislative and implementation events

	U.S. return – FPI-free home index		Home return – FPI-free home index	
	Abnormal return (%)	t-stat.	Abnormal return (%)	t-stat.
Panel A. OTC-traded FPIs				
1. OTC-traded FPIs with SOX compliance	-5.45 ***	-8.46	-5.17 ***	-9.17
2. OTC-traded FPIs without SOX compliance	-1.02	-0.66	-1.26	-0.81
Panel B. Additional robustness tests				
1. 36 country portfolios instead of stock returns	-4.59 ***	-2.59	-8.58 ***	-4.79
2. Trim daily returns beyond -25% and +25%	-8.93 ***	-7.72	-15.59 ***	-11.65
3. Excluding direct listings from Canada and Israel	-5.07 ***	-4.61	-15.47 ***	-10.45
4. MSCI country indexes as benchmarks	-9.53 ***	-8.08	-14.00 ***	-11.60
5. Use estimation period market-adjusted_returns to estimate standard error	-9.53 ***	-5.11	-14.00 ***	-6.82
6. Use event period market-adjusted_returns to estimate standard error	-5.48 ***	-4.42	-6.74 ***	-5.10

***, **, and * indicate that estimates are significant at the 1%, 5%, and 10% levels, respectively.
The estimation period is January 1999 to December 2001.
Except for Row 4 of Panel B, where I use Morgan Stanley Capital International (MSCI) country index as the benchmark, I use foreign private issuer (FPI)-free home country index as the benchmark.
Except for rows 5 and 6 of Panel B, I use market model adjusted returns.

Table 5
Cross-sectional analysis of going-dark probability and 2002 Sarbanes-Oxley Act (SOX)-related abnormal returns

Panel A. Cross-sectional analysis of SOX-related abnormal returns with ordinary least squares

		Dependent variable = U.S. abnormal return (1)		Dependent variable = home abnormal return (2)	
Category	Independent variable	Coeff.	t-stat.	Coeff.	t-stat.
Main variables					
Corporate law	*Shareholder rights*	5.31 ***	4.60	3.99 ***	2.75
	Judicial efficiency	-2.73 *	-1.81	-5.33 ***	-2.65
	Rule of law	-4.44 ***	-5.68	-2.10 **	-2.20
	Accounting standard	-0.06	-0.23	0.18	0.63
Securities law	*Public enforcement*	-0.31 ***	-2.96	-0.79 ***	-6.05
	Disclosure standard	-33.36 ***	-3.32	-14.77	-0.90
Institutional monitoring	*II block*	-0.04 *	-1.91	-0.27 *	-1.65
	Analyst coverage	-0.34 **	-2.24	-0.56 **	-2.20
Going-dark in the U.S.	*Going-dark probability*	1.61 *	1.91	1.82 *	1.93
Controlling shareholders	*Non-II block*	-0.15 **	-2.00	-0.17 *	-1.95
Control variables					
Financial development	*Log (GDP)*	12.09 ***	5.36	6.46 ***	2.69
Firm size	*Log (TA)*	-1.74 ***	-2.68	-1.57 *	-1.83
Fixed assets	*PPEPCT*	0.18 ***	3.49	0.15 *	1.70
Growth opportunities	*Sales growth*	-0.07 ***	-3.58	-0.09 ***	-4.80
Market friction	*Short sale*	46.95 ***	4.20	66.84 ***	3.48
	Time zone	0.45	1.38	0.53	0.90
	Illiquidity	3.59 ***	2.39	9.41	1.51
	Synchronicity	-23.65 ***	-4.08	-25.95 ***	-2.50
	Intercept	6.30	0.30	30.60	0.81
	Adjusted-R^2	0.25		0.26	
	Number of observations	459		360	

Table 5 – Continued
Panel B. Probit model estimating the likelihood of FPIs going-dark in the U.S.

		Dependent variable = 1 if FPIs go dark			
		U.S. sample		Home country sample	
		(1)		(2)	
Category	Independent variable	Coeff.	t-stat.	Coeff.	t-stat.
Corporate law	*Shareholder rights*	-0.16	-1.26	-0.16	-1.08
	Judicial efficiency	-0.15	-1.42	-0.23	-1.57
	Rule of law	-0.02	-0.21	0.02	0.15
	Accounting standard	0.07 ***	2.50	0.06 **	2.04
Securities law	*Public enforcement*	-0.73	-1.04	-0.45	-0.50
	Disclosure standard	-0.07	-0.05	0.04	0.02
Blockholdings	*Non-II block*	0.12 **	2.17	0.15 **	2.21
Firm characteristics	*Cross-listing market cap*	-0.01 ***	-3.17	-0.02 ***	-3.13
	U.S. volume	0.01	0.85	0.01	0.85
	Sales growth	-0.01 ***	-2.12	-0.01 **	-1.97
	Log (TA)	-0.22 ***	-3.70	-0.33 ***	-4.08
	Intercept	-1.78	-1.35	-0.57	-0.36
	Pseudo-R^2	0.36		0.37	
	Number of observations	459		360	

***, **, and * indicate that *t*-statistics are significant at the 1%, 5%, and 10% levels, respectively.
See Appendix B for variable definitions. I cluster standard errors within country in Panels A and B.

Table 6
Going-dark foreign private issuers (FPIs)

Panel A. Yearly statistics of going-dark FPIs and all FPIs

	1995	1996	1997	1998	1999	2000	2001	SOX passed in July 2002: 2002 1:7	2002 8:12	2003	2004	2005	Total
Going-dark FPIs													
Delisting													
Number	0	1	0	1	1	4	3	4	4	10	7	17	52
% of all delisting	0.0	4.0	0.0	1.6	1.4	5.3	3.8	12.1	11.1	16.1	16.7	26.6	9.4
% of total listing	0.0	0.2	0.0	0.1	0.1	0.5	0.4	0.5	0.5	1.3	0.9	2.2	
Deregistration without distress													
Number	0	1	0	0	1	2	3	5	4	11	8	17	52
% of all delisting	0.0	4.0	0.0	0.0	1.4	2.7	3.8	15.2	11.1	17.7	19.0	26.6	9.4
% of total listing	0.0	0.2	0.0	0.0	0.1	0.2	0.4	0.6	0.5	1.5	1.1	2.2	
All FPIs													
New listing	66	123	109	74	74	140	64	14	21	31	46	58	762
Delisting	25	25	38	61	74	75	80	33	36	62	42	64	551
Total listing	555	653	737	773	786	852	841	796	796	758	742	757	

Panel B. Five-day home market going-dark abnormal returns of FPIs before and after passage of SOX

Event window	Delisting returns: Before July30, 2002 Ret.	t-stat.	% of +	After July30, 2002 Ret.	t-stat.	% of +	Deregistration returns without distressed delistings: Before July30, 2002 Ret.	t-stat.	% of +	After July30, 2002 Ret.	t-stat.	% of +
(-5, +5)	-5.11	-1.99	21.4	2.22	0.62	63.2	-6.41	-1.60	25.0	2.21	0.81	65.0
# of obs.	14			38			12			40		

Table 6 – Continued
Panel C. Characteristics of cross-listed FPIs before and after going-dark in the U.S.

			FPIs that go dark							
			Before July30, 2002			After July30, 2002			Diff. of (3) & (6)	Diff. of (1) & (4)
			Go dark			Go dark				
			Pre	Post	Change	Pre	Post	Change	Signi-ficance	Signi-ficance
Category	Subcategory	Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Governance	Board characteristics	*Board size*	9.00	9.00	0.00	9.00	8.00	-1.00		
characteristics		*Non-executive directors (%)*	67.14	74.54	7.40*	64.27	66.98	2.71		
		Independent chairman (%)	55.56	77.78	22.22	65.00	75.00	10.00		
	Blockholdings	*Non-II block (%)*	33.67	34.33	0.66	35.53	27.38	-8.15***	**	
		Largest holding (%)	32.00	26.00	-6.00	21.00	20.00	-1.00		**
		II block (%)	1.89	6.89	5.00	11.33	14.68	3.35		**
Earnings	Earnings quality	*Earnings management*	0.43	2.54	2.11***	0.52	0.60	0.08	***	
characteristics	Analyst forecasts	*Forecast errors*	0.69	0.24	-0.45*	0.27	0.18	-0.09	***	**
		Forecast dispersion	0.39	0.47	0.08	0.21	0.20	-0.02*	**	**
		Revision volatility	0.19	0.45	0.26**	0.15	0.12	-0.03	**	
		Analyst coverage	5.60	5.55	-0.05	7.19	6.19	-1.00		*
Growth	Growth opportunities	*Sales growth (%)*	-33.65	35.48	69.13**	3.57	26.58	23.01***	**	***
potentials	Operating performance	*ROA (%)*	-1.50	-1.38	0.12	2.69	6.85	4.16***	*	**
		ROE (%)	-12.43	-12.87	-0.43	-0.75	8.13	8.88***	*	***
	Valuation	*Tobin's Q*	1.04	1.20	0.16	1.40	1.83	0.42***	*	
Liquidity	Liquidity	*Days with trading (%)*	86.31	52.04	-34.27	80.00	72.50	-7.50	***	
# of observation			11	11		38	38			

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The effect of the reliability of accounting information on systemic risk on listed companies at Tehran Stock Exchange

Mahmoud Moeinadin
Department of Accounting, Yazd Branch, Islamic Azad University, Yazd, Iran
Safaieeh, Shohadae gomnam Road, Zip code: 89195/155, Yazd, Iran
Email: Mahmoudmoein@gmail.com

Forough Heirany

Department of Accounting, Islamic Azad University, Yazd Branch, Yazd, Iran
Safaieeh, Shohadae gomnam Road, Zip code: 89195/155, Yazd, Iran
Email: heiranyforough@gmail.com

Ehsan Khoshnood
Young Researchers and Elite Club, Yazd Branch, Islamic Azad University, Yazd, Iran
Email: Ehsan.khoshnood@yahoo.com (Corresponding author)

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Abstract
One of the most important subjects in the financial management is the systematic risk which has always been focused on by the researchers. Due to the vastness of the market, there exist different devices for the investment in every financial market. The main goal of the shareholders, business owners and those who are concerned is to produce the optimum return and they face some risks in order to reach their goals and the fundamental requirement is to keep the relation between the risk and the return balanced. In other words, the decision makers of the stock markets produce their desired return by using the financial information of the companies. Therefore, the investigation into the risk and the factors influencing the risk is of importance. This article studies the reliability of the accounting information upon the systematic risk. To test the hypothesis, the data obtained from 52 companies listed on the Tehran stock exchange from 2006-2010 were chosen by the systematic deletion method and were tested by using the multi-variable regression. The conclusion suggests that there is a significantly positive statistical relation between the reliability of accounting information and the systematic risk.

Key words: Reliability of accounting information, Accruals quality, Earnings quality, Systematic risk, Fama and French three-factor model.

JEL Classification: M41

Introduction

The information offered to the managers, the investors, and the other users should be qualitatively high. The purpose of financial invoices, the final production of accounting system, and financial reporting is to render the brief and classified information about the financial situations, financial operations and financial inflexibility of the commercial units, which can be beneficial for the huge number of the financial invoice users for the purpose of making economic decisions.
According to the theoretical concepts of the financial reporting, a useful piece of the information must have particular qualitative features. The main qualitative features are related to the contents of the information and its reliability (Bolo et al, 2011).
Today, information systems of accounting play a prominent role in the operations of an organization within the economic environment. A large number of economic decisions are made based on the figures and information obtained from these systems. The financial reporting is a reflection of the information and expectations of the users of the financial invoices. Therefore, the passage of time, the development of economic activity, and the growing complexity of economy involve the growth of the purposes and the methods of reporting in order to meet the information needs because the dependable information obtained from the financial reporting is needed for making decisions about the activities of the business units (Khodaie Ardakani, 2008).
The investors make a choice from a wide range of investments based on the characteristics of risk and return. The investment in financial asset always entails some sort of hazard and insecurity which threatens the return and the capital. So, the role of risk in the investment is of importance.
It is quite obvious that the shareholders and the other beneficiaries of the economic centers try to reduce the cost of investment by minimizing the risk of investment. One of the risks the investors are faced with in the documents and negotiable instruments is the systematic risk. That is why it is necessary to draw attention toward the systematic risk and the influential factors on it in the capital market. The purpose of this study is to determine the dependable relation between accounting information which is measured by the accruals quality and it is called the systematic risk.

The Expression of the Question and the Theoretical Principles

The realization and the generation of revenues and the expenses of a company often differ from the time of receiving and paying cash. The accruals quality which distinguishes the profit of accounting from the cash flow is reported from this difference.
According to the point of view of the financial boards of accounting, one of the important roles of the accruals quality is to transfer the determination of the cash flow over the time so that the figures of the cash flow can measure the activity of a company better. The responsible accounting focuses on the economic transactions and events rather than the cash payment and receptions.

In the responsible accounting, the economic transactions and events are registered the moment they occur. In a responsible method, the principles like the realization and agreement are used for the reflection of revenues, the expenses, and the calculation of the benefits of accounting for example, the registration of the received account increases the determination of the cash flow in the benefit, and conforms the time of its determination with the time of gaining the economic benefit from the setting (Dastgir and Pairvand, 2010).

As a matter of fact, the principle of responsible accounting says the revenues are deposited into the accounts when the services are done.

In this method, the contracts made from the cash reception and payments are not only registered, but the business unit registers the contracts made on credit. After the industrial revolution had enhanced the commerce and the complexity of the contracts, the need for the responsible accounting arose. Although the success of a company can be measured by gaining the cash, the cash contract report has difficulty conforming and timing which make the cash flows a dangerous criterion for measuring the activities of companies. Since the companies make contracts on credit, reporting only the cash contract results in the wrong measurement of the activities of the companies. In the responsible accounting, the timing of knowing the cash flow is ignored in the reporting of the benefit. The benefit is made out of surplus and it is registered. According to the principle of the recognition of the revenues, the companies recognize all or considerable part of the cash they receive as the cost of their services. When the cash is reasonably known, and according to the principle of conformity, the companies recognize the cost in a period of time when the revenues are earned (Tousi, 2011).

In order to measure the relation between the risk and the return, a line of thoughts in the framework of the pricing model of capital goods has been generated. In this model, the investment is valued by using proper theory and methodology when gaining benefit is expected from the investment in future. To value and budget the capital of a project, the possibility to gain the capital must be studied. In the decision-making process, the evaluation of this possibility is called the risk rate. In other words, there is a possibility that the real return of an investment will be less than the expected one which is called risk. The systematic risk is inevitable and if it occurs, it can't be controlled. The systematic risk has an effect on all the documents and negotiable instruments, which is called the market risk. The systematic risk arises from the political risk, the economic risk, etc. (Vakili Fard, 2010).

By studying the index of the reliability of accounting information and the systematic risk, the importance of accounting information has been empirically tested and determined whether it has been used by the investors and the other beneficiaries and it has an effect on the systematic risk or not. If any relation between these two is proved, it can be stated that the quality of accounting information can improve the function of documents and negotiable instrument, the reduction of risk, and the capital cost, or other methods should be searched to strengthen the role of accounting information.

The Purposes and the Theoretical Framework

One of the main sources of information for people to make decisions is the accounting information. The high quality information brings about more coordination between the managers and investors to make decisions about their investments. On the contrary, the lower the quality of the information is, the higher is the risk the investors have to sustain. When they tolerate higher risks, they expect the higher return.

One of the functions of the accounting is to provide the useful information for the investors in order to ascertain the value of the documents and negotiable instruments as well as help them to make wise decisions about investments. On this purpose, the systematic risk and its influential factors in the market should be focused on. The aim of this study is to ascertain the reliability of the accounting information which is measured by the accruals quality and it is called the systematic risk.

Niu (2006) studied the corporate governance characteristics on the quality of accounting earnings; his research was conducted from 2001 to 2004 in Canada. He investigated over the ownership concentration and management ownership. The result showed that the corporate governance mechanisms would improve the earnings quality.

Velury and Jenkins (2006) did the research to study the relation between the earnings quality and the corporate governance in the U.S. from 1992 to 1999 and they concluded that the earnings quality wasn’t related to the corporate governance and the concentration of governance wouldn’t influence the reported earnings quality. The conclusion of the research suggests that the concentrated corporate governance may negatively influence the earnings quality.

Pierre and Smith (2008) did a research entitled “The stock prices and accounting information” from 1987 to 1996 in Malaysia and studied how the published accounting information with the stock prices by using the equation of regression. They wanted to know the relations between the variables. The conclusion of the research shows that the two accounting variable, that is, the book value of equity and the benefits reflected in the balance sheet and income statement, in turn, are of high value in the process of valuation, entitling the managers to use the accounting system as a main source of information so as to study the financial activities.

Li and Wang (2010) studied the relation between financial reporting quality and investment efficiency in the China's securities market from 1998 to 2006. The conclusion of the above-said research shows that the quality of the financial reporting is negatively correlated with the upper limit and lower limit investments and the effects of the accruals quality and leveling off the benefit on the upper limit and lower limit investments are of considerable importance.

Iatridis (2010) conducted a research into the admission of international standards of financial accounting on the quality of reported figures accounting. He also focused on the correlation between the information coming from the financial invoices based on IFRS and the value of the company. The results show that the execution of the international standards of accounting improved the quality of accounting figures, so giving the managers a free hand decreases the earnings management and this leads to the timely recognition of the loss, and finally this brings about the accounting information report which is more related with the value. This article suggest that the Less information asymmetry and the less interference with the benefit should result in disclosing high quality and useful financial information, helping the investors to make the wise and impartial judgments.

Rajgopal and Venkatachalam (2011) tested the relationship between financial reporting quality and return volatility in the United States of America during 1962 to 2001 and found that there is a positive relationship between lower earnings quality and return volatility. This positive association holds after employing several mediator variables and the impact of some factors such as new listed firms, hi-tech firms and observations of the company's negative earnings.
El-Sayed Ebaid (2011) conducted a research entitled the accruals quality and the prediction of the cash flow of the future in emerging markets of Egypt. The evidence shows that the retained earnings can predict the cash flow of the future better. He also understood that non-accumulated accruals items (made of main constitutes), changes in the accounts receivable and payable and in inventory, depreciation of fixed assets, amortization of intangible assets and the other accruals items can significantly enhance the prediction of the earnings.
Houmes et al (2012) studied the effect of the leverage of the operation on the systematic risk of the USA transportation industry. They used three indexes of the degree of the operation leverage, the natural net algorithm of the property, plant and equipment, the percentage of the active staff. The research showed that the three variables of the operation leverage would be positively related to the systematic risk (β).
Gill and Biger (2013) tested the impact of corporate governance on the efficiency of the working capital management of the manufacturing listed firms from 2009 to 2011. The sample is composed of 180 listed firms on NYSE. The findings of this study suggest that the corporate governance plays a key role in improving the efficiency of the working capital management.
Cohen et al (2013) studied the role of cash and accrual accounting in the local governments. They investigated 106 municipalities in Greece and found that the information on cash accounting plays a significant role in decision making rather than the role played by the information of accrual accounting. It seems that larger municipalities use extended accounting information for the negotiations about the cash and accrual accounting.

Methodology

Materials and Method

This research is of descriptive-correlative nature because the relation among the variables is examined and valued. Since the study can be used in decision-making process, it is regarded an applied project. The research covers the period from 2002 to 2010 and has been used to measure the reliability of accounting information and estimate the coefficient of the Fama and French accounting information of the period from 2002 to 2005 and investigate the relations among the main variables from 2006 to 2010.
In order to answer the question, the following hypothesis is presented:
There is a significant relation between the systematic risk and the accruals quality.

The statistical Population, the Sample and the Sampling Method

In order to choose a statistical population, we referred to Tehran's documents and negotiable instruments and the statistical sample was chosen by using the deletion sampling and considering the following limitations.

- The fiscal year ends in March every year.

- The shares of the companies were traded at least for 100 days a year.
- The companies shouldn't be insurance companies, investment companies, or broker companies.
- The required data and information should be available for measuring the variables of the research.

Regarding the method conditions and criteria, 52 companies were selected as a sample.

The Means of Data Collection

The data collection is done through the library method. To collect the data needed in the literature, the central bank of the Islamic Republic of Iran and the financial statements of the companies listed to the documents and negotiable instrument center were referred to as the source of information. To access the data, the Rahavard-e-Novin Software, the website of Tehran's stock exchange and the website of Tehran's documents and negotiable instruments can be referred to.

To analyze, results, the multi-variable regression was used and in order to organize the data, Excel and SPSS 20 were utilized. To test the hypothesis, the confidence level was 95%.

The Variables and the Procedure

The variables existent in the research are divided into control, dependent, and independent ones. The reliability of the accounting information is regarded as the independent variable. To calculate the reliability of the accounting information, the accruals quality was used.

In this research, Dechow and Dichev modified model (2002) proposed by Francis et al (2005) was utilized. The following method is used to measure the accruals quality:

$TCA_{it} = \phi_0 + \phi_1 CFO_{it-1} + \phi_2 CFO_{it} + \phi_3 CFO_{it+1} + \phi_4 \Delta REV_{it} + \phi_5 PPE_{it} + \nu_{it}$

TCA is the total current accruals quality which is calculated by the following method:

$TCA_{it} = \Delta CA_{it} - \Delta CL_{it} - \Delta Cash_{it} + \Delta STDebt_{it} - Depn_{it}$

CFO is the operating cash flow which is measured by using the following method:

$CFO_{it} = NIBE_{it} - TCA_{it}$

$NIBE_{it}$ is the net income before the extraordinary items.

ΔCA_{it} is the changes in the current assets.

ΔCL_{it} is the changes in the current liabilities.

$\Delta Cash_{it}$ is the changes in cash.

$\Delta STDebt_{it}$ is the changes in the current share of the long-term debts.

$Depn_{it}$ is the depreciation cost of the tangible and intangible assets.

ΔREV_{it} is changes in the revenues.

PPE_{it} is considered as the gross value of property, plant and equipment (the fixed assets).

ν_{it} is the residual variable which its standard deviation from t to t-4 determines the accruals quality.

The present study exploits the depreciation and amortization costs from the notes accompanied to the basic financial statements and operating cash flows.

The Dependent Variables

In this research, the systematic risk is regarded as the dependent variable, considered as the coefficient of angle (β^M) in the Fama and French (1993) three-factor asset pricing model.

$r_t - r_{f,t} = \alpha + \beta^M MKT_t + \beta^S SMB_t + \beta^H HML_t + \varepsilon_t$

Where in:

r is the stock return.

r_f is the risk-free rate.

α is the Intercept.

B^M, β^S, β^H are the angle coefficients of the market factor, size factor and value factor.

MKT is the market factor.

SMB is the size factor.

HML is the book value to market value (value factor).

t is the time.

ε is the residual value.

MKT is the market risk which is originally the beta factor of the model presented by CAPM. Market risk is defined as the difference between the market return and the risk-free return. The market return can be obtained from the total index of end subtracted from the total index of beginning divided by the total index of beginning. The index of the risk-free return is defined as the profit of government bonds.

The second factor, SMB, is the difference between the mean return of the portfolio of the shares of small companies and the portfolios of the shares of big companies, which is also called the size factor.

The third factor, HML, is the difference between the return of the portfolios of company shares with higher book value than the high market value and the return of the portfolios of company shares with the lower book value than the low market value which is called the value factor.

The Control Variables

The control variables are as follows:

The Size: The size of the company can be obtained from the natural logarithm of the value of capital market.

The proportion of the book value to the market value: This can be obtained when the book value of the shareholders is divided by the market value of the shareholders.

The proportion of the fixed assets to the total assets (capital intensity): the proportion of the net property, plant and equipment to the total assets.

The cash ratio is the proportion of the cash and equivalent amount of cash to the total current debts. In addition, the control variables include the angle coefficient of the size factor (β^S) and the value factor (β^H).

The Total Model of the Research

$\beta_{it}^{M} = \psi_0 + \psi_1$ Accruals Quality$_{it}$ + $\psi_2 \beta_{it}^{S} + \psi_3 \beta_{it}^{H} + \psi_4$ Size$_{it}$ + $\psi_5 \beta$
Book-to-Market$_{it}$ + ψ_6 Capital Intensity$_{it}$ + ψ_7 Cash Ratio$_{it}$ + ε_{it}

In the model β^M, the systematic risk of the *i* company in a year equals *t*. The index of the reliability accounting information, that is, the accruals quality and the control variable have already been discussed in the above paragraphs.

Results

The Statistical Description of the Data

Table 1. The Descriptive Statistics of the Variable

	Mean	Median	Standard Deviation	Skewness	Kurtosis	Minimum	Maximum
Capital intensity	0.215	0.164	0.182	1.166	0.852	0.0016	0.8321
Cash ratio	0.084	0.047	0.157	8.919	108.490	0.0023	2.1108
Accruals quality	0.604	0.626	0.205	-0.303	-0.801	0.1267	0.9918
Size	27.284	26.902	1.454	0.827	-0.125	23.8749	30.7716
Book-to-market	0.467	0.301	0.604	7.216	77.748	0.0077	7.2770
β^M	1.866	30.429	722.382	-9.946	122.601	-9049.480	2309.350
β^S	0.7184	-0.133	12.9562	8.828	99.571	-35.99	153.310
β^H	-0.3103	-0.2081	9.875	8.914	119.648	-43.65	122.840

Testing the Hypothesis

There is a significant relation between the accruals quality and the systematic risk.

Table 2. Analysis of Variance

Source	Degree of Freedom	Residual squares	Mean squares	F	Sig. level	Durbin Watson	R2	Adj. R2
Regression	8	92220038.47	11527504.8	569.858	0.000	1.635	0.819	0.817
Residual	147	2973621.916	20228.721					
Total	155	95193660.38						

Table 3. Regression coefficients

Variable	Coefficient	Standard Deviation	t	Sig.
constant	62.425	221.570	0.282	0.779
Capital intensity	4.381	670156	0.065	0.948
Cash ratio	-22.578	123.267	-0.183	0.855
Size	-3.276	7.819	-0.419	0.676
Book-to-market	4.768	31.461	0.152	0.880
Accruals quality	130.849	63.148	2.072	0.040
β^S	17.080	5.483	3.115	0.002
β^H	99.807	16.928	5.896	0.000

Regarding Table 2, the level of significance of the statistic F shows that there is a significant regression and a linear relation between the dependent and independent variables with 95% confidence level. To study the independence of error of each other, Durbin-Watson test was used. The lack of correlation among errors is accepted when the statistic is between 1.5 to 2.5.
The finding of Durbin-Watson statistic shows the relative independence of data. According to Table 2, the modified coefficient of determination of the model is 0.81, that is, 81% of the changes of the systematic risk can on average be shown by the model. In Table 3, it is obvious that there is a significantly positive relation between the accruals quality and the systematic risk regarding the confidence level of the statistic *t* obtained from the accruals quality and the systematic risk. In addition, regarding the findings of Table 3 and the level of significance, it can be said that the measures of β^H and β^S have a significant relation with the systematic risk, but other control variables have a significant relation with the systematic risk.

Discussion and Conclusion

The hypothesis in relation to the reliability of the accounting information is calculated by the accruals quality, and the systematic risk is tested. By using the modified model of Dechow and Dichev (2002) presented by Francis et al (2005) is tested and the systematic risk is measured by Fama and French three-Factor model.
Moreover, the study shows that there is a significantly positive relation between the accruals quality and the systematic risk. The large size of the accruals quality shows the small size of the measure of the accruals quality.
The findings show that the accounting information is becoming increasingly popular with the other users, shareholders, and the managers. The findings refer to the importance of the accounting information in Tehran Stock Exchange.
Considering the findings of the research and importance of the accruals quality in the estimation of systematic risk of investors in the capital market, it is suggested that the reliability of the accounting information should be relied on more than ever. To improve and strengthen the accounting information, the clarity of the revealed accounting information, and assuring the investors, the Stock Exchange should execute a number of strategies.
The other findings suggest that there is a significantly positive relation between the risk of the size factor (β^S), and the value factor (β^H), and the systematic risk. It is also suggested that the beneficiaries and the decision makers should take these two factors into account while making decisions about the estimation of the risk.

Corresponding Author

The Author to whom we should address our correspondence: Ehsan Khoshnood, Master of Accounting, Young Researchers and Elite Club, Yazd Branch, Islamic Azad University, Yazd, IRAN. A contact address, telephone/fax numbers and e-mail address: Shohadae gomnam Road, Safaieeh, Zip code: 89195/155, Yazd, Iran, Tel: (++98)351-8211391; Fax: (++98)351-8214810, Email: Ehsan.khoshnood@yahoo.com

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Why have measures of earnings quality changed over time? ☆

Anup Srivastava *

Accounting Information and Management Department, Kellogg School of Management, Northwestern University, 6220 Jacobs Center, 2001 Sheridan Road, Evanston, IL 60208-2001, USA

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ABSTRACT

The properties of earnings have changed dramatically over the past 40 years. Prior studies interpret this trend as a decline in earnings quality but disagree on whether it results from changes in the real economy or changes in accounting standards. I find that each new cohort of listed firms exhibits lower earnings quality than its predecessors, mainly because of higher intangible intensity. I conclude that the trend of decline in earnings quality is due more to changes in the sample of firms than to changes in generally accepted accounting principles (GAAP) or in the earnings quality of previously listed firms.

1. Introduction

The literature finds that over the past 40 years or so, there has been an increase in the volatility of earnings and a decrease in both the relevance of earnings and the degree of matching between concurrent revenues and expenses.[1] The literature interprets these changes as a decline in earnings quality (EQ). But there is disagreement about whether the decline is "due to changes in GAAP or due to real economic changes" (Collins et al., 1997, p. 65). I reexamine this question by using

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* Tel.: +1 847 467 6203.
E-mail address: anup-srivastava@kellogg.northwestern.edu

[1] See Collins et al. (1997), Lev and Zarowin (1999), Givoly and Hayn (2000) and Dichev and Tang (2008). The relevance of earnings is measured by the adjusted-R^2 of the regression of annual stock returns on the levels of, and changes in, annual earnings (Easton and Harris, 1991; Lev and Zarowin, 1999). The volatility of earnings is measured by the standard deviation of earnings over a rolling four-year window. Matching is measured by the coefficient on the current expenses in a regression of revenues on past, current, and future expenses (Dichev and Tang, 2008). Matching represents the contemporaneous revenue–expense correlation.

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more recent data than do most prior studies, allowing me to shed light on the issue in three ways. First, I show a strong negative correlation between intangible intensity and average EQ measures, i.e., volatility, relevance, and matching. (For ease of discussion, an increase in earnings volatility is viewed as a declining EQ measure.) Second, I show that successive cohorts of newly listed firms exhibit increasing intangible intensity and decreasing EQ measures. Third, I show that the progressive declines in EQ measures are largely the result of the assimilation of successive cohorts of newly listed firms into the firm population. Hence, I identify the "new-list" phenomenon as the biggest reason for the decline in average EQ measures over the study period of 1970 to 2009.

By the outset of the twenty-first century, the United States had moved from being primarily an industrial economy to becoming mainly a knowledge-based economy (Baumol and Schramm, 2010; Shapiro and Varian, 1998). As a result, U.S. firms have increased their investments in intangible capital such as innovation, advertising, information technology, human capital, and customer relations (Corrado and Hulten, 2010). Consistent with this trend, there has been a dramatic increase over time in U.S. firms' average intangible intensity as measured by research and development (R&D) expenses, market-to-book ratios, and selling, general, and administrative (SG&A) expenses (Francis and Schipper, 1999; Banker et al., 2011; Eisfeldt and Papanikolaou, 2013).

I hypothesize that increases in intangible intensity reduce earnings quality for several reasons. An intangible-intensive firm is likely to display high volatility in its revenues and cash flows because intangible investments carry higher uncertainty about future benefits than do tangible investments (Kothari et al., 2002). Furthermore, relative to material-intensive firms, intangible-intensive firms are more likely to have growth options, whose values and changes in values are typically not recognized in the balance sheet and income statement (Smith and Watts, 1992; Watts, 2003; Roychowdhury and Watts, 2007; Skinner, 2008). Similarly, firms generally expense their investments in internally generated intangibles as incurred, except for industry-specific practices (e.g., SOP 98-1 [AICPA 1998] for software firms). An immediate expensing of intangible investments, irrespective of when their associated benefits materialize, should increase the volatility in expenses and reduce the matching between concurrent revenues and expenses. The increased revenue and expense volatilities, compounded by the decline in matching, should increase the volatility in earnings. But volatile earnings are less informative for predicting a firm's future fundamentals (Dichev and Tang, 2009; Barton et al., 2010). Thus, intangible-intensive firms should display less earnings relevance. As expected, I find a strong and negative association between intangible intensity and average EQ measures (volatility, relevance, and matching).

I next examine whether the temporal trends in intangible intensity and EQ measures encompass all firms. I find that an increasing percentage of "new" firms, i.e., those listed after 1970 (Fama and French, 2004), enter knowledge-intensive industries such as business services, communications, pharmaceuticals, healthcare, and computers. These industries mainly transform "information from one pattern into another," unlike material-intensive industries that transform "matter and energy from one form into another" (Apte et al., 2008, p. 15). Thus, knowledge-intensive industries need a higher proportion of intangible inputs in their production functions than do material-intensive industries. Consistent with this idea, successive cohorts of new firms show increasing intangible intensity. In contrast, "seasoned" firms (those listed before 1970) continue to operate in material-intensive industries, such as textiles, utilities, aircraft, steel, and railroads. Following Fama and French (2004), these findings show that seasoned firms continue to pursue businesses that have reached the mature phases of their lifecycles (Anthony and Ramesh, 1992; Jovanovic and MacDonald, 1994).[2] In such phases, firms tend not to radically change their production functions unless breakthroughs in production technology occur (Hambrick, 1983; Chen et al., 2010). Consistent with this concept, increases in average intangible intensity over time mainly reflect the increasing intangible intensity of the successive cohorts of new firms rather than increasing intangible usage by seasoned firms.

In addition, I find that the average EQ measures of the firm population exhibit a declining trend. More important, successive cohorts of new firms display declining EQ measures despite controls for overall time trends. I investigate these trends by dividing the firm population into seasoned-firm and new-firm segments. The number of firms in the new-firm segment increases and its average EQ measures decline with the arrival of each new listing cohort. As a result, the average EQ measures of the new-firm segment decline more rapidly than those of the seasoned-firm segment. The average earnings relevance (the adjusted-R^2 of the regression of annual stock returns on levels of, and changes in, annual earnings) of the new-firm segment declines from 20.4% to just 2.6% from the period 1970–1974 to the period 2005–2009. This decline shows that the earnings of new firms no longer explain the variation in their stock returns in any economically significant way. In comparison, the average earnings relevance for seasoned firms declines less dramatically, from 20.1% to 14.4%. Further, for the new-firm segment, the average matching, measured by the concurrent revenue–expense association (Dichev and Tang, 2008), declines from 1.05 to just 0.59. This decline shows that a significant portion of the new firms' outlays are now expensed before recognition of the associated revenues. In comparison, the average revenue–expense matching of the seasoned-firm segment declines by much less, from 1.05 to 0.94. Similarly, the average earnings volatility of the new-firm segment increases more sharply. As a result, at the end of the study period, relative to the seasoned-firm segment, the new-firm segment's average earnings relevance is 82% lower, matching is 37% lower, and earnings volatility is 476% higher.

Because new firms have lower EQ measures than seasoned firms, the addition of new firms to the firm population should lower overall average EQ measures. I quantify this effect by disaggregating the changes in average EQ measures over the sample period of 1970 to 2009 into new-list and seasoned-firm effects. The seasoned-firm effect reflects the decline in

[2] Fama and French (2004) find seasoned firms to be relatively large firms with high survival rates and stable profits, but low growth prospects.

average EQ measures with no new firms joining the firm sample. The new-list effect is the change in average EQ measures that results from of the addition of new firms. I measure the new-list effect by the difference between the average EQ measures of the new- and seasoned-firm segments multiplied by the increases in the percentage of new firms in the firm population. I find that the new-list effect contributes as much as 73.9%, 80.0%, and 92.9% to the changes in average relevance, matching, and volatility, respectively, from the period 1970–1974 to the period 2005–2009. Hence, I show that the bulk of the changes in EQ measures over the last 40 years is due to the assimilation of newly listed firms into the firm population and not to changes in the EQ measures of existing firms. This is my main contribution to the literature.

In addition, I find that the biggest factor behind the new-list effect is the widening gap between the intangible intensities of the new- and seasoned-firm segments. Thus, changes in GAAP cannot be the main reason for the observed decline in earnings quality because the standards that require immediate expensing of in-house intangible investments have existed since the early 1970s.[3] Nevertheless, to control for changes in GAAP, I estimate trends in the properties of earnings by using the cash components of revenues, expenses, and earnings, which should be less affected by changes in GAAP (Dichev and Tang, 2008).[4] I find trends similar to those based on the accounting numbers. For example, successive firm cohorts display increasing volatility in operating cash flows, reflective of their increasing business risks (Fama and French, 2004). Hence, I conclude that the observed changes in average EQ measures have more to do with changes in average firm characteristics than with changes in GAAP. With this finding, I also contribute to the debate on whether the decline in earnings relevance over time is associated with increases in intangibles [Collins et al. (1997, p. 42) versus Francis and Schipper (1999, p. 321)]. I find a strong association between these two trends. However, I offer a more nuanced interpretation. I show that this phenomenon represents a shift in the firm population toward intangible-intensive firms due to new listings, rather than a general increase in the intangible intensity of all firms.

My findings differ from the literature in several respects. For example, I find that most of the observed declines in earnings relevance and matching reflect changes in the sample of firms. In contrast, Lev and Zarowin (1999, p. 358) and Dichev and Tang (2008, p. 1426), who also examine changing samples, conclude that the decline in average EQ measures is unrelated to the changes in their sample firms. Furthermore, my finding that the average matching and the volatility of core costs (McVay, 2006) have significantly changed over time differs from that of Donelson et al. (2011, p. 950). Additionally, I extend Givoly and Hayn (2000, p. 313) and Dichev and Tang (2008, p. 1452) by showing that the increase in the volatility of operating cash flows over time is a significant factor in the increase in earnings volatility. The differences between my study and the literature arise because I include firms listed in the 1990s and the first decade of the 2000s, whereas previous studies largely exclude those firms. These new firms make up three-quarters of the listed firm population today, use large amounts of intangible inputs, and display significantly lower EQ measures than do seasoned firms.

The rest of the paper proceeds as follows. Section 2 summarizes the literature and presents the hypotheses. Section 3 describes the sample selection, the measurement of the variables, and the correlational tests. Section 4 describes the tests of the hypotheses and examines the factors that cause the new-list effect. Section 5 presents concluding remarks.

2. Prior research, theory, and motivation of hypotheses

2.1. Prior research

Dechow et al. (2010) summarize the research on the changes in the properties of earnings over time. A brief summary of that research follows. Lev and Zarowin (1999) and Collins et al. (1997) document a decline in the relevance of earnings; Givoly and Hayn (2000) and Dichev and Tang (2008) find increases in the volatility of earnings; and Dichev and Tang (2008) find a decline in the matching of concurrent revenues and expenses. These studies interpret such trends as a decline in the quality of earnings.

However, the literature disagrees on whether it is changes in the real economy or changes in GAAP that have caused the declines in earnings quality. For example, Lev and Zarowin (1999, p. 358) conclude that "the declining returns-earnings association is not the result of new firms joining the sample." Similarly, Dichev and Tang (2008, p. 1426) find that the decline in matching is not driven by changes in the industry composition of the firm population, the characteristics of the sample firms, or the real economy. Also, Francis and Schipper (1999, p. 321) find no difference between the levels of, or changes in, the earnings relevance of high- and low-technology firms. In contrast, Collins et al. (1997, p. 59) find that the decline in earnings relevance is related to increases in the percentage of intangible-intensive industries. Additionally, Donelson et al. (2011) conclude that the decline in matching is related to the increases in special items that arise from both economic developments and changes in GAAP.

However, none of these studies includes firms listed in the late 1990s and the first decade of the 2000s, which now constitute a significant portion of the listed firm population (details described in Section 3). Thus, I reexamine changes in the

[3] SFAS No. 2 (FASB, 1974) requires an immediate expensing of R&D outlays. Some subsequent changes include a modification in the rule for reporting advertising expenses (Heitzman et al., 2010). In addition, SOP 98-1 (AICPA 1998) permits the selective capitalization of software-development costs, which should reduce reported R&D expenses. I find similar results by excluding advertising expenses and software firms.

[4] For example, the cash received from revenue transactions is less affected by changes in revenue recognition standards than are reported revenues (Altamuro et al., 2005).

properties of earnings by using more recent time-series data than do most prior studies. I respond to Dechow et al. (2010, p. 345), who call for more research on "how fundamental performance affects earnings quality." I also respond to Collins et al. (1997, p. 65), who call for an investigation into the effects of changes in industry composition and the resultant variation in the properties of earnings.

2.2. Changes in economic conditions over time

From the latter part of the twentieth century to the outset of the twenty-first century, the United States has moved from being an industrial economy to becoming a knowledge and services economy (Baumol and Schramm, 2010). Consequently, the demand for informational products has replaced the demand for many physical products (Shapiro and Varian, 1998). The literature offers probable reasons for the increases in the service and knowledge sectors of the U.S. economy. On a conceptual level, Keynes (1930) forecasted that technological improvements and rising productivities would lead to everyone experiencing more fun, leisure, and pleasure. Since Keynes's prediction, technological and agricultural productivities have improved significantly (Clark, 2010). As a result, the relative prices of basic goods have declined by two-thirds during the twentieth century (Zanias, 2005). In addition, Aguiar and Hurst (2007) find significant increases in leisure hours since 1965. Because of these developments, the demand for knowledge products and services has increased at a faster rate than the demand for physical products (Apte et al., 2008).

Further, while the United States built comparative advantages in the industrial sector through much of the twentieth century, these advantages had largely eroded by the dawn of the twenty-first century (Sachs and Schatz, 1994). In contrast, over the last few decades, the United States has built comparative advantages through innovation, ideas, knowledge, and competencies (Crescenzi et al., 2007; Bartram et al., 2012). The use of knowledge has also expanded because of increases in economies of scale and scope that have resulted from greater globalization (Romer, 1986; Jones and Romer, 2010). Technological developments have aided the growth of knowledge businesses by reducing consumers' search costs (Bakos, 1997), by facilitating instantaneous and low-cost delivery of knowledge products to remote customers (Spohrer and Engelbart, 2004), and by enabling a quicker assimilation of existing knowledge products into the creation of new knowledge products (Shapiro and Varian, 1998).

Apte et al. (2008) quantify the temporal increases in U.S. firms' intangible inputs by dividing the U.S. economy into two distinct domains. The first is the material domain, which transforms "matter and energy from one form into another." The second is the knowledge domain, which transforms "information from one pattern into another." Apte et al. (2008) show that the share of U.S. gross domestic product (GDP) deriving from the material domain declined from 71% in 1958 to 37% in 1997. Over this period, the economic share of the knowledge domain increased to 63% of U.S. GDP.

Furthermore, using macro-level indicators, Corrado and Hulten (2010) estimate aggregate expenditures in innovation, marketing, customer support, human capital, computerized data and algorithms, and organizational development by U.S. firms. They refer to these expenditures as "investments." They argue that savings occur when resources are used to provide future, not current, benefits. They estimate that U.S. firms' annual intangible investments more than doubled from 5.9% of U.S. GDP in the early 1970s to 11.3% by the end of the first decade of the 2000s.

2.3. Motivation for H1: successive cohorts' increasing knowledge intensity

Because knowledge-intensive firms mainly transform information from one pattern to another (Apte et al., 2008), the creation of knowledge products should require a higher proportion of intangible inputs, such as R&D, expert human capital, databases, and information technology, relative to the manufacture of physical goods. Analogously, knowledge production should consume fewer material inputs. Further, an increasing percentage of new firms coevolving with economic trends are likely to pursue knowledge-based businesses. Thus, successive cohorts of listed firms should use an increasing percentage of intangible inputs in their production functions.

To the extent that seasoned firms continue to pursue mature industrial businesses, they are unlikely to radically change their production functions (Hambrick, 1983; Fama and French, 2004; Chen et al., 2010).[5] Specifically, these firms are unlikely to significantly reduce their materials and energy usage unless breakthroughs in production technologies occur.[6] However, seasoned firms might exploit IT developments to increase their intangible intensity (Porter, 1985). Whether seasoned firms increase their intangible intensity and whether these increases are sufficient to keep pace with the increasing intangible intensity of the successive cohorts of new firms remain empirical questions.

[5] In the mature phases of an industry's lifecycle, the marketplace becomes relatively stable and firms avoid sudden, large moves to keep the beneficial status quo (Chen et al., 2010).

[6] Outsourcing of production activities merely replaces one form of product costs [in-house cost of goods sold (COGS)] with another (purchased COGS). For example, Ford has progressively increased outsourcing and has increased its focus on product design, brands, and customer relationships (Lev, 2001). Yet its COGS to total expense ratio has changed little—from 84.6% in 1970 to 82.9% in 2009. Contrast these COGS ratios against those of knowledge firms: Pfizer and Microsoft have average COGS ratios of just 31.9% and 19.1%, respectively.

I use SG&A intensity as a proxy for intangible intensity because firms typically expense in-house intangible expenditures through SG&A accounts (Banker et al., 2011; Eisfeldt and Papanikolaou, 2013).[7] I also use R&D expenditures and market-to-book ratios as additional proxies for intangible intensity (Francis and Schipper, 1999). Thus, I hypothesize the following:

H1A. Successive cohorts of new firms exhibit increasing SG&A intensities.

Intangible expenditures can generate benefits in the future (Lev and Sougiannis, 1996; Ittner and Larcker, 1998; Brynjolfsson and Hitt, 2000). Yet these outlays are typically expensed as incurred and are reported as SG&A expenses (Banker et al., 2011). This immediate expensing of intangible outlays should lower the correlation between SG&A expenses and current revenues. Further, increases in immediately expensed intangible outlays, to the extent that they are sporadically incurred, should increase year-to-year volatility in SG&A expenses. This effect is similar to increases in expense volatilities if property, plant, and equipment (PP&E) outlays were immediately expensed. This discussion leads to two hypotheses:

H1B. Successive cohorts of new firms exhibit decreasing matching between concurrent SG&A expenses and revenues.

H1C. Successive cohorts of new firms exhibit increasing volatility in SG&A expenses.

2.4. Motivation for H2: successive cohorts' decreasing EQ measures

At least two economic developments in the U.S. business environment should reduce average EQ measures. The first is the increase in business competitiveness and uncertainty (Irvine and Pontiff, 2005). This development increases firms' idiosyncratic stock-return volatilities and lowers firms' survival rates (Campbell et al., 2001; Fama and French, 2004). This development should also increase special items because of more frequent asset impairments, restructuring, and gains or losses from asset sales (Donelson et al., 2011). Increases in special items should reduce EQ measures for the following reasons. Special items are less correlated with current revenues than are other expenses, thus reduce matching (Donelson et al., 2011). Moreover, special items are less persistent than other earnings components, thus they increase the volatility of earnings (Fairfield et al., 1996; Givoly and Hayn, 2000; Jones and Smith, 2011). The resulting increase in volatility should lower the relevance of earnings (Elliott and Hanna, 1996).

The other significant development in the U.S. economy is the increase in firms' intangible usage. This development is likely to change EQ measures by affecting firms' business performance and their financial reports. As discussed in Section 2.3, the immediate expensing of intangible outlays intended to produce future revenues should reduce matching. In addition, any year-to-year fluctuations in intangible investments should increase the volatility of earnings because current revenues might not increase or decrease with investments. Further, intangible-intensive firms should exhibit high earnings volatility because their investments carry high uncertainty about future benefits (Kothari et al., 2002). The resultant increases in earnings volatility should reduce investors' ability to project a firm's future performance (Barton et al., 2010), thereby reducing the relevance of earnings. Furthermore, relative to material-intensive firms that typically have assets-in-place, which are recognized in financial reports, intangible-intensive firms are likely to have a higher proportion of growth options, which are not recognized in financial statements unless they are purchased (Smith and Watts, 1992; Watts, 2003; Skinner, 2008). Specifically, the values and the changes in values of growth options are typically not recognized in the balance sheet and the income statement (Roychowdhury and Watts, 2007). Therefore, intangible-intensive firms are likely to exhibit lower earnings relevance than material-intensive firms.

Because I expect successive cohorts of new firms to show increasing intangible intensity, I hypothesize the following:

H2A. Successive cohorts of new firms exhibit decreasing matching between concurrent revenues and expenses.

H2B. Successive cohorts of new firms exhibit increasing volatility in earnings.

H2C. Successive cohorts of new firms exhibit decreasing relevance of earnings.

3. Sample selection, measurement of key variables, and correlational tests

I use 189,608 firm-year observations with valid data from the years 1970 through 2009. I exclude all finance firms because the traditional cost classifications, i.e., cost of goods sold (COGS) versus SG&A, do not apply to these firms. In addition, I exclude the industry categorized as “almost nothing” in the Fama–French classification (Fama and French, 1997), as it is difficult to interpret its results in an industry context. Thus, I exclude the Fama–French industries identified by numbers 44–47 (representing finance firms) and 48 (representing “almost nothing”), which leaves 43 industries. The first year in which a firm's data are available in Compustat is referred to as the “listing year.”[8] All of the firms with a listing year before 1970 are classified as “seasoned firms” (Fama and French, 2004). The remaining firms are classified as “new firms.” All of the cohorts listed in a common decade are referred to as a “wave” of new firms (Brown and Kapadia, 2007).

[7] The measurement of SG&A intensity is described in Section 3.2.1.

[8] Alternatively, I could use the first year of data availability in the Center for Research in Security Prices (CRSP) as the listing year. I find qualitatively similar results using CRSP-based listing years. I opt to use the listing year based on Compustat data availability to align my sample with the empirical tests.

Table 1
The number of firm-year observations from the successive listing cohorts in each year.

This table presents the number of firm-year observations from the successive listing cohorts in each year from 1970 to 2009. All of the firms are divided into five listing cohorts in the following steps. The first year in which a firm's data are available in Compustat is referred to as the "listing year." All of the firms with a listing year before 1970 are classified as "seasoned firms." The remaining firms are classified as "new firms." All of the cohorts listed in a common decade are referred to as a "wave" of new firms. Consequently, all of the firms are divided into seasoned firms or a wave from the 1970s, 1980s, 1990s, or 2000s.

Fiscal year	Total number of firms	Seasoned firms	New firms			
			1970s wave	1980s wave	1990s wave	2000s wave
1970	2,470	**2,304**	166			
1971	2,786	2,263	523			
1972	2,975	2,219	756			
1973	3,121	2,169	952			
1974	3,206	2,108	1,098			
1975	3,213	2,051	1,162			
1976	3,214	1,977	1,237			
1977	3,105	1,886	1,219			
1978	3,051	1,806	1,245			
1979	3,247	1,731	**1,516**			
1980	3,510	1,657	1,413	440		
1981	3,656	1,587	1,336	733		
1982	4,109	1,533	1,264	1,312		
1983	4,273	1,428	1,160	1,685		
1984	4,396	1,348	1,046	2,002		
1985	4,526	1,257	978	2,291		
1986	4,544	1,186	900	2,458		
1987	4,661	1,098	822	2,741		
1988	4,629	1,024	760	2,845		
1989	4,636	970	705	**2,961**		
1990	4,684	944	667	2,712	361	
1991	4,868	935	650	2,538	745	
1992	5,098	921	636	2,371	1,170	
1993	5,319	905	602	2,159	1,653	
1994	5,713	873	578	1,986	2,276	
1995	6,166	847	555	1,877	2,887	
1996	6,593	813	539	1,913	3,328	
1997	6,578	757	502	1,783	3,536	
1998	6,635	705	461	1,629	3,840	
1999	6,500	651	417	1,506	**3,926**	
2000	6,347	605	393	1,384	3,495	470
2001	6,399	586	366	1,286	3,185	976
2002	6,183	561	351	1,190	2,839	1,242
2003	6,076	546	328	1,121	2,622	1,459
2004	5,852	524	311	1,037	2,407	1,573
2005	5,755	510	296	956	2,201	1,792
2006	5,597	472	276	882	1,989	1,978
2007	5,482	455	267	822	1,813	2,125
2008	5,344	443	257	791	1,677	2,176
2009	5,091	431	242	735	1,555	**2,128**
Percentage of firms that survived in 2009 from the last year of formation of that listing cohort (highlighted in bold letters)						
		18.71	15.96	27.10	44.49	100.00
Breakdown by listing cohorts in 2009						
Numerical proportion (%)		8.47	4.75	14.44	30.54	41.80
Market capitalization (%)		25.92	7.91	17.72	24.40	24.06

Consequently, all of the firms are divided into seasoned firms or a wave from the 1970s, 1980s, 1990s, or 2000s. Table 1 shows the annual distribution of firm-year observations by waves.

3.1. Changes in the composition of the Compustat firm population

The firm population refers to firms with valid data in Compustat.[9] Table 1 describes how the firm population changed during the 40-year study period. In 1970, there were 2,470 firms. From 1970 to 1997, the firm population increased to 6,578, at a compounded annual growth rate of 3.6%. The firm population declined thereafter to 5,091 in 2009.

[9] For reasons discussed in Section 3.2, each firm-year observation requires data on assets; earnings; revenues from the previous two years, the current year, and the next year; and stock-price data from the end of the previous and current years.

Before 1970, the firm population consisted entirely of seasoned firms, by definition. At the end of 2009, the percentage of seasoned firms stood at just 8.5%, respectively. Thus, from 1970 to 2009, the dominant firm-population segment changed from the seasoned-firm segment to the new-firm segment. Therefore, the changes in the average EQ measures over time should be related to changes in the sample of firms if EQ measures differ for seasoned and new firms.

3.2. Measurement of variables

3.2.1. SG&A intensity

Following Dichev and Tang (2008), I first calculate "total expenses" by subtracting income before extraordinary items (Compustat IB) from revenues (Compustat SALES). I measure COGS and SG&A expenses by the Compustat data items COGS and XSGA, respectively. Consistent with McVay (2006), I refer to the sum of COGS and SG&A as "core expenses." I call the other expenses "noncore." I calculate the relative proportions of the three types of expenses (COGS, SG&A, and noncore expenses) for each firm-year by dividing them by that firm-year's total expenses and refer to them as "SG&A intensity," "COGS intensity," and "noncore intensity," respectively.

3.2.2. Volatility of SG&A expenses, total expenses, revenues, and earnings

Following Givoly and Hayn (2000, p. 313) and Dichev and Tang (2008, p. 1441), I scale SG&A expenses, revenues, total expenses, and earnings by the average of the beginning and ending total assets. I then estimate the standard deviations of these variables for each firm-year using four rolling annual observations ($t-2$ through $t+1$).[10]

3.2.3. Matching

Following Dichev and Tang (2008, Table 3, p. 1436), I estimate the following regression on an annual cross-sectional basis for each wave-year:

$$Revenues_{i,t} = \beta_{1,t} + \beta_{2,t} \times TotalExpenses_{i,t-1} + \beta_{3,t} \times TotalExpenses_{i,t} + \beta_{4,t} \times TotalExpenses_{i,t+1} + \varepsilon_{i,t} \quad (1)$$

I scale all of the variables by average total assets. I measure "matching" by the regression coefficient on the contemporaneous expenses (β_3), which represents the contemporaneous revenue–expense correlation. I measure the "forward association" by the coefficient on past expenses (β_2) that represents the correlation between expenses and future revenues.

Similarly, I measure the matching of SG&A expenses by β_4 in the following equation:

$$Revenue_{i,t} = \beta_1 + \beta_2 \times TotalExpense_{i,t-1} + \beta_3 \times COGS_{i,t} + \beta_4 \times SG\&A_{i,t} + \beta_5 \times NoncoreExpenses_{i,t} + \beta_6 \times TotalExpenses_{i,t+1} + \varepsilon_{i,t} \quad (2)$$

3.2.4. Relevance

Consistent with Easton and Harris (1991, Table 3, p. 31), I estimate the following regression on an annual cross-sectional basis for each wave-year:

$$Ret_{i,t} = \beta_{1,t} + \beta_{2,t} \times \Delta Earnings_{i,t} + \beta_{3,t} \times Earnings_{i,t} + \varepsilon_{i,t} \quad (3)$$

These variables are defined in Appendix A. I measure the "relevance" of earnings by the adjusted R-square of the above regression.

3.3. Industry analysis

Before testing the hypotheses, I examine the principal ideas that underlie H1 and H2. Specifically, I examine whether successive firm cohorts pursue more knowledge-intensive businesses and whether EQ measures decline with intangible intensity. These tests also respond to Collins et al. (1997, p. 65), who call for an investigation into the effects over time of changes in the industry composition of the listed firm population.

3.3.1. Changes in industry composition

I assign "wave-order" values of 1 to seasoned firms and 2, 3, 4, and 5 to firms from the 1970s, 1980s, 1990, and 2000s waves, respectively. For example, firms listed in 1955 and 2006 are assigned wave-order values of 1 and 5, respectively. I categorize all of the firms by the Fama–French 48-industry classification. I calculate an industry's "recency" by averaging the wave-order values of all of its pooled firm-year observations from 1970 to 2009. Therefore, an industry with observations only from the seasoned-firm category has a recency of 1. Similarly, an industry with observations only from firms from 2000s wave has a recency of 5. Thus, an industry's recency ranges from 1 to 5—the higher the recency, the higher is the proportion of firm-year observations coming from the most recent waves.

[10] Using this method ($t-2$ through $t+1$) instead of using observations ($t-3$ through t) makes the data requirements consistent with those of Eq. (1). Nevertheless, I lose the first observation of each wave because I do not have asset data for year $t-3$ to estimate the average total assets for the year $t-2$.

I sort the industries by the highest to lowest values of recency and present them in Panel A of Table 2. This table shows that the ten industries with the highest recency are pharmaceuticals (recency of 3.48), business services (3.34), gold and precious metals (3.30), healthcare (3.24), medical equipment (3.14), communication (3.10), computers (3.09), entertainment (3.01), electronic equipment (2.85), and personal services (2.85). All of these industries are innovation and knowledge intensive except for the gold and precious metals industry. The ten industries with the lowest recency are utilities (1.49), aircraft (1.73), tobacco products (1.85), shipbuilding and railroad equipment (1.87), textiles (1.92), shipping containers (1.93), business supplies (1.94), construction materials (1.97), food products (2.05), and steel (2.10).

Panel A of Table 2 also shows the average attributes of each industry based on all of its pooled firm-year observations from 1970 to 2009. For expositional purposes, I highlight the five industries with the highest (lowest) values in each attribute by using bold (bold italic) letters. This panel shows that in general, industries with the highest recency have the highest market-to-book ratios and SG&A intensity. Furthermore, in unreported tests, I find that each new wave of firms exhibits higher growth and higher stock-return volatility than its predecessors (Brown and Kapadia, 2007). In contrast, I find seasoned firms to be relatively large firms with low growth (Fama and French, 2004). Taken together, the results show that new firms increasingly pursue evolving, knowledge-intensive businesses but seasoned firms largely continue to operate in mature, material-intensive industries.

3.3.2. Correlational tests

Panel B of Table 2 presents the Pearson and Spearman's rank correlations among the average attributes of the industries. These correlations support the principal ideas underlying this study. First, SG&A intensity is negatively correlated with matching (correlation coefficient of -0.640 and significant at a p-value <0.01) but positively correlated with forward association (results not reported). These correlations are consistent with the idea that intangible investments are often immediately expensed and reported in the SG&A category of expenses. Second, SG&A intensity is strongly correlated with the market-to-book ratio (correlation coefficient of 0.787 and significant at a p-value <0.01). This correlation indicates that a measure based on SG&A expenses is consistent with a widely used measure of intangible intensity. Third, SG&A intensity is negatively correlated with relevance (correlation coefficient of -0.360 and significant at a p-value of 0.02) and positively correlated with earnings volatility (correlation coefficient of 0.732 and significant at a p-value <0.01). These correlations indicate that the immediate expensing of investment outlays reduces the three EQ measures. Also, the correlations among the EQ measures indicate that relevance improves with matching (correlation coefficient of 0.463 and significant at a p-value <0.01) but declines with earnings volatility (correlation coefficient of -0.512 and significant at a p-value <0.01).

Other correlations provide preliminary support for my hypotheses. Recency is positively correlated with both SG&A intensity and the market-to-book ratio (correlation coefficients of 0.652 and 0.756, respectively, and both significant at a p-value <0.01). Consistent with H1A, which posits that successive firm cohorts exhibit increasing SG&A intensities, these correlations indicate that industries with more recently listed firms exhibit higher intangible intensity. Also, recency is negatively and positively correlated with SG&A matching and volatility, respectively (correlation coefficients of -0.408 and 0.774 and both significant at a p-value <0.01). These correlations show that industries with more recently listed firms have lower SG&A matching but higher SG&A volatility, consistent with hypotheses H1B and H1C, respectively. In addition, recency is negatively correlated with matching and relevance (correlation coefficients of -0.710 and -0.459, respectively, and both significant at a p-value <0.01) and positively correlated with earnings volatility (correlation coefficient of 0.834 and significant at a p-value <0.01). These correlations indicate that industries with recently listed firms exhibit low EQ measures, which is consistent with H2A, H2B, and H2C.

4. Tests of hypotheses

4.1. H1A: successive waves' increasing SG&A intensity

I first calculate the cross-sectional average of SG&A intensity by wave-year. This calculation results in 140 wave-year averages made up of 40 annual observations for the seasoned-firm category (1970–2009) and 40 (1970–2009), 30 (1980–2009), 20 (1990–2009), and ten (2000–2009) annual observations for the 1970s, 1980s, 1990s, 2000s waves, respectively. I then calculate the overall average of the annual wave-year averages for each wave. The first column of Panel A in Table 3 shows that average SG&A intensities for seasoned firms and for the 1970s, 1980s, 1990s, and 2000s waves are 16.2%, 21.8%, 29.5%, 29.5%, and 38.3%, respectively. This pattern indicates increasing intangible intensity across successive cohorts of listed firms. Because COGS and SG&A constitute approximately 89% of the firms' total costs, I find opposite patterns for COGS intensity. Specifically, the second column of Panel A in Table 3 shows decreasing COGS intensities of 72.9%, 67.3%, 58.9%, 58.6%, and 47.9%, respectively, indicating decreasing material intensity.[11]

Nevertheless, the above averages might not be comparable across waves because they are calculated over different periods. Thus, the above patterns could simply represent overall time trends. For example, the average for the 2000s wave is calculated using only ten wave-year observations. In contrast, the average for the seasoned firms is calculated using 40

[11] COGS represent the costs of procurements of goods or the costs of direct and indirect labor, material, and energy required for the production of goods.

Table 2
Cross-sectional analysis: intangible intensity; recency; selling, general, and administrative expenses (SG&A) attributes; and earnings quality by Fama–French 48-industry classification.

All of the firms are classified by the Fama–French 48-industry method. Four industries representing the finance firms and one "almost nothing" category are excluded. Panel A presents the average attributes of each industry calculated by using all of the pooled observations from that industry from 1970 to 2009. These attributes are calculated by using the methods described in Appendix A. The top (bottom) five industries for each attribute are highlighted in bold (bold italic) letters. All of the industries are sorted by the highest to lowest values of recency, which is calculated in the following steps. First, the firms listed before 1970 and the firms listed in the 1970s, 1980s, 1990s, and the first decade of 2000s are assigned the "wave-order" values of 1, 2, 3, 4, and 5, respectively. Then, an industry's "recency" is calculated by averaging the wave-order values of all of its pooled firm-year observations. The higher the recency, the higher is the percentage of firm-year observations from the most recently listed firms.

Panel A: The average attributes of industries

Fama–French industry code		Composition	Intangibles	SG&A attributes			Earning quality measures		
	Industry name	Recency	Market-to-book Ratio	Intensity (%)	Matching	Volatility	Earnings volatility	Matching	Relevance (%)
13	Pharmaceutical Products	**3.48**	**4.25**	35.88	0.32	**0.13**	**0.26**	***0.33***	***1.39***
34	Business services	**3.34**	**2.81**	35.54	0.48	0.09	**0.19**	0.80	2.59
27	Gold and precious metals	**3.30**	**2.80**	**37.56**	***−0.11***	**0.39**	**0.23**	***0.11***	***0.64***
11	Healthcare	**3.24**	1.97	20.86	0.66	0.06	0.11	0.82	3.61
12	Medical equipment	**3.15**	**3.24**	**45.23**	0.31	**0.12**	**0.18**	0.64	1.87
32	Communication	3.10	2.09	22.24	0.34	0.09	0.13	***0.60***	2.65
35	Computers	3.09	2.59	**37.35**	0.41	0.08	0.18	0.78	4.00
7	Entertainment	3.01	2.03	21.16	***0.11***	0.12	0.14	0.84	2.43
36	Electronic equipment	2.85	2.15	30.42	0.38	0.05	0.12	0.88	3.31
33	Personal services	2.85	1.88	26.10	0.90	0.04	0.06	0.90	5.12
30	Petroleum and natural gas	2.83	1.93	20.98	***−0.02***	**0.12**	0.13	0.72	2.93
29	Coal	2.83	1.47	12.35	0.39	0.05	0.07	0.95	4.56
3	Candy and soda	2.72	2.05	28.53	0.92	0.03	0.11	0.93	4.20
37	Measuring and control eqp	2.70	2.24	**37.78**	0.48	0.05	0.12	0.85	3.94
43	Restaurants, hotels	2.65	1.61	13.50	0.79	0.04	0.06	0.87	3.58
40	Transportation	2.58	1.43	***9.43***	0.69	0.03	0.05	0.94	2.72
28	Mining	2.55	**2.75**	**39.14**	***−0.09***	**0.33**	**0.21**	***0.26***	***0.79***
1	Agriculture	2.54	1.70	20.50	0.89	0.05	0.08	0.94	**10.14**
6	Recreation	2.50	1.85	28.80	0.17	0.05	0.14	0.95	1.90
41	Wholesale	2.49	1.60	19.87	0.67	0.04	0.08	0.98	2.74
42	Retail	2.46	1.56	25.31	0.94	0.02	0.05	0.97	6.05
18	Construction	2.42	1.34	12.78	0.79	0.04	0.06	**1.02**	3.68
22	Electrical equipment	2.37	2.03	26.29	0.23	0.05	0.10	0.88	3.15
26	Defense	2.36	1.92	16.05	**1.03**	0.04	0.07	**1.12**	9.51
4	Beer and liquor	2.34	1.86	27.64	0.86	0.03	***0.04***	***0.57***	5.93
15	Rubber and plastic	2.33	1.50	20.55	0.78	0.03	0.06	0.95	5.38
14	Chemicals	2.32	2.11	23.18	0.21	0.04	0.09	0.84	2.33
21	Machinery	2.30	1.87	25.27	0.15	0.04	0.10	0.95	***1.54***
20	Fabricated products	2.27	***1.17***	16.58	0.94	0.05	0.05	1.02	**17.36**
8	Printing and publishing	2.20	1.73	31.85	0.77	0.04	0.05	0.82	6.25
23	Automobiles and trucks	2.20	1.64	13.94	0.21	0.03	0.07	0.94	***0.63***
10	Apparel	2.19	1.35	24.09	0.94	0.02	0.05	0.99	**12.13**
9	Consumer goods	2.13	1.67	30.61	**0.97**	0.04	0.06	1.00	7.04
19	Steel works	2.10	***1.30***	***10.68***	0.39	0.03	0.06	1.00	4.44
2	Food products	2.05	1.59	19.72	0.94	0.03	0.05	0.97	2.11
17	Construction materials	1.97	1.34	17.54	0.82	0.03	0.05	1.02	8.31
38	Business supplies	1.94	1.36	17.49	**0.99**	***0.02***	***0.04***	0.97	8.09
39	Shipping containers	1.93	1.39	***11.77***	***0.08***	***0.02***	0.06	0.98	2.82
16	Textiles	***1.92***	***1.03***	13.43	**1.01**	***0.01***	***0.04***	**1.04**	**17.78**
25	Shipbuilding railroad eqp	***1.87***	***1.26***	***10.28***	**1.04**	***0.01***	***0.05***	**1.11**	**15.49**

5	Tobacco products	***1.85***	2.22	23.35	0.69	0.04	0.06	0.83	3.45
24	Aircraft	***1.73***	1.55	15.62	0.23	0.03	0.08	**1.08**	2.48
31	Utilities	***1.49***	***1.12***	***1.01***	0.50	***0.00***	***0.01***	1.00	7.65

Correlational tests

Panel B shows the correlations among the average attributes of the 43 industries presented in Panel A.

Panel B: Correlations among industry attributes

	$N=43$	Pearson correlation							
		Composition	Intangibles	SG&A attributes			EQ measures		
Spearman rank correlation		Recency	Market-to-book ratio	Intensity	Matching	Volatility	Earnings volatility	Matching	Relevance
	Recency	–	0.756	0.652	−0.408	0.774	0.834	−0.710	−0.459
	Market-to-book ratio	0.724	–	0.787	−0.458	0.897	0.893	−0.767	−0.526
	SG&A intensity	0.577	0.811	–	−0.279	0.847	0.732	−0.640	−0.360**
	SG&A matching	−0.396	−0.484	−0.262*	–	−0.406	−0.634	0.534	0.681
	SG&A volatility	0.716	0.871	0.848	−0.452	–	0.884	−0.597	−0.503
	Earnings volatility	0.777	0.795	0.587	−0.704	0.824	–	−0.771	−0.512
	Matching	−0.725	−0.826	−0.680	0.516	−0.643	−0.604	–	0.463
	Relevance	−0.444	−0.585	−0.329**	0.802	−0.604	−0.676	0.528	–

All correlations are significant at 1% level.

* Indicates significance at the 10% level.

** Indicates significance at the 5% level.

Table 3

The cost composition and intangible intensity of the successive listing cohorts.

Panel A presents the average attributes of the successive listing cohorts. All of the firms are divided into five listing cohorts in the following steps. The first year in which a firm's data are available in Compustat is referred to as the "listing year." All of the firms with a listing year before 1970 are classified as "seasoned firms." The remaining firms are classified as "new firms." All of the cohorts listed in a common decade are referred to as a "wave" of new firms. Consequently, all of the firms are divided into seasoned firms or a wave from the 1970s, 1980s, 1990s, or 2000s. All attributes are first calculated on a wave-year basis by using the methods described in Appendix A. These methods result in 40 annual observations for the seasoned-firm category (1970–2009), 40 annual observations for the 1970s wave (1970–2009), 30 annual observations for the 1980s wave (1980–2009), 20 annual observations for the 1990s wave (1990–2009), and 10 annual observations for the 2000s wave (2000–2009) for each attribute. Volatility has one fewer observation per wave. The overall average attribute of a listing cohort is calculated by averaging all of its annual attributes.

Panel A: The average characteristics of the successive listing cohorts

	Composition of total costs			Other measures of intangible intensity		Attributes of SG&A expenses	
Listing cohort	SG&A intensity (%)	COGS intensity (%)	Noncore intensity (%)	R&D intensity (%)	Market-to-book ratio	SG&A matching	SG&A volatility
Seasoned firms	16.2	72.9	10.9	1.13	1.39	1.05	0.024
1970s wave	21.8	67.3	11.0	1.94	1.61	0.9	0.051
1980s wave	29.5	58.9	11.6	5.47	2.56	0.54	0.100
1990s wave	29.5	58.6	11.9	8.15	2.52	0.55	0.097
2000s wave	38.3	47.9	13.8	9.39	3.53	0.1	0.25

Differences in the SG&A attributes of the successive listing cohorts after controlling for overall time trends

Panel B examines whether the attributes of SG&A expenses (intensity, matching, and volatility) differ across successive listing cohorts after controlling for overall time trends. All of the firms are divided into five listing cohorts in the following steps. The first year in which a firm's data are available in Compustat is referred to as the "listing year." All of the firms with a listing year before 1970 are classified as "seasoned firms." The remaining firms are classified as "new firms." All of the cohorts listed in a common decade are referred to as a "wave" of new firms. Consequently, all of the firms are divided into seasoned firms or a wave from the 1970s, 1980s, 1990s, or 2000s. All of the SG&A attributes are calculated on a wave-year basis by using the methods described in Appendix A. Then the following regression is estimated by using 140 wave-year observations, comprising 40 annual observations for the seasoned-firm category (1970–2009), 40 annual observations for the 1970s wave (1970–2009), 30 annual observations for the 1980s wave (1980–2009), 20 annual observations for the 1990s wave (1990–2009), and ten annual observations for the 2000s wave (2000–2009). Volatility has one less observation per wave.

$$SG\&AAttribute_{Wave,year} = \beta_1 + \beta_2 \times FiscalYear + \gamma_1 \times DummyListYear1970\_79 + \gamma_2 \times DummyListYear1980\_89 + \gamma_3 \times DummyListYear1990\_99 + \gamma_4 \times DummyListYear2000\_09 + \varepsilon_{Wave,year},$$

where the dummy variables *DummyListYear1970_79*, *DummyListYear1980_89*, *DummyListYear1990_99*, and *DummyListYear2000_09* take the value of one for the wave-year observations of the 1970s, 1980s, 1990s, and 2000s waves, respectively, and zero otherwise. Because a dummy variable for the seasoned-firm observations is not included in the above regression, they form the base case.

Panel B: Differences in the SG&A attributes of the successive listing cohorts

	SG&A intensity		SG&A matching		SG&A volatility	
	Estimate	*t*-Statistic	Estimate	*t*-Statistic	Estimate	*t*-Statistic
Intercept	−1.322	−5.02***	23.318	8.15***	−1.619	−4.26***
Fiscal Year × *1,000*	0.746	5.63***	−11.192	−7.78***	0.825	4.32***
DummyListYear1970_79	0.057	16.11***	−0.151	−4.00***	0.026	5.48***
DummyListYear1980_89	0.129	34.11***	−0.451	−10.93***	0.071	13.34***
DummyListYear1990_99	0.126	28.24***	−0.389	−7.99***	0.065	10.17***
DummyListYear2000_09	0.211	36.09***	−0.776	−12.29***	0.213	24.45***
N		140		140		135
F-value		522***		88***		182***
Adjusted *R*-square (%)		94.94		75.76		87.36
F-tests		*p*-Value		*p*-Value		*p*-Value
Average Seasoned firms = *1970s wave* (γ_1)		< 0.001		0.001		< 0.001
Average 1970s wave = *1980s wave* ($\gamma_1 = \gamma_2$)		< 0.001		< 0.001		< 0.001
Average 1980s wave = *1990s wave* ($\gamma_2 = \gamma_3$)		0.417		0.189		0.315
Average 1990s wave = *2000s wave* ($\gamma_3 = \gamma_4$)		< 0.001		< 0.001		< 0.001

*** Indicates statistical significance (two-sided) at the 1% level.

wave-year observations. Thus, the seasoned-firms' average includes the earliest observations from the sample period, which are characterized by the lowest intangible usage. To control for overall time trends, I estimate the following regression, which is similar to Brown and Kapadia (2007, p. 374):

$$SG\&A - Intensity_{Wave,Year} = \beta_1 + \beta_2 \times Year + \gamma_2 \times DummyListYear1970\_79$$

$$+\gamma_3 \times DummyListYear1980\_89 + \gamma_4 \times DummyListYear1990\_99$$
$$+\gamma_5 \times DummyListYear2000\_09 + \varepsilon_{Wave,Year} \quad (4)$$

I use 140 wave-year observations to estimate this regression. The *Year* variable controls for the overall time trend. The dummy variables *DummyListYear1970_79*, *DummyListYear1980_89*, *DummyListYear1990_99*, and *DummyListYear2000_09* take the value of one for the wave-year observations of the 1970s, 1980s, 1990s, and 2000s waves, respectively, and zero otherwise. Because I do not include a dummy variable for the observations of seasoned firms, they form the base case. Hence, the coefficients on the dummy variables represent the differences between the waves' and the seasoned firms' averages after controlling for overall time trends.

The first column of Panel B in Table 3 shows that the coefficients on all of the wave dummies are positive and significant. Thus, each new cohort shows higher SG&A intensity relative to the seasoned firms. In addition, the *F*-tests on the differences in the regression coefficients of the other successive waves (that is, γ_1 versus γ_2, γ_2 versus γ_3, and γ_3 versus γ_4) suggest that each successive wave exhibits higher SG&A intensity than its predecessor. The only exception is that I do not find a significant difference between the 1980s and 1990s waves.[12]

I use Eq. (4) to test the subsequent hypotheses by using alternative dependent variables. Therefore, for brevity, I do not repeat this equation or the manner of its interpretation.

4.1.1. Additional tests using R&D and market-to-book ratios

I calculate the average R&D intensity and market-to-book ratio for each wave (formulae described in Appendix A). The fourth column of Panel A in Table 3 shows that the successive waves exhibit increasing R&D intensity of 1.13%, 1.94%, 5.47%, 8.15%, and 9.39%. Similarly, the fifth column shows that the successive waves exhibit increasing market-to-book ratios of 1.39, 1.61, 2.56, 2.52, and 3.53. These findings, along with the SG&A intensity results, provide consistent evidence that the successive waves display increasing intangible intensity.

4.2. H1B and H1C: successive waves' decreasing SG&A matching and increasing SG&A volatilities

The sixth column of Panel A in Table 3 shows that the successive waves exhibit declining SG&A matching of 1.05, 0.90, 0.54, 0.55, and 0.10. I estimate Eq. (4) to control for overall time trends and find similar results, as shown in the second column of Panel B in Table 3. Further, in unreported tests, I find a declining trend in average SG&A matching for the firm population.[13] In this respect, my results differ from those of Donelson et al. (2011), who find no temporal decline in average SG&A matching. This difference arises because Donelson et al. (2011) largely exclude new firms from their study sample.[14]

The seventh column of Panel A in Table 3 shows that successive waves have increasing SG&A volatility of 0.02, 0.05, 0.10, 0.10, and 0.25. The third column of Panel B in Table 3 shows similar trends despite controlling for overall time trends. Arguably, this increase in SG&A volatility reflects increases in one-off core costs that are expensed as incurred, such as senior executive hiring, brand launches, IT system installations, advertising campaigns, and market-research projects. As a result, the total-expense volatility shows an increasing pattern of 0.13, 0.20, 0.27, 0.27, and 0.47 (the third column of Panel A in Table 4). In this respect, my findings differ from those of Dichev and Tang (2008), who find no temporal increase in average expense volatility. However, as noted in footnote 14, Dichev and Tang (2008) also largely exclude new firms from their study.

4.3. H2A: successive waves' decreasing matching

If COGS matching is held constant, then a reduction in SG&A matching and an increase in SG&A intensity should lower the matching of total expenses. Indeed, the matching of total expenses across successive waves shows a decreasing pattern of 1.00, 0.96, 0.80, 0.77, and 0.38 (the first column of Panel A in Table 4). The first column of Panel B in Table 4 shows similar results despite controlling for overall time trends. Further, I find similar results after controlling for special items (results not reported). The forward association shows an increasing pattern (results not reported). These results, along with the H1 results, are consistent with the idea that the SG&A expense category of new firms increasingly includes immediately expensed investment outlays.

4.3.1. Additional tests using the cash components of revenues and expenses

I estimate matching in Eq. (1) by using the cash components of revenues and expenses. The second column of Panel A in Table 4 shows declining matching of 0.85, 0.83, 0.71, 0.72, and 0.44 across the successive waves. This result shows that the decline in matching of total expenses is strongly associated with developments in the underlying revenue–expense relation. In this respect, my conclusion differs from Dichev and Tang (2008), who rule out real developments as a reason for the decline in matching over time.

[12] Similarly, I find no significant differences between the 1980s and 1990s waves in most of the tests described later. For brevity, I do not repeat this point.

[13] I estimate a "trend rate" (γ_2) using 40 annual averages of the firm population and the following equation: $AverageAnnualAttribute_t = \gamma_1 + \gamma_2 \times t + \varepsilon_t$. I find a negative trend rate for SG&A matching.

[14] To examine "economically substantial firms," Dichev and Tang (2008) and Donelson et al. (2011) select a sample of one thousand firms with the largest assets. Their tests require each firm to have at least 12 years of prior data. Their selection criteria result in a sample with an average listed age of 26 years. Thus, their sample largely excludes new firms.

Table 4

The average revenue–expense matching, earnings volatility, and earnings relevance of the successive listing cohorts.

Panel A presents the average measures of earnings quality (EQ) of the successive listing cohorts. All of the firms are divided into five listing cohorts in the following steps. The first year in which a firm's data are available in Compustat is referred to as the "listing year." All of the firms with a listing year before 1970 are classified as "seasoned firms." The remaining firms are classified as "new firms." All of the cohorts listed in a common decade are referred to as a "wave" of new firms. Consequently, all of the firms are divided into seasoned firms or a wave from the 1970s, 1980s, 1990s, or 2000s. The EQ measures are first calculated on a wave-year basis by using the methods described in Appendix A. These methods result in 40 annual observations for the seasoned-firm category (1970–2009), 40 annual observations for the 1970s wave (1970–2009), 30 annual observations for the 1980s wave (1980–2009), 20 annual observations for the 1990s wave (1990–2009), and ten annual observations for the 2000s wave (2000–2009) for each attribute. Volatility has one fewer observation per wave. The overall average EQ measure of a listing cohort is calculated by averaging all of its annual estimates.

Panel A: The average earnings quality of the successive listing cohorts

Listing cohort	Matching	Matching of cash components of revenues and expenses	Expense volatility	Revenue volatility	Earnings volatility	Volatility of cash flow from operations	Earnings relevance (%)
Seasoned firms	1.00	0.85	0.13	0.14	0.03	0.06	15.26
1970s wave	0.96	0.83	0.20	0.20	0.07	0.10	10.73
1980s wave	0.80	0.71	0.27	0.22	0.15	0.18	5.00
1990s wave	0.77	0.72	0.27	0.22	0.16	0.17	4.79
2000s wave	0.38	0.44	0.47	0.25	0.37	0.38	2.41

Differences in the earnings qualities of the successive listing cohorts after controlling for overall time trends.

Panel B examines whether the measures of earnings quality (EQ) differ across successive listing cohorts after controlling for overall time trends. All of the firms are divided into five listing cohorts in the following steps. The first year in which a firm's data are available in Compustat is referred to as the "listing year." All of the firms with a listing year before 1970 are classified as "seasoned firms." The remaining firms are classified as "new firms." All of the cohorts listed in a common decade are referred to as a "wave" of new firms. Consequently, all of the firms are divided into seasoned firms or a wave from the 1970s, 1980s, 1990s, or 2000s. Matching and earnings relevance are calculated on a wave-year basis by using the methods described in Appendix A. Then, the following regression is estimated by using 140 wave-year observations, comprising 40 annual observations for the seasoned-firm category (1970–2009), 40 annual observations for the 1970s wave (1970–2009), 30 annual observations for the 1980s wave (1980–2009), 20 annual observations for the 1990s wave (1990–2009), and ten annual observations for the 2000s wave (2000–2009).

$$EQMeasure_{Wave,year} = \beta_1 + \beta_2 \times FiscalYear + \gamma_1 \times DummyListYear1970\_79 + \gamma_2 \times DummyListYear1980\_89 + \gamma_3 \times DummyListYear1990\_99 + \gamma_4 \times DummyListYear2000\_09 + \varepsilon_{Wave,year},$$

where the dummy variables *DummyListYear1970_79*, *DummyListYear1980_89*, *DummyListYear1990_99*, and *DummyListYear2000_09* take the value of one for the wave-year observations of the 1970s, 1980s, 1990s, and 2000s waves, respectively, and zero otherwise. Because a dummy variable for the seasoned-firm observations is not included in the above regression, they form the base case.

Panel B: Differences in the earnings qualities of the successive listing cohorts.

	Matching		Earnings relevance	
	Estimate	*t*-Statistic	Estimate	*t*-Statistic
Intercept	14.152	6.87***	5.971	8.17***
Fiscal Year × 1,000	−6.612	−6.38***	−2.921	−7.95***
DummyListYear1970_79	−0.039	−1.47	−0.046	−4.83***
DummyListYear1980_89	−0.163	−5.50***	−0.088	−8.58***
DummyListYear1990_99	−0.157	−4.54***	−0.073	−6.32***
DummyListYear2000_09	−0.516	−11.34**	−0.085	−5.43***
N		140		140
F-value		58***		47***
Adjusted *R*-square (%)		67.28		61.83
F-tests		*p*-Value		*p*-Value
Average seasoned firms = 1970s wave (γ_1)		0.001		< 0.001
Average 1970s wave = 1980s wave ($\gamma_1 = \gamma_2$)		< 0.001		< 0.001
Average 1980s wave = 1990s wave ($\gamma_2 = \gamma_3$)		0.872		0.199
Average 1990s wave = 2000s wave ($\gamma_3 = \gamma_4$)		< 0.001		0.478

*** and ** indicate statistical significance (two-sided) at the 1% and 5% levels, respectively.

Differences in the earnings volatilities of the successive listing cohorts after controlling for overall time trends.

Panel C examines whether the volatilities of revenues, expenses, and earnings differ across successive listing cohorts after controlling for overall time trends. All of the firms are divided into five listing cohorts in the following steps. The first year in which a firm's data are available in Compustat is referred to as the "listing year." All of the firms with a listing year before 1970 are classified as "seasoned firms." The remaining firms are classified as "new firms." All of the cohorts listed in a common decade are referred to as a "wave" of new firms. Consequently, all of the firms are divided into seasoned firms or a wave from the 1970s, 1980s, 1990s, or 2000s. Volatility is calculated on a wave-year basis by using the methods described in Appendix A. Then, the following regression is estimated by using 135 wave-year observations, comprising 40 annual observations for the seasoned-firm category (1970–2009), 39 annual observations for 1970s wave

Table 4 (*Continued*)

Table 4 (*continued*)

(1971–2009), 29 annual observations for 1980s wave (1981–2009), 19 annual observations for 1990s wave (1991–2009), and nine annual observations for 2000s wave (2001–2009):

$$Volatility_{Wave,year} = \beta_1 + \beta_2 \times FiscalYear + \gamma_1 \times DummyListYear1970\_79 + \gamma_2 \times DummyListYear1980\_89 + \gamma_3 \times DummyListYear1990\_99 + \gamma_4 \times DummyListYear2000\_09 + \varepsilon_{Wave,year},$$

where the dummy variables *DummyListYear1970_79*, *DummyListYear1980_89*, *DummyListYear1990_99*, and *DummyListYear2000_09* take the value of one for the wave-year observations of the 1970s, 1980s, 1990s, and 2000s waves, respectively, and zero otherwise. Because a dummy variable for the seasoned-firm observations is not included in the above regression, they form the base case.

Panel C: Differences in the earnings volatilities of the successive listing cohorts

	Revenue volatility		Expense volatility		Earnings volatility	
	Estimate	*t*-Statistic	Estimate	*t*-Statistic	Estimate	*t*-Statistic
Intercept	2.891	9.30***	−0.884	−1.59	−4.391	−8.17***
Fiscal Year × *1,000*	−1.382	−8.85***	0.512	1.83*	2.221	8.23***
DummyListYear1970_79	0.061	15.49***	0.067	9.59***	0.035	5.19***
DummyListYear1980_89	0.085	19.51***	0.131	16.68***	0.107	14.20***
DummyListYear1990_99	0.092	17.75***	0.128	13.79***	0.103	11.40***
DummyListYear2000_09	0.132	18.35***	0.329	25.70***	0.302	24.41***
N		135		135		135
F-value		126***		193***		223***
Adjusted *R*-square (%)		82.64		87.94		89.94
F-tests		*p*-Value		*p*-Value		*p*-Value
Average seasoned firms = 1970s wave (γ_1)		< 0.001		< 0.001		< 0.001
Average 1970s wave = 1980s wave ($\gamma_1 = \gamma_2$)		< 0.001		< 0.001		< 0.001
Average 1980s wave = 1990s wave ($\gamma_2 = \gamma_3$)		0.171		0.839		0.379
Average 1990s wave = 2000s wave ($\gamma_3 = \gamma_4$)		< 0.001		< 0.001		< 0.001

* and *** indicate statistical significance (two-sided) at the 10% and 1% levels, respectively.

4.4. H2B: successive waves' increasing earnings volatility

The successive waves exhibit increasing revenue volatilities of 0.14, 0.20, 0.22, 0.22, and 0.25 (the fourth column of Panel A in Table 4). This pattern arguably reflects increases in underlying business risks (Brown and Kapadia, 2007) or the higher uncertainty of the benefits associated with intangible investments (Kothari et al., 2002). In addition, the successive waves exhibit increasing expense volatility, as discussed in Section 4.2. These developments, along with a decline in matching, should increase earnings volatility. Specifically, earnings volatility should increase because it equals the sum of the expense and revenue volatilities minus twice their covariance. The fifth column of Panel A in Table 4 shows that the successive waves display increasing earnings volatility of 0.03, 0.07, 0.15, 0.16, and 0.37. And the last column of Panel C in Table 4 shows similar patterns despite controlling for overall time trends.

4.4.1. Additional tests on the volatility of operating cash flow

The sixth column of Panel A in Table 4 shows an increase in the volatility of operating cash flows across successive waves of 0.06, 0.10, 0.18, 0.17, and 0.38. In unreported tests, I find that more than 95% of the increase over time in average earnings volatility is explained by the increase in average cash flow volatility. This inference differs from Givoly and Hayn (2000, p. 313). Their Fig. 3, based on a constant sample of firms, shows a large increase in earnings volatility over time but shows no corresponding increase in the volatility of operating cash flows.[15] Similarly, Dichev and Tang (2008, p. 1452) find large changes in the time-series properties of earnings but no significant change in the time-series properties of operating cash flows. Thus, by examining a changing sample of firms that represent the changing firm population, my study extends both of these studies. I show that the change over time in the properties of underlying cash flows is a significant factor for the observed change in the time-series properties of earnings.

4.5. H2C: successive waves' decreasing earning relevance

Relevance is a widely employed measure of earnings quality. The correlational tests in Section 3.3.2 show that relevance improves with matching but declines with earnings volatility. Moreover, in H2A and H2B tests, I find significant declines in

[15] However, they do not test the significance of temporal changes in cash flow volatility. They find that the principal reason for the increase in earnings volatility is the increase in the volatility of non-operating accruals that results from the increase in special items.

Table 5
Disaggregation of the changes over time in the average measures of earnings quality.

This table examines the contribution of the increases in the numerical percentage of "new" firms in the firm population and their distinctive attributes to the changes over time in the average measures of earnings quality (EQ). All of the EQ measures are calculated on an annual basis for the "new-firm" and "seasoned-firm" segments by using the methods described in Appendix A. All of the firms are divided into these two segments in the following steps. The first year in which a firm's data are available in Compustat is referred to as the "listing year." All of the firms with a listing year before 1970 are classified as "seasoned firms." The remaining firms are classified as "new firms." The average EQ measure in a year should equal the weighted average of EQ measures of the new and seasoned firm segments. As described in Appendix B, the changes in average EQ measure from the early 1970s to the late 2000s should be:

$$\begin{aligned} EQ_{Population,Late2000s} - EQ_{Population,Early1970s} &= Percent_{SeasonedFirms,Early1970s} \times (EQ_{SeasonedFirms,Late2000s} - EQ_{SeasonedFirms,Early1970s}) \quad \text{[first term]} \\ &+ Percent_{NewFirms,Early1970s} \times (EQ_{NewFirms,Late2000s} - EQ_{NewFirms,Early1970s}) \quad \text{[second} - \text{A term]} \\ &+ (Percent_{NewFirms,Late2000s} - Percent_{NewFirms,Early1970s}) \times (EQ_{NewFirms,Late2000s} - EQ_{SeasonedFirms,Late2000s}), \quad \text{[second} - \text{B term]} \end{aligned}$$

where the early 1970s and the late 2000s refer to the years 1970–1974 and 2005–2009, respectively, and the percentages of the new-firm segment in the early 1970s and the late 2000s equal 24.01% and 91.53%, respectively. The "seasoned-firm effect" measures the contribution of changes in the EQ measures of the seasoned-firm segment, holding its percentage in the firm population constant at the early 1970s level. This effect is measured by the first term in the equation. The "new-list" effect represents the combined effect of the new-firm segment's distinctive EQ measures as well as its percentage increase in the firm population. The sum of the second-A term and the second-B term represents the new-list effect. The trend rate is measured by $\gamma_2 \times 1{,}000$ where γ_2 is obtained from the following regression estimated by using 40 annual observations from 1970 to 2009: $EQMeasure_t = \gamma_1 + \gamma_2 \times t + \varepsilon_t$.

	EQ measures		
	Earnings relevance	Matching	Earnings volatility
Seasoned-firm segment			
Attribute (early 1970s)	20.12%	1.049	0.022
Attribute (late 2000s)	14.40%	0.935	0.040
Percent change in attribute	−28.43	−10.84	79.21
New-firm segment			
Attribute (early 1970s)	20.42%	1.052	0.038
Attribute (late 2000s)	2.56%	0.591	0.230
Percent change in attribute	−87.44	−43.83	513.34
Percent difference in attributes of new- and seasoned-firm segments			
Early 1970s	1.47	0.32	68.34
Late 2000s	−82.19	−36.80	476.12
Trend rates			
Seasoned-firm segment	−1.83	−2.83	0.62
New-firm segment	−4.07	−13.40	5.73
Difference	−2.24	−10.57	5.11
(p-value)	(< 0.01)	(< 0.01)	(< 0.01)
Percent contribution to changes in the average attributes of the firm population			
First term (seasoned-firm effect)	26.15	20.11	7.13
Second-A term	25.78	25.78	24.59
Second-B term	48.07	54.11	68.28
New-list effect	73.85	79.89	92.87

matching and significant increases in earnings volatility for the successive waves. Therefore, not surprisingly, the seventh column of Panel A in Table 4 shows that successive waves exhibit decreasing earnings relevance of 15.26%, 10.73%, 5.00%, 4.79%, and 2.41%. The relevance of the latest wave is 84% lower than that of the seasoned firms. This result shows that the extent to which the "earnings of the reporting period reflect the information used by the market in forming prices during that period" (Easton et al., 1991, p. 120) declines with new waves.

To control for overall time trends, I estimate Eq. (4) with relevance as the dependent variable. The results presented in the second column of Panel B in Table 4 show that the 1970s wave has significantly lower relevance than the seasoned firms and that the 1980s wave has significantly lower relevance than the 1970s wave. Yet the earnings relevance measures of the last three waves (1980s, 1990s, and 2000s) do not significantly differ from each other. Nevertheless, all four waves show dramatically lower relevance than that of seasoned firms.

I also estimate a regression of stock returns on the levels of, and changes in, operating cash flows [instead of earnings in Eq. (3)]. In unreported tests, I find a declining pattern in the adjusted R-squares of the modified Eq. (3) across the successive waves. This finding suggests that the decline in relevance of the successive waves is at least partly due to the decline in the relation between stock returns and concurrent cash flows.

4.6. *Differences in trends of EQs of the new-firm and the seasoned-firm segments*

The H2 tests show that successive waves display declining EQ measures even after controlling for overall time trends. As a result, each new wave's arrival should reduce the EQ measures of the new-firm segment. Also, the EQ measures of the new-firm segment should decline faster than that of the seasoned-firm segment. Table 5 shows that for each of the three EQ measures, the magnitude of the trend rate (calculation described in footnote 13) is significantly higher for the new-firm segment than for the seasoned-firm segment. As a result, over the sample period, the new-firm segment's relevance declined from 20.4% to just 2.6%, or by 87%. The seasoned-firm segment's relevance also declined, but less dramatically, from 20.1% to 14.4%. Furthermore, the new-firm segment's matching declined from 1.05 to 0.59. In contrast, the seasoned-firm segment's matching declined much less, from 1.05 to 0.94.[16] In addition, the earnings volatility increased more significantly for the new-firm segment. Consequently, at the end of the study period, relative to the seasoned-firm segment, the new-firm segment's earnings relevance was lower by 82%, matching was lower by 37%, and earnings volatility was higher by 476%.

4.6.1. The relative contributions of the new-list and seasoned-firm effects to changes in average EQ measures

The firm populations' average EQ measure equals the weighted average of the new and seasoned firms' EQ measures:

$$EQ_{Population} = Percent_{SFirms} \times EQ_{SFirms} + (1 - Percent_{SFirms}) \times EQ_{NFirms}, \tag{5}$$

where *EQ* equals the earnings quality measure, *SFirms* equals the seasoned firms, and *NFirms* equals the new firms.

Thus, as described in Appendix B, the changes in the average EQ measures from the early 1970s (i.e., 1970–1974) to the late 2000s (i.e., 2005–2009) can be expressed as follows[17]:

$$\begin{aligned} EQ_{Population,Late2000s} - EQ_{Population,Early1970s} &= [Percent_{SFirms,Early1970s} \times (EQ_{SFirms,Late2000s} - EQ_{SFirms,Early1970s})] \\ &+ [Percent_{NFirms,Early1970s} \times (EQ_{NFirms,Late2000s} - EQ_{NFirms,Early1970s}) + (Percent_{NFirms,Late2000s} - Percent_{NFirms,Early1970s}) \\ &\times (EQ_{NFirms,Late2000s} - EQ_{SFirms,Late2000s})] \end{aligned} \tag{6}$$

I refer to the first term in the square brackets as the seasoned-firm effect. This term measures the contribution of the changes in EQ measures of the seasoned-firm segment, holding its percentage in the firm population constant. I refer to the second term in square brackets as the new-list effect. This term represents the combined effect of the new-firm segment's distinctive EQ measures and the increase in their numerical percentage in the firm population. I then calculate the percentage contributions of the seasoned-firm and new-list effects to changes in the average EQ measures from the early 1970s to the late 2000s.

Table 5 shows that the new-list effect accounts for 73.9%, 80.0%, and 92.9% of the temporal changes in average earnings relevance, matching, and volatility, respectively. The seasoned-firm effect accounts for the remaining 26.1%, 20.0%, and 7.1%, respectively. Hence, I conclude that the bulk of the changes over time in the EQ measures reflects the new-list effect. This is my main contribution to the literature. My conclusion differs from that of Lev and Zarowin (1999, p. 358), who conclude that the declining returns-earnings association is not the result of new firms joining the sample. This difference occurs because I include firms listed in the late 1990s and the first decade of the 2000s that Lev and Zarowin (1999) do not examine. These firms display significantly lower EQ measures than do seasoned firms.[18] In addition, my conclusion differs from that of Dichev and Tang (2008, p. 1426), who conclude that the decline in matching is not because of changes in the firm sample.

4.7. Factors related to the new-list effect

I next examine the principal reasons for the widening gap between the EQ measures of the new- and the seasoned-firm segments. I estimate the following univariate regression with factors that potentially affect the EQ measures as explanatory variables:

$$DifferenceEarningsQuality_{Year} = \alpha + \gamma_1 \times DifferenceAttribute_{Year} + \varepsilon_{Year} \tag{7}$$

I use the differences between annual cross-sectional averages of the attributes of the new- and seasoned-firm segments as dependent and independent variables. Specifically, I use one of the annual differences in relevance, matching, or volatility as the dependent variable and one of the annual difference in special items (Elliott and Hanna, 1996), revenue volatility (Hribar and Nichols, 2007), market-to-book ratio, or SG&A intensity as the independent variable. Of these factors, market-to-book ratio and SG&A intensity represent intangible intensity. Accordingly, I use 40 annual observations (1970–2009) to estimate each of the 12 [3 (earnings qualities) × 4 (explanatory variables)] univariate regressions.

The results of these 12 regressions, presented in Panels A–D of Table 6, show that the *R*-squares of the regressions based on intangible intensity, ranging from 25% to 71%, are the highest. These results indicate that the widening gap between the intangible intensities of the new- and seasoned-firm segments is the most important factor in explaining the widening gap

[16] The core expenses of the seasoned firms remain highly correlated with their current revenues. And the matching for the seasoned firms declines largely due to increases in special items (Donelson et al., 2011).

[17] The early 1970s refers to the five-year period from 1970 to 1974. Similarly, the late 2000s refer to the five-year period from 2005 to 2009. I examine changes from the early 1970s to the late 2000s instead of from 1970 to 2009 to control for temporary year-to-year variations. I reach similar conclusions by examining changes from 1970 to 2009.

[18] The Lev and Zarowin (1999) conclusion is based on findings of significant declines in the relevance of both constant and total firm samples and no significantly higher trend rate in the total sample relative to the constant sample. Nevertheless, the data presented in their Table 1 show that the new firms have lower relevance than the old firms. More important, by extending the Lev and Zarowin (1999) study period to 2009, I find that the difference between the trend rates of the two samples becomes significant.

Table 6
Factors associated with the new-list effect.

This table examines the principal reasons for the widening gap between the average earnings quality (EQ) measures of the "new-firm" and the "seasoned-firm" segments. All of the firms are divided into these two segments in the following steps. The first year in which a firm's data are available in Compustat is referred to as the "listing year." All of the firms with a listing year before 1970 are classified as seasoned firms. The remaining firms are classified as new firms. The following univariate regression is estimated by using one of the factors that potentially affect the EQ measures as an explanatory variable:

$$DifferenceEQ_{Year} = \alpha + \gamma_1 \times DifferenceAttribute_{Year} + \varepsilon_{Year}$$

In this equation, the dependent variable is the annual difference between one of the EQ measures (earnings relevance, matching, or earnings volatility) of the new- and seasoned-firm segments. And the independent variable is one of the annual differences between the new- and seasoned-firm segments' special items, revenue volatility, market-to-book ratio, or SG&A intensity. All of the variables are defined in Appendix A. Each regression is estimated using 40 annual observations (1970–2009).

Panel A: $DifferenceEQ_{Year} = \alpha + \gamma_1 \times DifferenceSpecialItems_{Year} + \varepsilon_{Year}$

	Annual differences					
$N=40$	Earnings relevance		Matching		Earnings volatility	
	Estimate	*t*-Statistic	Estimate	*t*-Statistic	Estimate	*t*-Statistic
Intercept	−0.063	−5.23***	−0.101	−3.84***	0.068	6.01***
DifferenceSpecialItems	0.041	–0.03	–4.934	–1.59	2.186	1.71*
F-value		2.92		17.92		2.92
Probability		0.97		0.12		0.09
Adjusted *R*-square (%)		−2.78		3.94		4.93

*** and * indicate statistical significance (two-sided) at the 1% and 5% levels, respectively.

Panel B: $DifferenceEQ_{Year} = \alpha + \gamma_1 \times DifferenceRevenueVolatility_{Year} + \varepsilon_{Year}$

	Annual differences					
$N=40$	Earnings relevance		Matching		Earnings volatility	
	Estimate	*t*-Statistic	Estimate	*t*-Statistic	Estimate	*t*-Statistic
Intercept	0.087	1.92*	0.146	1.34	−0.100	−2.44**
DifferenceRevenueVolatility	−1.988	−3.37***	–3.573	−2.51**	2.361	4.43***
F-value		11.33		17.92		19.61
Probability		< 0.01		0.01		< 0.01
Adjusted *R*-square (%)		21.83		12.52		33.46

***, **, and * indicate statistical significance (two-sided) at the 1%, 5%, and 10% levels, respectively.

Panel C: $DifferenceEQ_{Year} = \alpha + \gamma_1 \times DifferenceM\text{-}BRatio_{Year} + \varepsilon_{Year}$

	Annual differences					
$N=40$	Earnings relevance		Matching		Earnings volatility	
	Estimate	*t*-Statistic	Estimate	*t*-Statistic	Estimate	*t*-Statistic
Intercept	–0.006	−0.40	0.011	0.30	0.010	0.71
DifferenceM-BRatio	−0.079	−3.38***	–0.189	−4.18***	0.095	5.39***
F-value		15.06		17.45		18.63
Probability		< 0.01		< 0.01		< 0.01
Adjusted *R*-square (%)		27.54		30.77		43.16

*** indicates statistical significance (two-sided) at the 1% level.

Panel D: $DifferenceEQ_{Year} = \alpha + \gamma_1 \times DifferenceSG\&A\text{-}Intensity_{Year} + \varepsilon_{Year}$

	Annual differences					
$N=40$	Earnings relevance		Matching		Earnings volatility	
	Estimate	*t*-Statistic	Estimate	*t*-Statistic	Estimate	*t*-Statistic
Intercept	0.023	0.93	0.166	3.89***	−0.058	−3.83***
DifferenceSG&A-Intensity	−0.881	−3.67***	–2.962	−7.23***	1.399	9.53***

Table 6 (*continued*)

Panel D: $DifferenceEQ_{Year} = \alpha + \gamma_1 \times DifferenceSG\&A\text{-}Intensity_{Year} + \varepsilon_{Year}$

N=40	Annual differences					
	Earnings relevance		Matching		Earnings volatility	
	Estimate	*t*-Statistic	Estimate	*t*-Statistic	Estimate	*t*-Statistic
F-value		13.49		52.53		90.77
Probability		< 0.01		< 0.01		< 0.01
Adjusted *R*-square (%)		25.23		58.12		70.81

***Indicates statistical significance (two-sided) at 1% level.

This panel uses the partial *R*-square method (Wold, 1966) to examine the relative contributions of the principal reasons for the widening gap between the average EQ measures of the new-firm and the seasoned-firm segments. The market-to-book ratio is excluded from the following multivariate regression because it is highly correlated with SG&A intensity.

Panel E: $DifferenceEQ_{Year} = \alpha + \gamma_1 \times DifferenceSpecialItems_{Year} + \gamma_2 \times DifferenceRevenueVolatility_{Year} + \gamma_3 \times DifferenceSG\&A\text{-}Intensity_{Year} + \varepsilon_{Year}$

N=40	Annual differences					
	Earnings relevance		Matching		Earnings volatility	
	Estimate	Partial *R*-square	Estimate	Partial *R*-square	Estimate	Partial *R*-square
Intercept	0.071	–	0.029	–	−0.057	–
DifferenceSpecialItems	1.715	0.00%	0.773	6.53%	−0.291	7.49%
DifferenceRevenueVolatility	−0.899	8.83%	2.971**	11.56%	−0.049	30.08%
DifferenceSG&A-Intensity	−0.745**	25.16%	−3.893***	46.36%	1.434***	34.13%
R-square† (%)		33.99		64.45		71.70
Adjusted *R*-square (%)		28.16		61.29		69.23
F-value		5.84		20.53		28.75
Probability		< 0.01		< 0.01		< 0.01

*** and ** indicate statistical significance (two-sided) at the 1% and 5% levels, respectively.
†Equals the sum of the partial *R*-squares.

between their EQ measures. I find similar results by using R&D as an alternative measure of intangibles (results not reported).

I also use the partial *R*-square method (Wold, 1966) to examine the relative contributions of the principal reasons for the widening gap between the EQ measures of the new- and the seasoned-firm segments. I estimate the following multivariate regression[19]:

$$DifferenceEarningsQuality_{Year} = \alpha + \gamma_1 \times DifferenceSpecialItems_{Year} + \gamma_2 \times DifferenceRevenueVolatility_{Year} + \gamma_3 \times DifferenceSG\&A - Intensity_{Year} + \varepsilon_{Year} \quad (8)$$

Results presented in Panel E of Table 6 show that the partial *R*-squares of SG&A intensity are the highest. Results in this section, along with the results in Section 4.6.1, are consistent with the idea that the increases in intangible intensity of the new-firm segment along with its percentage increase in the listed firm population are the principal factors for the observed decline in the average EQ measures.

5. Concluding remarks

This study shows that successive cohorts of newly listed firms since 1970 exhibit progressively lower EQ measures. One of the principal reasons for this development is the successive cohorts' increasing intangible intensity, which affects the firms' business performance and their financial reports. Specifically, successive cohorts display increasing volatility of both revenues and cash flows, arguably because of high uncertainty about the benefits of intangible investments. Further, successive cohorts display decreasing matching and increasing expense volatility, mainly because of the immediate expensing of intangible investments. The increases in revenue and expense volatilities, in conjunction with the decline in

[19] The partial *R*-square (or coefficient of partial determination) measures the marginal contribution of one explanatory variable when all other variables are included in the model. I do not include market-to-book ratio in this regression because it is highly correlated with SG&A intensity.

matching, heighten earnings volatility. The increased earnings volatility makes earnings less useful for predicting a firm's future performance. Hence, successive cohorts show a declining relevance of earnings.

Consequently, each new cohort's arrival lowers the average EQ measures of the firm population. And the cumulative addition of new cohorts explains approximately three-quarters of the changes in EQ measures since 1970. Accordingly, I conclude that the main reason for the observed trend in average EQ measures is not the changes in the earnings quality of the seasoned firms but rather the inclusion of new firms in the firm population. Further, I find similar trends by using the cash components of revenues, expenses, and earnings, which are less likely to be affected by changes in GAAP and more likely to reflect changes in the nature of the underlying transactions. Accordingly, I conclude that the observed trend in EQ measures is strongly related to changes in the business activities of the listed firms.

Appendix A. Definitions of variables

The firm population consists of all nonfinancial firms that in a sample formation year have assets, earnings, and revenue data from the previous two years, the current year, and the next year; and stock-price data from the end of the previous and current years.

The corresponding data items in the Compustat annual database are listed in capital letters.

Total Assets	=	AT
Revenues	=	SALE, scaled by average Total Assets for the year
Earnings	=	IB, scaled by average Total Assets for the year
Total Expenses	=	(SALE – IB), scaled by average Total Assets for the year
COGS	=	Cost of Goods Sold (COGS), scaled by average Total Assets for the year
SG&A	=	Selling, General, and Administrative expenses (XSGA), scaled by average Total Assets for the year
Noncore Expenses	=	Total Expenses – (*COGS*+*SG&A*)
Market-to-Book Ratio	=	[Market Value of Equity (Price {PRCC_F} × Number of Shares Outstanding {CSHO})+Total Liabilities [Total Assets−Shareholder Equity {CEQ}])/Total Assets.
Accruals	=	[Change in Current Assets (ACT)−Change in Cash (CHE)−Change in Current Liabilities (LCT)−Change in Tax Payable (TXP)−Depreciation and Amortization (DP)], scaled by average Total Assets for the year
Revenue Accruals	=	[Change in Accounts Receivable (AR)−Change in Deferred Revenue (DRC+DRLT)], scaled by average Total Assets for the year
Expense Accruals	=	Accruals−Revenue Accruals
Cash Flow from Operations (*CFO*)	=	Earnings−Accruals
Cash Component of Revenues	=	Revenues−Revenue Accruals
Cash Component of Expenses	=	Total Expenses−Expense Accruals
Attributes		
SG&A Intensity	=	Selling, General, and Administrative expenses (XSGA)/Total Expenses
COGS Intensity	=	Cost of Goods Sold (COGS)/Total Expenses
Noncore Intensity	=	1−(*SG&A* Intensity+*COGS* Intensity)
R&D Intensity	=	Research and Development Expenditures (XRD)/Total Expenses
Matching and Forward Association	=	The following regression is estimated on an annual cross-sectional basis for each wave-year: $Revenue_t = \beta_1 + \beta_2 \times TotalExpense_{t-1} + \beta_3 \times TotalExpense_t + \beta_4 \times TotalExpense_{t+1} + \varepsilon_t$. Forward Association and Matching are measured by β_2 and $\beta_{3,}$ respectively.
Matching of SG&A	=	The following regression is estimated on an annual cross-sectional basis for each wave-year: $Revenue_{i,t} = \beta_1 + \beta_2 \times TotalExpense_{t-1} + \beta_3 \times COGS_{i,t} + \beta_4 \times SG\&A_{i,t} + \beta_5 \times NoncoreExpenses_{i,t} + \beta_6 \times TotalExpenses_{i,t+1} + \varepsilon_{i,t}$ Matching of *SG&A* is measured by β_4.
Volatility of *SG&A*, Revenues, Expenses, Earnings, and *CFO*	=	Standard deviation of *SG&A*, Revenues, Expenses, Earnings, and *CFO*, respectively, for the four-year rolling windows (years $t-2$ through $t+1$)
Relevance	=	Adjusted *R*-square of the following regression, estimated on an annual cross-sectional basis for each wave-year: $RET_{i,t} = \beta_{1,t} + \beta_{2,t} \times \Delta Earnings_{i,t} + \beta_{3,t} \times Earnings_{i,t} + \varepsilon_{i,t}$ *RET* is [(End-of-Year Share Price {PRCC_F}/Adjustment Factor {AJEX}+Dividend per Share {DVPSP_F}/Adjustment Factor−Beginning-of-Year Share Price/Beginning-of-Year Adjustment Factor)/(Beginning-of-Year Share Price/Beginning-of-Year Adjustment Factor)]. Earnings and change in Earnings are scaled by average Total Assets.
EQ measures	=	Earnings Volatility, Revenue–Expense Matching, and Earnings Volatility.
Firm category		
Listing year	=	First year in which the firm has valid data in Compustat.
Seasoned firms	=	Firms whose listing year is before 1970.
New firms	=	Firms that are not Seasoned firms.
Listing cohorts	=	All of the cohorts listed in a common decade are referred to as a "wave" of New firms. Consequently, all of the firms are divided into Seasoned firms or a wave from the 1970s, 1980s, 1990s, or 2000s.

Dummy variables for waves	=	Dummy variables *DummyListYear1970_79*, *DummyListYear1980_89*, *DummyListYear1990_99*, and *DummyListYear2000_09*, take the value of one for the wave-year observations of the 1970s, 1980s, 1990s, and 2000s waves, respectively, and zero otherwise.
Industry	=	All of the firms are classified by the Fama–French 48-industry method. Four industries representing the finance firms and one "almost nothing" category are excluded, leaving 43 industries.
Recency	=	Wave-order values of 1, 2, 3, 4, and 5 are assigned to the Seasoned firms, and the firms listed in the 1970s, 1980s, 1990s, and the first decade of 2000s, respectively. An industry's average recency is calculated by averaging the wave-order values of its pooled firm-year observations.

Notes:

- All variables are winsorized at the 1st and 99th percentiles.
- Industry tests (Table 2)
  - The average attribute for an industry, measured by a proportion or a volatility, is first calculated on a firm-year basis and then averaged across all of that industry's pooled observations. Other attributes (relevance and matching) are estimated by pooled panel-data regressions by industry. These methods results in 43 industry observations for each attribute.
- Time-series tests (Tables 3–6)
  - An attribute for a wave-year, measured by a proportion or a volatility, is first calculated on a firm-year basis and then averaged across all of the cross-sectional observations in that wave-year. Other attributes (relevance and matching) are estimated by cross-sectional regressions by wave-year. These methods result in 140 wave-year observations for each attribute, comprising 40 observations for seasoned firms (1970–2009), 40 observations for the 1970s wave (1970–2009), 30 observations for the 1980s wave (1980–2009), 20 observations for the 1990s wave (1990–2009), and observations for the 2000s wave (2000–2009). Volatility has one less observation per wave. The overall average attribute of a listing cohort is calculated by averaging all of its annual wave-year attributes.
  - The annual attribute of the new-firm segment is calculated by averaging the wave-year attributes of the 1970s, 1980s, 1990s, and 2000s waves.
  - Years 1970–1974 and 2005–2009 are referred to as the early 1970s and the late 2000s, respectively.

Appendix B. Contributions of the new-list and seasoned-firm effects to changes in EQ measures

The observed earnings quality of the firm population equals the weighted average of the EQ measures of the new- and the seasoned-firm segments as described below:

$$EQ_{Population,T1} = WT_{SF,T1} \times EQ_{SF,T1} + WT_{NF,T1} \times EQ_{NF,T1} \tag{B.1}$$

where EQ=EQ measures, WT=percentage in firm population, SF=seasoned firms, NF=new firms, T1=early 1970s (1970–1974), and T2=late 2000s (2005–2009).

$$EQ_{Population,T2} = WT_{SF,T2} \times EQ_{SF,T2} + WT_{NF,T2} \times EQ_{NF,T2} \tag{B.2}$$

because

$$WT_{SF,T2} = WT_{SF,T1} + [WT_{SF,T2} - WT_{SF,T1}] \tag{B.3}$$

and

$$WT_{NF,T2} = WT_{NF,T1} + [WT_{NF,T2} - WT_{NF,T1}]. \tag{B.4}$$

Eq. (B.2) can be written as

$$EQ_{Population,T2} = (WT_{SF,T1} + [WT_{SF,T2} - WT_{SF,T1}]) \times EQ_{SF,T2} + (WT_{NF,T1} + [WT_{NF,T2} - WT_{NF,T1}]) \times EQ_{NF,T2} \tag{B.5}$$

$$= WT_{SF,T1} \times EQ_{SF,T2} + WT_{NF,T1} \times EQ_{NF,T2} + (WT_{SF,T2} - WT_{SF,T1}) \times EQ_{SF,T2} + (WT_{NF,T2} - WT_{NF,T1}) \times EQ_{NF,T2} \tag{B.6}$$

but

$$(WT_{SF,T2} - WT_{SF,T1}) = -1 \times (WT_{NF,T2} - WT_{NF,T1}). \tag{B.7}$$

Thus, (B6) can be expressed as

$$EQ_{Population,T2} = WT_{SF,T1} \times EQ_{SF,T2} + WT_{NF,T1} \times EQ_{NF,T2} + (WT_{NF,T2} - WT_{NF,T1}) \times (EQ_{NF,T2} - EQ_{SF,T2}). \tag{B.8}$$

Subtracting (B.1) from (B.8) gives

$$\begin{aligned} EQ_{Population,T2} - EQ_{Population,T1} = {} & WT_{SF,T1} \times (EQ_{SF,T2} - EQ_{SF,T1}) \quad \text{(first term)} \\ & + WT_{NF,T1} \times (EQ_{NF,T2} - EQ_{NF,T1}) \quad (second - A\ term) \\ & + (EQ_{NF,T2} - EQ_{SF,T2}) \times (WT_{NF,T2} - WT_{NF,T1}) \quad (\text{second} - \text{B term}) \end{aligned}$$

1. First term: Changes in the EQ measures of the seasoned-firm segment over time holding their percentage in the firm population constant. This term is referred to as the "seasoned-firm effect."
2. Second-A term: Changes in the EQ measures of the new-firm segment over time holding their percentage in the firm population constant.
3. Second-B term: Differences between the EQ measures of the new- and the seasoned-firm segments at the end of the study period × the percentage increase of the new-firm segment.

The sum of the second-A term and the second-B term is the "new-list" effect.

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On Guidance and Volatility*

Mary Brooke Billings
New York University
mbilling@stern.nyu.edu

Robert Jennings
Indiana University
jennings@indiana.edu

Baruch Lev
New York University
blev@stern.nyu.edu

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Abstract

In contrast to theoretical and empirical evidence linking disclosure to information environment benefits, recent research concludes that guidance increases volatility, but leaves open the question of whether volatility plays a role in prompting the issuance of guidance. Consistent with the notion that managers react to rising volatility by providing guidance, we document a link between abnormal run-ups in volatility and the decision to issue a forecast after controlling for the market's ability to anticipate the guidance. Upon disentangling pre-guidance volatility changes from post-guidance volatility changes, we find no evidence that guidance increases volatility. Indeed, our evidence consistently supports the view that managers seek to and do mitigate share price volatility with guidance.

Keywords: earnings guidance; volatility; earnings announcements; bundled forecasts

JEL Classification: G13; G14; M41

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* Corresponding author: Mary Billings, New York University, Stern School of Business, Suit 10-94, 44 West Fourth Street, New York, NY 10012. Telephone: 212-998-0097. Fax: 212-995-4004. E-mail: mbilling@stern.nyu.edu.

1. Introduction

Theory and empirical evidence establish a close link between voluntary, value-relevant disclosure and share price volatility. Theoretical models indicate that managers engage in voluntary disclosure in order to decrease information asymmetry (Diamond 1985; Diamond and Verrecchia 1991) and reduce investor uncertainty (Dye 1985; Lewellen and Shanken 2002; Pastor and Veronesi 2003). In these models, investors are uncertain about the parameters of the distribution of firms' future cash flows and earnings, and learn about the parameters of the distribution over time as information is revealed about the firm. Investors' uncertainty positively correlates with future stock return volatility and, as disclosure lowers uncertainty, it also lowers subsequent return volatility (Barry 1978; Brown 1979). In other words, disclosure increases the precision of investors' beliefs regarding the parameters of the distribution of future cash flows/earnings, and this belief precision links to forward-looking volatility of stock returns.[1] Consistent with this literature's focus on the volatility of firms' future stock returns, this paper examines the link between a specific type of disclosure—earnings guidance—and a forward-looking measure of the market's estimate of stock price volatility—option implied volatility. In so doing, we provide evidence that speaks to the hotly debated question of whether managers seek to and do mitigate share price volatility with earnings guidance (McKinsey 2006; Rogers, Skinner and Van Buskirk 2009).

A wealth of empirical evidence indicates that managers care about their firms' information environment, and specifically about stock return volatility: large stock price movements have been linked to decreased liquidity (Chordia, Sarkar and Subrahmanyam 2005), and the increased likelihood of both lawsuit filings (Kim and Skinner 2012) and CEO turnover (Engel, Hayes and Wang 2003), all naturally of great concern to corporate managers. Indeed,

[1] Thus, in a Capital Asset Pricing Model setting, managerial supplied information about a firm's future prospects influences the stock's beta. Barry and Brown (1985) demonstrate that differential amounts of disclosure among firms affect the firm's equity cost of capital.

consistent with the notion that volatility concerns influence managers' disclosure decisions, research documents that managers respond to shocks to their firm's information environment with increased disclosure (Leuz and Schrand 2009) and, in particular, with increased guidance (Anantharaman and Zhang 2011; Balakrishnan, Billings, Kelly and Ljungqvist 2014). Accordingly, a substantial literature connects managers' curative guidance efforts with various information environment benefits, including decreased information asymmetry (Coller and Yohn 1997), reduced litigation risk (Billings and Cedergren 2014), increased analyst coverage (Anantharaman and Zhang 2011), economically meaningful improvements in liquidity (Balakrishnan et al. 2014), and compliance with disclose-or-abstain insider trading regulations (Li, Wasley and Zimmerman 2014).[2]

Survey evidence corroborates the above findings: when asked about their ongoing communication with investors, managers express concern about excessive share price volatility, which they widely believed to escalate investors' risk perceptions about the firm and increase the likelihood of costly shareholder litigation. Consequently, executives often mention guidance's effectiveness in promoting a reputation for transparency, attracting analyst following, and constraining volatility, when explaining why they are committed to guidance (Graham, Harvey and Rajgopal 2005; Johnson 2009; National Investor Relations Institute 2009). Thus, from managers' points of view, reducing volatility is an important objective, and guidance is an effective means for achieving this objective.

Yet, in contrast to the theoretical and empirical evidence linking disclosure to information environment benefits, recent research links guidance to both *increased* volatility (Rogers et al. 2009) and increased crash risk (Hamm, Li and Ng 2014). In so doing, it provides support for consultants and influential institutions (including McKinsey, Deloitte, the Business

[2] Prior work also links improvements in analysts' ratings of firms' disclosure policies to capital market benefits (Lang and Lundholm 1993, 1996; Healy et al. 1999; Healy and Palepu 2001).

Roundtable and the CFA Institute) who advise against providing guidance — citing litigation and market penalties associated with missed earnings targets, as well as a lack of evidence that disclosure actually curbs volatility (McKinsey 2006). Thus, while empirical evidence suggests that managers can use guidance to positively shape their firm's information environment, recent research examining volatility and crash risk contends that guidance achieves just the opposite.

Weighing in on this important debate, we consider the interplay between guidance and volatility. Consistent with recent theoretical work by Clinch and Verrecchia (2013) that underscores the importance of considering the endogeneity of disclosure choice when examining hypothesized benefits to disclosure, we begin our analysis by investigating whether volatility concerns play a role in prompting the issuance of guidance—a question left open by the prior literature. Then, controlling for determinants of disclosure, we examine the link between guidance and subsequent share price volatility. In particular, as shown in Panel A of Figure 1, we focus on: (1) whether abnormal increases in volatility are associated with managers' decisions to bundle a forecast (guidance) with current-quarter earnings news, and (2) how volatility changes after the issuance of a bundled forecast compare to volatility changes in quarters in which earnings are released without guidance.

Our analyses examine a sample of 107,307 quarterly earnings announcements made during the decade since Regulation Fair Disclosure ("Reg FD") took effect in October of 2000. In our primary empirical tests, we compare the volatility dynamics surrounding quarterly earnings announcements bundled with guidance to quarterly earnings announcements without guidance. Recognizing that not all managers may seek to quiet volatility and because the theoretical disclosure literature emphasizes that it is a sustained commitment to disclosure that improves a firm's information environment (Diamond and Verrecchia 1991; Leuz and Verrecchia 2000; Clinch and Verrecchia 2013), our tests concentrate on firms with a demonstrated willingness to guide.[3] Thus, because we aim to predict *when* a firm with a guiding history chooses to supply guidance (as opposed to *if* a firm chooses to be a guiding firm), we use firms' guiding histories to narrow our focus to the firm-quarters in which guiding firms choose whether to guide or not.

Prior work linking guidance to increases in volatility examines volatility *surrounding unbundled forecasts* (Rogers et al. 2009) and in the context of crash risk studies a yearly count of only *annual forecasts* (Hamm et al. 2014). Our research design and main tests, in contrast, focus on whether a *bundled quarterly or annual forecast* is given and the volatility dynamics *both before and after* that forecast (although we do examine unbundled forecasts in some of our empirical tests to corroborate our results). The overwhelming majority of guidance now arrives bundled with a quarterly earnings release. Over our sample period, approximately 80% of all forecasts are bundled and, in later years, the proportion climbs above 90%. Further, excluding either quarterly or annual forecasts leaves out approximately half of all post-Reg-FD guidance. Thus, bundled forecasts of *both* quarterly and annual earnings offer the most representative sample of guidance practices. Consistent with this notion, Rogers and Van Buskirk (2013) document the shift in guidance practices toward the issuance of bundled forecasts and caution against drawing inferences from non-representative samples of unbundled guidance.[4]

In contrast to prior work's focus on the volatility changes *surrounding* unbundled forecasts (as depicted in Panel B of Figure 1), in this study we separate pre-forecast changes

[3] In particular, it is possible that some management teams face conflicting incentives that cause them to remain silent in the face of rising volatility. For example, So (2013) finds that firms with high sensitivities of firm value to changes in underlying volatility (i.e., "high-vega" firms) are more likely to be firms that abstain from giving guidance (i.e., "non-guiding" firms), consistent with the notion that these managers enjoy benefits associated with increased volatility. In our analyses, we test whether volatility concerns help to explain when a guiding firm chooses to give guidance.

[4] Although researchers often limit analysis to a small sample of unbundled forecasts in an effort to isolate guidance effects, the decision to provide a forecast (bundled or unbundled) is endogenous and, as we document later, unbundled forecasts are frequently accompanied by value-relevant information events that contaminate the analysis. This prior work that examines unbundled forecasts controls for the endogeneity of managers' disclosure decisions only by matching on the gap in earnings expectations (Rogers et al. 2009). Because earnings announcements are well-defined information events that occur routinely for all firms (Bushee et al. 2010), in our analyses we control for various determinants of managers' disclosure decisions documented by prior work and augment these models to control for other factors, most notably, firms' guiding histories, as well as the presence of "disclose-or-abstain" insider trading incentives (as discussed in Li et al. 2014). See Section 5 for further discussion.

from post-forecast changes in volatility (as depicted in Panel A of Figure 1). Disentangling the change in volatility surrounding the forecast into two distinct windows (pre- and post-guidance) allows us to examine the role that volatility plays in prompting firms to guide. Further, and just as important, this measurement precision allows us to control for pre-forecast movements in volatility when examining post-forecast volatility changes. Absent separation of pre-guidance changes from post-guidance changes in volatility, tests examining the link between guidance and volatility are biased in favor of finding a positive relation if managers issue forecasts in response to some other volatility-provoking event and the measurement window commingles pre-guidance movement with post-guidance movement.

Supporting the notion that volatility concerns factor into managers' quarterly decisions to guide, we find that guidance is more likely to be bundled with earnings announcements when the release follows an abnormal run-up in forward-looking stock price volatility. Thus, in an attempt to calm a particularly turbulent pre-earnings release information environment, some managers choose to accompany current-quarter earnings news with forward-looking guidance. Shifting attention to the effectiveness of managers' guidance efforts, we find no evidence that guidance increases volatility. To the contrary, we document that earnings releases bundled with guidance are associated with abnormally large post-announcement reductions in volatility—after controlling for both the run-up in pre-announcement volatility and the average (typical) post-announcement rundown in volatility.

Our evidence of a link between pre-announcement run-ups in volatility and the decision to guide is consistent with: (1) managers reacting to the rising volatility with guidance, and/or (2) investors anticipating the arrival of a forecast (and its impact on prices). Because we are interested in examining the presence of the former effect, we make a number of adjustments to our research design in an effort to control for (or hold constant) investors' expectation of guidance (the latter effect). Most notably, all of our regressions explaining current-quarter guidance include the average run-up in volatility for the prior four quarters. This average run-up serves as a proxy for the expected (and well-documented) run-up around earnings releases and allows the current-quarter run-up to capture the abnormal increase in uncertainty. Further, all of our regressions explaining post-announcement reductions in volatility control for the current-quarter run-up as well as the average rundown in volatility from the prior four quarters. This allows our tests to link the decision to guide to abnormally large reversions in volatility.

In a further effort to hold constant the market's expectation of guidance, we re-estimate our regressions focusing on subsamples where investors are either very unlikely or are very likely to anticipate guidance. Focusing on subsets of *unlikely* guiders and *unexpected* guiders for which guidance is *un*anticipated, we continue to find that an abnormally *high* run-up in current quarter volatility predicts the quarters in which these firms that rarely bundle (and for which bundling should be *un*expected by the market) choose to bundle. In contrast, focusing on the subset of *likely* guiders for which guidance is to be expected, we find that an abnormally *low* run-up in current quarter volatility predicts the quarters in which these firms that bundle almost 9 out of every 10 quarters (and for which bundling should be expected by the market) choose *not* to bundle. Taken collectively, these subsample tests provide further support for the notion that abnormal changes in volatility explain the quarters in which guiders do and do not give guidance.

We execute a number of additional robustness tests that continue to lend support to our hypotheses and all of our findings hold: (1) when we examine uncontaminated (and seemingly unexpected) instances of unbundled guidance, (2) when we employ backward-looking measures of *realized* volatility and abnormal news items, and (3) when managers do not appear to be using guidance to adjust gaps in earnings expectations (i.e., when we control for the expectations gap faced by managers). Thus, our tests provide robust evidence of an important interplay between guidance and volatility.

Our evidence consistently supports the view that managers seek to and do mitigate share price volatility with guidance. Consequently, by considering the interplay between guidance and volatility, this paper helps to reconcile the recent findings linking guidance to increased uncertainty with the wealth of prior literature that suggests disclosure improves firms' information environments. In so doing, we enhance research that seeks to explain the decision to bundle guidance with the firm's quarterly earnings announcement—improving the explanatory power of existing models by greater than 50%. Given the recent shift in guidance practices and the importance of controlling for endogeneity associated with disclosure choice, our findings offer researchers an approach to studying bundled guidance, which represents the predominant form of guidance in recent years.

The remainder of this paper progresses as follows. Section 2 reviews the relevant literature and presents our predictions. Section 3 discusses our data and Section 4 provides descriptive statistics. Section 5 presents our findings concerning the motives of guidance. Section 6 discusses alternative explanations. Section 7 presents findings on the consequences of guidance. Section 8 concludes the study.

2. Related Literature and Hypotheses

Patell and Wolfson (1976, 1981) document that implied volatility increases before an earnings announcement and subsequently falls, while Rogers et al. (2009) document a similar pattern surrounding bundled forecasts. Shifting attention to unbundled forecasts, Rogers et al. (2009) observe a rise in pre-issuance volatility, but note that volatility remains elevated thereafter (see their Figure 2 on page 96). Thus, their work establishes that volatility escalates before the market receives a management forecast, but leaves open the important question of whether this pre-forecast rise in volatility reflects investors' expectation of a the forthcoming forecast, or if the pre-forecast rise in volatility motivates managers to issue a forecast aimed at calming the market. As Rogers et al. (2009) observe:

> "This increase in volatility likely occurs for two reasons. First, the sample includes some regular forecasts for which timing is predictable. Second, forecasts may be issued in response to some other event that caused an increase in volatility." (footnote 13 of Rogers et al. 2009).

The second possibility (i.e., guidance is given in response to volatility increases) suggests that managers believe that they can use guidance to positively shape their firm's information environment.

Thus, we begin by examining the question of whether volatility plays a role in the decision to supply a forecast. Given that managers committed to the practice of guidance do so because they believe that it aids in reducing investor uncertainty (e.g., Verrecchia (1983), Diamond (1985), and Diamond and Verrecchia (1991)) and in curbing volatility (Graham, Harvey, and Rajgopal 2005; McKinsey survey 2006), our first prediction focuses on the role that an unsettled information environment, as measured by volatility, plays in prompting managers to provide guidance in a given quarter. We posit that recent upturns in volatility induce managers to provide a forecast along with the current quarter's regularly scheduled earnings release. In particular, for managers who guided in the past, even sporadically, we expect that a recent increase in volatility (or the presence of volatility-generating events, such as an increase in material news items) will give guiding managers increased incentive to provide a forecast that quarter. Accordingly, our first hypothesis predicts:

H1: Abnormally large increases in pre-earnings announcement share price volatility are associated with an increased likelihood of bundling guidance for managers with a history of providing guidance.

The prior literature examining the benefits and costs to disclosure emphasizes that it is a sustained commitment to disclosure that affects a firm's information environment (Diamond and Verrecchia 1991; Leuz and Verrecchia 2000; Clinch and Verrecchia 2011). Consistent with this literature, H1 focuses on making predictions about when a firm with a demonstrated willingness to guide in the past chooses to guide in the current quarter. In other words, H1 suggests that an abnormal run-up in volatility explains when guiding firms guide versus remain silent in a particular quarter.

Shifting attention to the consequences of guidance, we note that prior evidence suggests that guidance might not result in reductions in volatility. While some work connects earnings guidance (and/or improvements in disclosure ratings) to decreased stock price volatility and other information environment benefits (Welker, 1995; Bushee and Noe 2000; Balakrishnan et al. 2014), other work links the issuance of negative earnings guidance to increased volatility (Rogers et al. 2009) and the frequency of annual guidance to heightened crash risk (Hamm et al. 2014). Collectively, these studies suggest that guidance not only fails to decrease volatility, but might actually increase it. Consequently, these latter findings lead us to examine whether bundled guidance (pertaining to both annual and quarterly earnings), which now constitutes the vast majority of guidance cases, alters the typical post-earnings-announcement decline in volatility documented by Patell and Wolfson (1976, 1981). Accordingly, we make the following prediction with respect to post-announcement declines in volatility during quarters in which managers bundle guidance with earnings news:

H2: The general post-earnings-announcement decrease in volatility is further enhanced by the presence of guidance with the earnings release.

3. Data

We begin our data collection by obtaining the report date of quarterly earnings announcements (*RDQ*) for all firm quarters in Compustat from the beginning of 2001 through the end of 2010. To these firm-quarter observations, we add guidance data from First Call's

Company Issued Guidelines files maintained by Thomson Reuters.[5] We code a variable (*BUNDLE*) to indicate when a management forecast occurs during the 5 trading days centered on the earnings announcement.[6] We also code several indicator variables that reflect the firm's guidance history. *GUIDE_CQTR* indicates whether the firm previously provided guidance for the current quarter's earnings. *BUNDLE_PRIOR* reflects whether the firm bundled earnings guidance with the prior quarter's earnings announcement. *BUNDLE_SQLY* equals one for firm-quarters in which the firm bundled earnings guidance with the earnings announcement for the same fiscal quarter of the previous year. *RECENT_GUIDER* denotes firms with at least three instances of guidance in the prior 12 quarters. Finally, *UNBUNDLED* indicates instances when the firm provides guidance this quarter outside of the five-day window around the *RDQ*.

Within guiding firms (i.e., *RECENT_GUIDER*=1), we code two additional variables that allow us to examine subsamples of firms where the market is likely/unlikely to expect guidance: *LIKELY_GUIDER* denotes guiding firms that bundled in the prior quarter (i.e., *BUNDLE_PRIOR*=1) and also bundled in the same quarter of last year (i.e., *BUNDLE_SQLY*=1). In contrast, *UNLIKELY_GUIDER* denotes guiding firms that did not bundle in the prior quarter (i.e., *BUNDLE_PRIOR*=0) and also did not bundle in the same quarter of last year (i.e., *BUNDLE_SQLY*=0).

Next, we collect analyst forecast data from I/B/E/S, using the unadjusted, detail file three days prior to each earnings announcement. From this file, we derive the number of analyst forecasts (*NUMEST*), conditional on the forecast being no more than 90 days old (i.e., non-stale), the median non-stale analyst forecast, and the standard deviation of non-stale analyst forecasts

[5] Limiting attention to the guidance behavior of firms with a history of guidance in the post-Reg-FD time period helps to address concerns as to bias in First Call's coverage, as all firms included in this analysis appear in the guidance dataset at least once (and often many times) in the prior 12 quarters. In addition, other sample selection and data availability constraints lead us to examine a sample of firms with high analyst following and large institutional ownership, which prior research also suggests mitigates concerns as to coverage issues. Refer to the appendix of Anilowski et al. (2007) for a discussion of the evolution of First Call as a provider of earnings forecast data and to Chuk et al. (2013) for a discussion of possible incompleteness of the CIG dataset.

[6] The 5-day window follows from prior work (Anilowski et al. 2007; Rogers et al. 2009). All results remain if we exclude the 3% of our firm-quarter observations where the forecast does not arrive exactly on the *RDQ*.

(*DISPERSION*). We measure each quarter's earnings surprise (*SURPRISE*) as the reported actual earnings (obtained from Compustat quarterly files) minus the most recent median analyst estimates, deflated by stock price three trading days prior to the earnings release date. That is, we examine the typical standardized unexpected earnings (*SUE*). Following Rogers and Van Buskirk (2013), we create indicator variables for positive earnings surprises (*P_SURPRISE* equals one if *SURPRISE* > +0.0001) and for negative earnings surprises (*N_SURPRISE* equals one if *SURPRISE* < -0.0001). In addition, we code an indicator variable (*LOSS*) for firm quarters where the firm reports negative earnings. To capture the recent history of earnings surprises, we compute the proportion of the four prior quarters that *SURPRISE* was non-negative, i.e., the proportion of quarters the firm met or beat analysts' median forecasts (*PROPMB*). For earnings announcements with a bundled management forecast of future earnings, we also compare the guidance to the prevailing median analyst forecast for the same horizon. Three binary variables are used to denote instances where the management forecast exceeds the analysts' forecast (*POSITIVE_BUNDLE*), is equal to (i.e., confirms) the analysts' forecast (*NEUTRAL_BUNDLE*), or is less than the analysts' forecast (*NEGATIVE_BUNDLE*).[7]

In addition to actual and forecasted earnings information, we collect share price, return, number of shares and volume data from CRSP. We use these data to compute the market value of a firm's equity each quarter (*MVE*), the 90-day return ending three days prior to the earnings release date (*PRIOR_RET*), and the standard deviation of returns over that 90-day period (*SVOL_LEVEL*).

Earnings announcements often generate substantial anticipatory news and uncertainty about a firm's prospects. Our intuition is that managers can use earnings forecasts (guidance) to help investors digest the many, possibly disparate, pieces of information about the firm that

[7] Rogers and Van Buskirk (2013) identify econometric problems associated with classifying news of bundled forecasts and describe an alternative approach to classifying bundled forecast news based on conditional expectations. All of our results remain when we reclassify the nature of the guidance news using their conditional approach to measurement.

occur around the earnings release date. In the theoretical models linking disclosure behavior to cost of capital, disclosure is useful to investors in forming beliefs about the distribution of future earnings/cash flows. Early work studying the effect of parameter uncertainty (e.g., Barry 1978 and Brown 1979) suggests that the volatility of future stock returns is positively correlated with the uncertainty regarding these distributional parameters. Therefore, in selecting an empirical proxy for investor uncertainty, we wish to employ a statistic that is forward-looking. Option implied volatility is a common proxy used to capture uncertainty about a firm's prospects: it is a reasonably available, market-determined estimate of the stock price's fluctuation between the date of observation and the option's expiration. Thus, changes in investor belief precision are reflected in the value of options and, thereby, implied volatility. Consequently, following Rogers et al. (2009), we gather close-of-day implied volatility data from the standardized option files of OptionMetrics. These are the implied volatilities on 30-day, standardized at-the-money options during the days before and after each earnings release date. This allows us to determine an average level of implied volatility in the days before a quarterly earnings release (*IVOL_LEVEL*) and the changes in implied volatility over various time periods before (*ΔIVOL_PRE*) and after quarterly earnings releases (*ΔIVOL_POST*).[8] We also collect closing levels of the Chicago Board Option's Exchange volatility index (*VIX_LEVEL*) from their website during the three-day window centered on an earnings announcement date to control for market-wide volatility effects.

As noted by Rogers et al. (2009, Table 1), although options exchanges exhibit a coverage bias toward larger firms, exchanges now list options covering a wide spectrum of over 3,000 publicly-traded firms, which increases the generalizability of the results. Further, in robustness tests, we use alternative proxies for changes in uncertainty to replicate our findings using the full

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[8] As depicted in Figure 1, Rogers et al. (2009) study movements in volatility in the 7-day period surrounding the forecast. Because we are interested in disentangling the role that volatility plays in prompting the forecast from post-forecast movements in volatility, we measure volatility changes before, during and after the forecast.

sample of firms. This addresses concerns about sample selection bias introduced by restricting the sample to firms with traded options. But, because of the strong theoretical ties and measurement advantages associated with the use of implied volatility measures, we tabulate all of our main analyses using implied volatility metrics.[9]

We suggest that at informationally intense times, managers aim to influence the firm's information environment by releasing guidance. We use two measures of informational intensity in our tests. In addition to the implied volatility measures discussed above, we count the number of material news events using the Key Developments database from Capital IQ. For this measure, we count the number of news items during the 15, 30 and 90 days leading up to each quarter's earnings release. For a given quarter, we also compute "abnormal" news items as the percentage difference between the number of news items in the quarter of interest and the number in the same quarter in the prior year (*ABNEWS15D*, *ABNEWS30D*, and *ABNEWS90D*).

Finally, we gather insider trading data (sales + purchases) from Thomson Reuters Stock Transactions file. In constructing our trading measures, we concentrate on the behavior of directors and officers, consistent with prior work (e.g., Johnson et al. 2007; Li et al. 2014). This focuses our attention on the trading decisions of insiders who are most likely to be aware of impending earnings news and also most likely to be in a position to influence the firm's disclosure decisions. To further concentrate on the trading behavior of individuals most central to disclosure choices, we restrict our measure of insider trading to actions of the CEO and CFO. Insider trading is measured both within the quarter of interest ($INSIDERTRADE_{qtr}$ and CEO/CFO_TRADE_{qtr}) and in the 15-day period of time after the earnings release ($INSIDERTRADE_{post15d}$ and $CEO/CFO\_TRADE_{post15d}$). This 15-day window corresponds to the

[9] Please refer to page 91 of Rogers et al. (2009) for a discussion of the advantages of using implied volatility as an empirical proxy for investor uncertainty and page 95 for a discussion of potential bias in OptionMetrics coverage. Because we require First Call and I/B/E/S data, our sample is already predisposed toward larger capitalization firms.

period of time when Bettis et al. (2000) find that managers are typically not restricted in trading shares of the firm's stock. We fully define all the variables used in our analyses in Appendix A.

4. Descriptive Statistics

Table 1 characterizes the variables of interest for the 107,307 sample observations. We condition the data on whether the earnings announcement is or is not accompanied by guidance (i.e., *BUNDLED*). In the overall sample, about 31% (32,910 of 107,307) of the quarterly earnings announcements are bundled with guidance, which aligns with prior work (Anilowski et al. 2005; Rogers and Van Buskirk 2013). Consistent with idea that the guidance decision is sticky, this fraction increases substantially when we examine the subsample of recent guiders. Specifically, in untabulated analyses, we find that over 55% of current-quarter earnings announcements contain guidance if we condition on a recently demonstrated willingness to guide (i.e., *RECENT_GUIDER*=1).

[Insert Table 1]

As shown in last two columns of Table 1, we find statistically significant differences between the means and medians of the bundled and non-bundled earnings announcements for all the variables tabulated. Notably, the current quarter bundling decision is highly correlated with past guiding decisions (*GUIDE_CQTR*, *BUNDLE_PRIOR, UNBUNDLED*). Managers who report positive current and past earnings news (*P_SURPRISE* and *PROPMB*) are more likely to bundle guidance with the earnings release than managers reporting less favorable earnings news. Firms providing bundled guidance tend to have greater market capitalizations (*MVE*) and be more widely followed by analysts (*NUMEST*) than non-guiders. There also tends to be less disagreement among analysts following firms that guide than those that do not guide (*DISPERSION*). The decision to provide guidance with earnings is positively correlated with insiders' (either in general or just the CEO and CFO) total trading behavior both in the quarter leading up to the earnings release or in the typically open trading window after the earnings release. That is, total insider trades are larger for the firm quarters where firms choose to guide than for quarters where firms do not guide. This association between insider trading and disclosure decisions is consistent with recent research highlighting the disclosure incentives created by "disclose-or-abstain" insider trading rules (Li et al. 2014).

The final three variables in Table 1 provide insight into the public news activity of the sample firms in the 15, 30, and 90 days leading up to the earnings announcement date (*ABNEWS15D*, *ABNEWS30D*, and *ABNEWS90D*). In all cases, we find that the percentage change in news activity leading up to a quarter with a bundled earnings release is larger than that leading up to an earnings release without a bundled forecast. For example, firm-quarters without bundled guidance are associated with a mean increase in abnormal news of −2.7%, while firm-quarters with bundled guidance are associated with a significantly larger mean increase in news events (10.1%) in the 15 days prior to the earnings announcement.

5. The Decision to Bundle Guidance with an Earnings Release

This section reports the results of our investigation into the association between pre-announcement changes in uncertainty (as measured by option implied volatility and abnormal news activity) and the decision to bundle guidance with a particular earnings release. Because theory emphasizes a commitment to disclosure as being key to obtaining disclosure benefits, our empirical tests identify firms with a history of guidance (i.e., *RECENT_GUIDER*=1).

Univariate findings

Table 2 provides descriptive statistics for the stock price volatility measures we use in our analyses. We include only firm-quarters of recent guiders with OptionMetrics data (47,947 observations), but note that results are nearly identical when tabulated for the full sample (and all statistical differences remain). To get a sample-wide idea of volatility levels and changes in volatility around earnings, we compute the (unreported) overall sample means by combining the bundlers and the non-bundlers in Table 2. On average, the realized stock price volatility (*SVOL_LEVEL*) in the 90 days prior to the earnings announcement is 2.8% per day, or about 44.1% annualized (assuming identically and independently distributed returns) to a 252 trading-day year. Implied volatility from OptionMetrics, *IVOL_LEVEL*, is, on average, 47.6%. As noted in prior literature, implied volatility rises in the days prior to an earnings announcement (by 1.98% over three days, as evidenced by *ΔIVOL_PRE3D*, and by 3.48% over 15 days, as evidenced by *ΔIVOL_PRE15D*, on average), and falls substantially on the earnings announcement day (2.44%, on average, as evidenced by *ΔIVOL_RDQ*) and the immediately following days (by 6.92% to 7.7%, *ΔIVOL_POST3D* or *ΔIVOL_POST15D*).

[Insert Table 2]

Using the conditional statistics from Table 2, consistent with prior work (e.g., Waymire 1985), we document that guiding firms have lower volatility *levels* (either historical or implied) than non-guiding firms. We also find that bundled quarters are associated with larger *increases* in volatility prior to the earnings release than non-bundled quarters. The average volatility increase in the 15 days prior to earnings announcements of bundled quarters (4.2% or 1.9 volatility points based on the 0.447 mean *IVOL_LEVEL* for bundlers) exceeds that of all non-bundled quarters (2.6% or 1.3 volatility points relative to the 0.512 mean *IVOL_LEVEL* for non-bundlers that recently guided). This suggests that the decision to bundle might be related to the pre-earnings volatility increase—a finding not reported in the existing literature, but consistent with Rogers et al. (2009)'s findings for unbundled forecasts. This result is also consistent with our finding (see Table 1) that firm-quarters having guidance bundled with earnings are associated with a larger number of news stories than firm-quarters without such guidance. Further, it corroborates the univariate evidence presented in Coller and Yohn (1997), as they find bid-ask spreads rise in the year prior to a sample of 278 unbundled forecasts.

We also document significantly larger declines in post-earnings volatility for bundled quarters (around 11%, consisting of 2.8% on the earnings announcement day and at least 8% in the days thereafter) than for non-bundled quarters (less than 9%)—as evidenced by contrasting *ΔIVOL_RDQ*, *ΔIVOL_POST3D* and *ΔIVOL_POST15D* across the bundled guidance partition. To gain understanding of the overall movement in volatility surrounding the earnings announcement, we define the net overall change in volatility as the pre-announcement change in implied volatility (*ΔIVOL_PRE*), which is typically positive, combined with report date change (*ΔIVOL_RDQ*) as well as the post-earnings change (*ΔIVOL_POST*), which are both typically negative. On average, bundled firm-quarters are associated with a more negative net change (i.e., a larger overall decrease) in implied volatility as compared to non-bundled quarters. For example, the mean seven-day net volatility change from three days before the announcement through three days afterward is −8.6% for bundled quarters as compared to −5.9% for non-bundled quarters.

Multivariate findings

H1 predicts that increased uncertainty is associated with a higher likelihood of bundled guidance. To test this hypothesis, we estimate the following logistic regression model that builds on the model supplied in Rogers and Van Buskirk (2013):

$$\begin{aligned}
\text{BUNDLE}_{i,t} &= \alpha_0 + \alpha_1\left(\Delta\text{UNCERTAINTY}_{i,t}\right) \\
&+ \alpha_2\left(\text{AVG}\Delta\text{UNCERTAINTY_4Q}_{i,t}\right) + \alpha_3\left(\text{VOL_LEVEL}_{i,t}\right) \\
&+ \alpha_4\left(\text{GUIDE_CQTR}_{i,t}\right) + \alpha_5\left(\text{UNBUNDLED}_{i,t}\right) + \alpha_6\left(\text{BUNDLE_PRIOR}_{i,t}\right) \\
&+ \alpha_7\left(\text{INSIDER_TRADE_QTR}_{i,t}\right) + \alpha_8\left(\text{INSIDER_TRADE_POST15D}_{i,t}\right) + \alpha_9\left(\text{VIX_LEVEL}_{i,t}\right) \\
&+ \alpha_{10}\left(\Delta\text{VIX}_{i,t}\right) + \alpha_{11}\left(\text{P_SURPRISE}_{i,t}\right) + \alpha_{12}\left(\text{N_SURPRISE}_{i,t}\right) + \alpha_{13}\left(\left|\text{SURPRISE}_{i,t}\right|\right) + \alpha_{14}\left(\text{LOSS}_{i,t}\right) \\
&+ \alpha_{15}\left(\text{DISPERSION}_{i,t}\right) + \alpha_{16}\left(\text{PRIOR_RET}_{i,t}\right) + \alpha_{17}\left(\text{LOG_MVE}_{i,t}\right) + \alpha_{18}\left(\text{LOG_NUMEST}_{i,t}\right) \\
&+ \alpha_{19}\left(\text{PROPMB}_{i,t}\right) + \varepsilon_{i,t}.
\end{aligned} \tag{1}$$

The presence of a bundled forecast with the current quarter's earnings announcement (i.e., *BUNDLE*) serves as the dependent variable. H1 predicts a positive coefficient for *ΔUNCERTAINTY*: increased uncertainty in the current quarter (as measured by *ΔABNORMAL_NEWS* or *ΔIVOL_PRE15D*) is associated with an increased likelihood of a bundled forecast. Given the positive correlation between the decision to bundle and pre-release changes in volatility (Table 2) and the stickiness of the decision to guide (Table 1), the inclusion of *AVGΔUNCERTAINTY_4Q* captures the "typical" information environment leading into earnings releases and, thereby, provides a control for the market's anticipation of guidance in the current quarter. This allows the current-quarter variable, *ΔUNCERTAINTY*, to capture the *abnormal* or *unanticipated* increase in uncertainty.

In addition to controlling for the expected/typical rise in uncertainty prior to the firm's earnings announcement, we also include controls for firm-level volatility. Prior work indicates that managers tend to disclose more frequently when earnings are less volatile (Waymire 1985) and easier to predict (Chen, Matsumoto, and Rajgopal 2011). Consistent with this, Cotter, Tuna, and Wysocki (2006) find that "management guidance is more likely when ... analysts' forecast dispersion is low." Similarly, Houston, Lev, and Tucker (2010) argue that forecast dispersion reflects greater difficulty in predicting earnings and document a positive relation between guidance cessation and increased dispersion. Collectively, these studies indicate that managers are less likely to commit to guidance (and, accordingly, be a guiding firm) when the *level* of stock price volatility is high. When *ΔABNORMAL_NEWS* (*ΔIVOL_PRE15D*) is our proxy for the change in uncertainty we use *SVOL_LEVEL* (*IVOL_LEVEL*) to control for firm-level volatility in our regressions. Using historical volatility instead of implied volatility allows us to follow extant work with the largest possible sample by not requiring option data. Following Kim et al. (2014), we also control for market-wide volatility by using the Chicago Board Option Exchange's volatility index (*VIX_LEVEL* and ΔVIX).

Further, recent work by Li et al. (2014) underscores the importance of controlling for the presence of "disclose-or-abstain" insider trading incentives. Consequently, we also include measures of total insider trading during the quarter ($INSIDER\_TRADE_{QTR}$) and in the typically open trading window following the report date of quarterly earnings ($INSIDER\_TRADE_{POST15D}$) in the regression. Because we expect the disclosure and trading decisions to be most salient for the CEO and CFO, we tabulate results using measures of trading based exclusively on the trades of the CEO and CFO (i.e., CEO/CFO_TRADE_{QTR} and $CEO/CFO\_TRADE_{POST15D}$). Our results are robust to either approach to measurement.[10]

As mentioned, our model adjusts and augments the model introduced by Rogers and Van Buskirk (2013). Accordingly, the remaining control variables follow directly from their analysis. In particular, consistent with Rogers and Van Buskirk (2013), we predict that the likelihood of current-quarter guidance increases with past guidance (i.e., *GUIDE_CQTR* and *BUNDLE_PRIOR*).[11] In addition, because the existence of an earlier unbundled management forecast in the current quarter might alter the relation we anticipate between pre-announcement changes in volatility and the decision to bundle guidance, we also include a binary variable (*UNBUNDLED*) to indicate if the firm issued an unbundled piece of guidance earlier in the quarter of interest. Again following Rogers and Van Buskirk (2013) we also control for the current quarter's earnings news (*P_SURPRISE*, *N_SURPRISE*, |*SURPRISE*|, and *LOSS*), the

[10] Although sample size is reduced by approximately 20%, all of our results are robust when we exclude all observations where any trading occurs in the 15-day window following the report date of quarterly earnings (and, hence, the management forecast). Thus, our results remain robust to the exclusion of management forecasts that are potentially issued in response to disclose-or-abstain rules (Li et al. (2014).

[11] *BUNDLE_PRIOR* and *GUIDE_CQTR* are highly correlated (61% Spearman correlation in the full sample of firm-quarter observations and 38% Spearman correlation in the subsample of firm-quarter observations for recent guiders). Following Rogers and Van Buskirk (2013) we include both in our tabulated regressions. All of our results remain when we re-estimate our regressions excluding either *BUNDLE_PRIOR* and *GUIDE_CQTR.* More important, in the subsample analyses below that predict bundling within the groups of firms that are more/less likely to guide, both of these variables are no longer needed in the model, as they are held constant within these subsamples.

information environment of the firm (*DISPERSION*, *LOG_NUMEST*, *LOG_MVE*), and recent performance (*PRIOR_RET* and *PROPMB*).[12]

We report results from two samples and two measures of uncertainty in Table 3. The two samples are all firm-quarter observations and the firm-quarter observations associated with recent guiders. Uncertainty measures include abnormal news items and changes in option implied volatilities using options with 30 days until expiration during the 15 days prior to the earnings announcement.[13]

[Insert Table 3]

In columns [1] and [2], we use all observations in the sample with complete relevant data. This includes all 107,307 firm quarters in column [1], while column [2] uses all 72,016 firm quarters with available OptionMetrics data. In column [3], we use only the observations characterized as coming from recently guiding firms (*RECENT_GUIDER*=1) with options data. The advantage of focusing the sample on recent guiders is that we consider only firms with a demonstrated willingness to provide guidance. These firms are more consistent with the theory motivating disclosure as a means to impact firms' information environments and less consistent with the firms highlighted in So (2013). Thus, while the regressions in columns [1] and [2] at least partially distinguish guiding firms from non-guiding firms, the regression in column [3] focuses more sharply on explaining why a firm with a history of guiding chooses to guide or remain silent in a particular quarter.

[12] Rogers and Van Buskirk (2013) also include an indicator variable to identify earnings announcements that are accompanied by conference calls. When we re-estimate all of our regressions using a subset of data for which we have available conference call data, all of our results remain when we include a conference call indicator. Because we conduct all of our main tests using the subsample of firms with guiding histories and for which publicly traded options exist, the vast majority of our firms host conference calls surrounding their earnings announcements.

[13] In addition to examining shorter-term measures of uncertainty, we also examine longer-term measures of uncertainty (based on 60- and 91-day volatility). Our results are robust to the use of these alternative measures. Further, Patell and Wolfson (1976, 1981) document that implied volatility increases before an earnings announcement and subsequently falls. Consequently, this causes concern that our tests are picking up the normal rise in volatility associated with investors' anticipation of the forthcoming earnings and perhaps forecast news. Although we believe that including $\boldsymbol{AVG\Delta UNCERTAINTY_{4Q}}$ addresses this concern because it allows our tests to focus on the abnormal, current-quarter run-up in volatility, we further address this concern by moving the window over which we measure the run-up back to ten days prior to the report date of quarterly earnings (i.e., we measure from day -20 to day -10), as Figure 2 of Rogers et al. (2009) indicates that most of this rise in volatility occurs in the 10 days before the announcement. Our results are robust to this alternative measurement.

In all specifications in Table 3 the relation between the change in "unexpected" pre-earnings uncertainty (volatility) and management's decision to bundle guidance with the earnings is positive. We also report the coefficient estimates of variables designed to control for the typical/normal increase in volatility prior to an earnings release (*AVGΔUNCERTAINTY*), the level of earnings volatility (*VOL_LEVEL*), the firm's guidance history (*GUIDE_CQTR* and *BUNDLE_PRIOR*), the existence of a management forecast during the quarter of interest that is not bundled with earnings (*UNBUNDLED*), and insider trading (CEO/CFO_TRADE_{qtr} and $CEO/CFO\_TRADE_{post15d}$).

Although we do not report the coefficient estimates for the remaining control variables, our conclusions are consistent with prior findings. Further, the addition of our volatility and trading variables significantly improves the fit of the model, as the Pseudo R^2 for our model estimated on the full sample is 65.5%. This improves considerably upon the 42.49% shown in Rogers and Van Buskirk (2013, Table 3) for a similar time period—suggesting a 54% increase in explanatory power for the model.

Focusing on the full-sample specifications, we find that both *ABNORMAL_NEWS* and *ΔIVOL_PRE15D* (our proxies for *ΔUNCERTAINTY*) are associated with an increased likelihood of bundled guidance. Because we control for the "typical" increase in uncertainty prior to earnings with $AVG\Delta UNCERTAINTY_{4Q}$, this mitigates the likelihood that the increases in uncertainty reflect the market's anticipation of the bundling decision. Thus, the coefficient estimate for *ΔUNCERTAINTY* represents the effect that the current-quarter elevation in *unanticipated* uncertainty has on the bundling decision. For the most part, reported control variables have the expected sign. Firms with higher volatility levels are less likely to bundle. Firms that guided in the past (either via bundled or unbundled forecasts) are more likely to continue to provide guidance in the quarter of interest. Finally, consistent with the idea that managers must disclose or abstain from trading (Li et al. 2014), we find that guidance positively relates to both backward-looking and forward-looking measures of insider trading.

Because we aim to predict *when* a firm with a demonstrated willingness to guide chooses to issue guidance (as opposed to *if* a firm chooses to be a guiding firm), the specification presented in column [3] narrows our focus to *recent* guiders. Said differently, we remove non-guiding firms from the analysis in order to allow our tests to focus on explaining the quarters in which guiders do and do not guide. In so doing, we increase the difficulty of predicting when firms will choose to bundle. Here too, we find strong evidence that an abnormal run-up in volatility helps to explain when recent guiders choose to bundle a forecast with the current-quarter earnings news. Thus, the evidence in Table 3 indicates that regardless of whether we measure the current-quarter pre-announcement rise in uncertainty using news stories or option implied volatility, we detect a consistently robust, positive relation between abnormal run-ups in investor uncertainty and the decision to issue earnings guidance.

6. Is the run-up in volatility related to the market's expectation of guidance?

Evidence of a link between run-ups in volatility prior to providing guidance is consistent with two explanations: (1) the market anticipating the act of bundling (and its associated impact on stock price), and (2) managers reacting to the rising volatility by providing guidance. The fact that managers of firms with a history of guidance are also more likely to guide following quarters containing an *abnormal* increase in uncertainty provides initial evidence consistent with the latter effect: the presence of a managerial reaction. In our next analyses, we provide additional evidence in support of the presence of a managerial reaction effect by limiting variation in the extent to which investors might reasonably anticipate guidance (Table 4), by substituting backward-looking realized volatility for forward-looking implied volatility in our tests (Table 5), and by examining the run-up in volatility prior to unbundled guidance (Table 6).

Holding constant investors' expectation of guidance: subsample analyses

As shown in Panel A of Table 4, focusing on the subset of *likely* guiders for which guidance is expected (as measured by the *presence* of a bundled forecast in the same quarter of last year as well as the *presence* a bundled forecast last quarter—i.e., *BUNDLE_PRIOR*=1 and *BUNDLE_SQLY*=1), we find that this set of firms bundles 87.2% of the time in the current quarter. Given that these firms bundle the vast majority of the time (i.e., nearly 9 out of every 10 quarters), investors should rationally anticipate a bundled forecast in the current quarter. In contrast, focusing on the subset of *unlikely* guiders, for which guidance is *not* expected (as measured by the *absence* of a bundled forecast in the same quarter of last year, as well as the *absence* a bundled forecast last quarter—i.e., *BUNDLE_PRIOR*=0 and *BUNDLE_SQLY*=0), we find that these firms only bundle 24.2% of the time in the current quarter. Thus, partitioning based on firms' guidance histories allows us to isolate subsamples where investors are more and less likely to expect the guidance.

[Insert Table 4]

In Panel A of Table 4, we compare the pre-earnings run-up in volatility across four groups within these subsubsamples:

(1) ***Likely guiders who DO guide:*** firms that are more likely to bundle this quarter and, as expected, *do* bundle in the current quarter (i.e., *BUNDLE_PRIOR*=1, *BUNDLE_SQLY*=1 and *BUNDLE*=1),

(2) ***Likely guiders DO NOT guide:*** firms that are more likely to bundle this quarter and, unexpectedly, *do not* bundle in the current quarter (i.e., *BUNDLE_PRIOR*=1, *BUNDLE_SQLY*=1 and *BUNDLE*=0),

(3) ***Unlikely guiders who DO guide:*** firms that are less likely to bundle this quarter and, unexpectedly, *do* bundle in the current quarter (i.e., *BUNDLE_PRIOR*=0, *BUNDLE_SQLY*=0 and *BUNDLE*=1), and

(4) ***Unlikely guiders DO NOT guide:*** firms that are less likely to bundle this quarter and, as expected, *do not* bundle in the current quarter (i.e., *BUNDLE_PRIOR*=0, *BUNDLE_SQLY*=0 and *BUNDLE*=0).

First, we hold constant the likelihood of bundling and compare *ΔIVOL_PRE15D* for GROUP 1 to that of GROUP 2 and *ΔIVOL_PRE15D* for GROUP 3 to that of GROUP 4—i.e., we compare *ΔIVOL_PRE15D* across the bundled columns *within* the likely (row [a]) and unlikely (row [b]) subsamples. These comparisons are less plausibly influenced by differences in the market's anticipation of bundling and more likely to represent management's reaction to changes in uncertainty. For firms likely to bundle (row [a]), the mean volatility increase is 4.3% for the firms that actually bundle (GROUP 1) in the current quarter compared to 2.3% for firms that do not bundle (GROUP 2). For firms unlikely to bundle (row [b]), the mean volatility increase is 4.4% for the current-quarter bundlers (GROUP 3) and 3.1% for the current-quarter non-bundlers (GROUP 4). Both of these differences are statistically significant. Thus, holding constant the market's anticipation of bundling, *ΔIVOL_PRE15D* is higher in quarters when the firm actually bundles as compared to non-bundled quarters. These differences are consistent with a managerial reaction to rising volatility in the current quarter, as the likelihood of bundling is similar across compared groups.

Next, we hold constant the presence/absence of a bundled forecast in the current quarter and compare *ΔIVOL_PRE15D* for GROUP 1 to that of GROUP 3 and *ΔIVOL_PRE15D* for GROUP 2 to that of GROUP 4—i.e., we compare *ΔIVOL_PRE15D* across groups that differ with respect to the market's ability to anticipate guidance based on historical guiding history but identical with respect to the current quarter's guidance choice. For firms that bundle in the current quarter, the mean volatility run-up is 4.3% for firms for which the market should anticipate guidance (i.e., GROUP 1) and 4.4% for firms that the market should not anticipate guidance (i.e., GROUP 3). Likewise, the mean volatility increase in non-bundled quarters is 2.3% for likely bundlers (i.e., GROUP 2) as compared to 3.1% for unlikely bundlers (i.e., GROUP 4). None of these differences in means (or medians) is statistically significant at traditional levels. Hence, holding constant the guidance decision in the quarter of interest, we detect no differences in volatility run-up between likely and unlikely bundlers. The absence of significant differences in these comparisons is inconsistent with notion that the volatility increase is due solely to the market's anticipation of bundled guidance.

Building upon the univariate evidence of a managerial reaction effect presented in Panel A of Table 4, in Panel B of Table 4 we re-consider the multivariate analysis presented in Table 3 but this time we differentiate between instances where investors are more or less likely to anticipate current-quarter guidance from guiding firms. In column [1], we consider firm-quarter observations where the market is *more* likely to expect guidance (i.e., the group described in row [a] of Panel A). In column [2], we consider firm-quarter observations where the market is *less* likely to expect guidance (i.e., the group described in row [b] of Panel A).

Column [1] reports the results of estimating Equation (1) using firm quarters of likely guiders. The incidence of guiding increases with changes in implied volatility. Recall from Panel A, 87.2% of these sample firms guided with the current quarter's earnings. Thus, for this subset of firms, the variation in the dependent variable that remains to be explained by our logistic regression is limited (as the overwhelming majority of these observations come with bundled forecasts). Yet, we continue to find strong evidence of a positive association between the abnormal run-up in volatility (Δ*UNCERTAINTY*) and the decision to bundle. Said differently, we find that the abnormal run-up in current quarter volatility predicts the quarters in which firms that bundle the vast majority of the time (and for which bundling should be largely expected by the market) choose *not* to bundle. In column [2], we shift attention to the unlikely guiders for which guidance is *less* likely to be anticipated, as Panel A indicates that these firms bundle 24.2% of the time. Thus, for this subset of firms, the market should not be routinely anticipating guidance. Yet, we continue to find strong evidence of a positive association between the abnormal run-up in volatility (Δ*UNCERTAINTY*) and the decision to bundle.

Because investors are unlikely to be assessing a high likelihood of bundling for these firms, we argue that the decision to bundle is a reaction to the larger increase in volatility rather than the volatility increasing because the market anticipates guidance.

Finally, in column [3], we re-estimate our logistic regression using a sample of "unexpected" guiders. To construct this subsample, we begin with the full sample of 72,016 firm-quarter observations having complete data. Using this sample, we estimate the likelihood of bundling in the current quarter using Equation (1) and select the quartile of firm-quarters with the lowest estimated likelihood of bundling. As shown in the bottom row of Table 5, this subsample only bundles 2.5% of the time. Thus, guidance is very unlikely to be anticipated by investors for this subset of firms. Nonetheless, the run-up in uncertainty prior to the earnings release continues to be significantly positively associated with the decision to guide in the current quarter for firm-quarters where there should be virtually no anticipation of guidance.

Taken collectively, these subsample tests support the notion that guidance is prompted by an abnormal volatility run-up, even after we hold constant the expectation of bundling (by narrowing in on the firm-quarters where bundling is expected the vast majority of the time or by narrowing in on the firm-quarters where bundling is unexpected).

Importantly, we notice that when we limit the analysis to the subsamples that hold constant the expectation of guidance (i.e., Panel B), we do not detect a significant relation between the average run-up ($AVG\Delta UNCERTAINTY_{4Q}$) and the decision to bundle in the current quarter. In contrast, when estimating the regression on the full sample of guiding firms (i.e., Table 3) we detect a significantly positive relation. The lack of significance in the subsample regressions is consistent with the notion that focusing on subsamples successfully controls for the expectation of guidance in the current quarter and, thus, the inclusion of the normal run-up is no longer important in explaining *BUNDLE*.[14]

Substituting backward-looking realized volatility for forward-looking implied volatility

If investors anticipate that a firm will guide in the upcoming quarter's earnings release, then pre-earnings implied volatility could increase because of the added information potential of guidance. Although we believe that the subsample results examined in Table 4 mitigate this concern, we take an alternative approach to addressing this issue in Table 5. In particular, we replace the forward-looking option implied volatility with backward-looking realized (actual) stock price volatility into our estimate of Equation (1). Backward-looking measures of volatility lack the theoretical tie to asset pricing, but are less likely to be influenced by future events. We report results using the standard deviation of stock returns in the 15 days prior to the earning release (as this matches the windows used to evaluate implied volatility) but results are not sensitive to using longer windows to compute this metric. To compute an abnormal change in uncertainty we subtract the 15-day pre-earnings standard deviation of returns from the same quarter last year (i.e., *abnormal_rvol_pre15d*). If the previously documented positive association between the decision to bundle and the pre-earnings increase in uncertainty is purely an anticipation effect, then we do not expect to find any relation between the decision to bundle this quarter and changes in backward-looking, *realized* volatility. If the manager reacts to increasing uncertainty by bundling, however, then we expect that realized volatility is indicative of an unsettled information environment and also positively correlates with the guiding choice.

[Insert Table 5]

In Table 5, we report the results of substituting realized (backward-looking) volatility for implied (forward-looking) volatility. The results documented in Table 4 are confirmed; firm-

[14] The magnitude of the coefficient estimate on *ΔUNCERTAINTY* is reduced if observations with extremely large and extremely small uncertainty changes are removed (or if the sample is winsorized at the 5% tails), but the coefficient remains significant in all specifications.

quarters with higher abnormal *realized* volatility are those where management tends to bundle. This is inconsistent with the notion that our results solely reflect market anticipation of bundling and, instead, supports the hypothesis that managers react to increased uncertainty by guiding.[15]

Examining volatility movement before unbundled guidance

Finally, in Table 6 we aim to limit the expectation of guidance by examining whether there is an abnormal run-up in volatility prior to *unbundled* guidance. As unbundled guidance can be issued at any date, not just with earnings, it is arguably more difficult for the market to anticipate. We focus on the 8,039 firm-quarters in which guiding firms supplied an unbundled piece of guidance during the quarter (i.e., *UNBUNDLED*=1). In this analysis, we test whether the run-up in volatility prior to an unbundled forecast (as measured by Δ*IVOL_PRE15D_UNBUNDLED*) is greater than the run-up in volatility during the same time in the prior quarter (as measured by Δ*IVOL_PRE15D_UNBUNDLED_PRIOR*) or than the run-up in volatility during the same time last year (as measured by Δ*IVOL_PRE15D_UNBUNDLED_SQLY*). We find evidence of a significant difference between the run-up prior to an unbundled forecast as compared to the run-up during the same time last quarter (i.e., [a]>[b]) and as compared to the run-up same time in the same quarter of last year (i.e., [a]>[c]). This again supports the hypothesis that managers react to rising volatility with guidance.

[**Insert Table 6**]

Yet, as Rogers et al. (2009) note, a sample of unbundled forecasts may include some forecasts for which the timing is predictable or forecasts that are issued in response to a volatility-provoking news event. Using the Key Developments database from Capital IQ, we find support for this notion: 3,655 (59%) of the 6,197 unbundled forecasts (with available OptionMetrics data) occurring after 2004 (the point at which Capital IQ data becomes stable)

[15] Abnormal number of news items (see Table 4) is a similar backward-looking measure of an informationally unsettled environment and produces similar results.

contain a contaminating news item in the 3-day window prior to and including the date of the forecast, some of which can be anticipated by investors.[16] To address this issue of potential anticipation by investors, we limit our analysis to the 2,542 uncontaminated, unbundled forecasts that are not contemporaneous with another announcement or event. Although the mean/median changes in volatility run-ups are now smaller in magnitude, we continue to find evidence consistent with a managerial reaction to rising volatility, as the increase in volatility before unbundled forecasts is greater than the volatility change in the same 15 days of the prior quarter or the same 15 days of the prior year.

Given that recent research cautions against drawing inferences from small samples of unbundled guidance, our main analyses focus on the decision to supply bundled guidance. Nonetheless, this small sample evidence is consistent with volatility concerns influencing the decision to supply unbundled guidance. This provides further evidence of a managerial reaction to rising volatility, as uncontaminated, unbundled forecasts are relatively infrequent and are less likely to be anticipated by investors.

Collectively, the evidence presented in Tables 4, 5, and 6 indicates that managers aim to calm short-term investor uncertainty with guidance in the current quarter. In our next set of tests, we examine the extent to which this anticipated benefit manifests.

7. The Change in Implied Volatility following the Guidance

In this section, we investigate whether bundled earnings releases are associated with larger declines in volatility than the volatility declines following earnings releases that are not

[16] Additional (untabulated) analysis of the Key Developments database indicates that from 2005 through 2010, the mean (median) number of key events per firm per year is 24 (17), with a lower quartile of 7 and an upper quartile of 32. This suggests that the typical firm experiences a key event approximately every two weeks, although many key events cluster in time. Of the 8,913 unbundled forecasts occurring during this period, 3,431 (38.5%) of those forecasts are given on the same date that the firm holds a conference call (which are announced in advance) and in total 5,838 (65.5%) of those forecasts have a contaminating event in the 7-day window surrounding the forecast. The most frequent contaminating events are conference presentation calls, client announcements, CEO/CFO/executive board change announcements, product related announcements, and monthly sales announcements/calls. Because some of these events have predictable timing, investor anticipation can be an issue even with unbundled guidance.

accompanied by guidance. We do this by estimating the following regression equation for the sample of recent guiders:

$$
\begin{aligned}
&\Delta\text{IVOL\_POST15D}_{i,t} = \beta_0 + \beta_1\left(\text{BUNDLE}_{i,t}\right) \\
&\quad + \beta_2\left(\text{AVG}\Delta\text{IVOL\_POST15D\_4Q}_{i,t}\right) + \beta_3\left(\Delta\text{IVOL\_PRE15D}_{i,t}\right) + \beta_4\left(\Delta\text{IVOL\_RDQ}_{i,t}\right) \\
&\quad + \beta_5\left(|\text{SURPRISE}|_{i,t}\right) + \beta_6\left(\text{INSIDER\_TRADE\_QTR}_{i,t}\right) + \beta_7\left(\text{INSIDER\_TRADE\_POST15D}_{i,t}\right) \quad (2) \\
&\quad + \beta_8\left(\text{VIX\_LEVEL}_{i,t}\right) + \beta_9\left(\Delta\text{VIX}_{i,t}\right) + \beta_{10}\left(\text{VOL\_LEVEL}_{i,t}\right) + \beta_{11}\left(\text{LOG\_MVE}_{i,t}\right) \\
&\quad + \beta_{12}\left(\text{LOG\_NUMEST}_{i,t}\right) + \beta_{13}\left(\text{PROBMB}_{i,t}\right) + \varepsilon_{i,t}.
\end{aligned}
$$

The change in implied volatility measured in the 15 days subsequent to the earnings announcement, Δ*IVOL_POST15D*, serves as the dependent variable in this regression. H2 predicts a negative coefficient for *BUNDLED*: bundled guidance is associated with abnormally large reversions in post-announcement volatility.

The above regression equation follows from Rogers et al. (2009), with a few notable exceptions. First, we disentangle the change in volatility surrounding the forecast into two distinct windows (pre- and post-guidance). Absent efforts to separate pre-guidance changes from post-guidance changes in volatility, tests examining the link between guidance and volatility are biased in favor of finding a positive relation if managers issue forecasts in response to some other volatility-provoking event (such as an abnormal amount of news) and the measurement window commingles pre-guidance movement with post-guidance movement. Consequently, we adjust Rogers et al. (2009)'s research design to disentangle the pre- and post-guidance movements in volatility, which allows us to sharpen our tests.

In addition, this measurement allows us to control for pre-forecast movements in volatility when examining post-forecast volatility changes. In particular, if the run-up is greater, then we expect that the reversion will likely be greater. Our analyses address this issue with the inclusion of the current-quarter run-up (Δ*IVOL_PRE15D*), the day 0 movement (Δ*IVOL_RDQ*), and the average rundown from the prior four quarters *AVG*Δ*IVOL_POST15D*$_{4Q}$). As such, our analysis speaks to the relation between *BUNDLE* and the abnormal rundown in volatility (Δ*IVOL_POST15D*) after the current-quarter earnings announcement. In our opinion, this is a strong test, as the average rundown will be higher for frequently guiding firms, as there may have been bundled guidance in the prior four quarters. Hence, our tests link abnormally large reversions to guidance after controlling for the run-up in volatility and after controlling for the typical rundown that follows the firm's earnings announcement.

Our main findings, as shown in Table 7, is that the firm-quarters including guidance (regardless of the contemporaneous earnings news) consistently have *larger* post-earnings announcement *decreases* in volatility than firm-quarters without guidance, as evidenced by the significantly negative coefficient for *BUNDLE*. This result holds after controlling for the earnings news (i.e., moving across the negative (columns [1] and [2]), neutral (columns [3] and [4]), and positive (columns [5] and [6]) current-quarter earnings news samples), as well as the typical run-down in volatility post earnings, the change in volatility levels leading up to the earnings release, and the change in volatility on the earnings release date. The clear message is that bundling guidance with earnings announcement is associated with larger decreases in post-earnings announcement volatility than unbundled earnings releases. The coefficients in the 15-day regression average almost -0.015 across the various subsamples, suggesting that bundling firms' implied volatility falls an additional 1.5%, on average ceteris paribus, than non-bundlers. That compares to an overall mean post earnings 15-day volatility change of -7.7% for the recent-guider sample (Table 2). Thus, bundling is associated with a 19% greater run-down (1.5% marginal effect compared to an unconditional average of 7.7%). As we have selected our sample from guiding firms, this result is not simply due to a distinction between firms that never guide and firms that guide, but reflects differences in firms that are willing to guide between quarters when they guide and quarters when they do not guide.

[Insert Table 7]

In additional (untabulated) analyses, we repeat these analyses: (1) replacing forward-looking option implied volatility with backward-looking realized (actual) volatility examined earlier (see Table 5) and (2) focusing on the subsamples of Unlikely/Unexpected guiders examined earlier (see Panel B of Table 4). Despite the added measurement error (associated with imprecise measurement of changes in realized volatility) and reduced sample size, we continue to find strong support for our predictions, as the presence of a bundled forecast is associated with abnormal reductions in post-announcement volatility in all of these tests.

As noted by Rogers et al. (2009), under the "expectations adjustment hypothesis" of Ajinkya and Gift (1984), managers are more likely to provide guidance when investors' earnings expectations differ from their own. Although our tests thus far control for the amount and sign of earnings news, in additional (untabulated) robustness tests we control for managers' use of guidance to adjust gaps in investors' expectations of earnings by limiting analysis to firm-quarter observations in which (1) firms report no current-quarter earnings surprise and (2) managers either remain silent or bundle a neutral/confirming forecast with the current-quarter, no surprise earnings news (i.e., no "expectation adjustment").

In these "no news" firm-quarters, we find that managers are still more likely to bundle a confirming forecast (as opposed to remain silent) in the presence of an abnormal run-up in volatility.[17] In other words, an abnormal increase in uncertainty explains when managers bundle verbal indications of their agreement with the market's expectations of their future earnings versus when managers tacitly confirm their agreement with the market's expectations via silence.

Further, we continue to find that the abnormal rundown in volatility is greater when managers bundle verbal indications of their agreement with the market's expectations of their

[17] Consistent with the notion that focusing on "no news" firm-quarters (as measured by the absence of a current-quarter earnings surprise and either the absence of a bundled forecast or the presence of a neutral confirming forecast) holds constant contemporaneous news, we detect no significant differences in the means, medians or standard deviations of the 3- or 5-day abnormal return surrounding the report date of quarterly earnings when we compare the bundled (i.e., neutral/confirming guidance) quarters to the non-bundled (silent) quarters.

future earnings than when managers tacitly confirm their agreement with the market's expectations via their silence. Consequently, we view this evidence as supporting the notion that explicit (verbal) guidance that confirms the consensus has a volatility benefit that exceeds the benefit of implicit (non-verbal) agreement with the prevailing consensus.

8. Conclusion

In this study, we consider the interplay between guidance and volatility after separating pre-earnings run-ups in volatility from post-earnings declines in volatility. Our motivation for this investigation comes from the tension between the theoretical and empirical literature that links disclosure to various information environment benefits and recent academic evidence indicating that guidance increases volatility and crash risk (Rogers et al. 2009).

Consistent with the notion that volatility does indeed factor into managers' decisions to provide earnings guidance, we find that abnormal run-ups in volatility predict the quarters in which guiding firms choose to guide. And what happens to share price volatility after the guidance release? In contrast to recent work, we find no evidence that guidance increases volatility. In fact, our evidence indicates that earnings releases bundled with guidance are associated with abnormally large post-announcement reductions in volatility.
Thus, consistent with managers' perceptions (as reflected in survey evidence regarding the perceived benefits of disclosure) as well as theoretical work, guidance appears to reduce share price volatility. This finding, along with recent work connecting guidance to meaningful improvements in liquidity, reductions in litigation risk and the attraction of analyst coverage, speaks to the potential benefits of guidance.

Given the endogeneity of managers' disclosure decisions, in our analyses we control for various determinants of managers' disclosure decisions documented by prior work and augment these models to control for other factors—including firms' guiding histories, as well as the presence of "disclose-or-abstain" insider trading incentives. Although the explanatory power of our models examining the quarterly decision to guide improves upon existing models by greater than 50%, we cannot completely rule out alternative factors at play in this setting. Nevertheless, we execute a number of additional robustness tests in an effort to address concerns that the volatility patterns we document merely reflect investors' anticipation of forthcoming guidance. In so doing, our results are robust: (1) when we hold constant the expectation of guidance by focusing on subsamples of likely and unlikely/unexpected guiders, (2) when we examine uncontaminated (and seemingly unexpected) instances of unbundled guidance, and (3) when we examine backward-looking measures of *realized* volatility and abnormal news items. Thus, while these findings do not (and cannot) suggest the absence of anticipation effects at play in our setting, we believe these findings do offer compelling evidence of the presence of a reaction effect. That is, our evidence consistently and robustly supports the notion that, on average, managers react to rising volatility with guidance and that those efforts ultimately do positively shape their firms' information environment.

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Appendix A ■ Variable definitions

We assemble a sample of 107,307 firm-quarter observations for the period of 2001 through 2010 with available Compustat, CRSP, I/B/E/S and First Call data. In our main tests, we focus on the 47,947 firm-quarter observations associated with firms with guidance in their recent history (i.e., ***recent_guider*=1**) and with standardized option data available from OptionMetrics. We winsorize all continuous firm-quarter observations at the 1% and 99% levels. We code industry fixed effects based on 2-digit SIC codes.

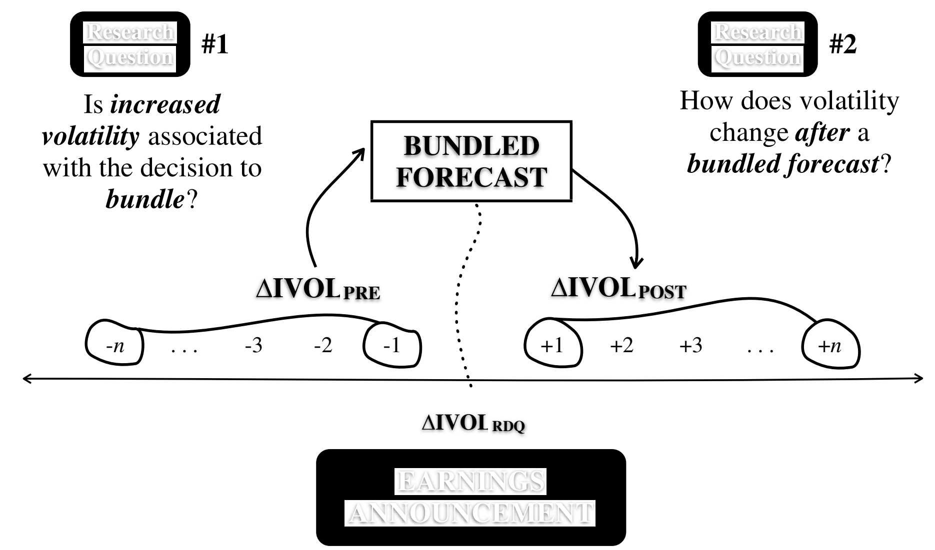
bundle	An indicator variable set to 1 if the firm provided an earnings forecast during the 5-day window surrounding the report date of quarterly earnings.
negative_bundle	An indicator variable set to 1 if ***bundle=1*** and the forecast estimate is less than the pre-forecast prevailing median analyst estimate.
positive_ bundle	An indicator variable set to 1 if ***bundle=1*** and the forecast estimate is greater than the pre-forecast prevailing median analyst estimate.
neutral_ bundle	An indicator variable set to 1 if ***bundle=1*** and the forecast estimate is equal to the pre-forecast prevailing median analyst estimate.
guide_cqtr	An indicator variable set to 1 if the firm previously provided earnings guidance for the current quarter's earnings.
bundle_prior	An indicator variable set to 1 if the firm issued an earnings forecast during the 5-day window surrounding the report date of quarterly earnings last quarter.
bundle_sqly	An indicator variable set to 1 if the firm issued an earnings forecast during the 5-day window surrounding the report date of quarterly earnings same quarter of last year.
unbundled	An indicator set to 1 if the firm provided any unbundled guidance during the current quarter.
recent_guider	An indicator set to 1 if the firm is a guiding firm, as measured by the presence of at least 3 pieces of guidance in the prior 12 quarters.
likely_guider	An indicator set to 1 if the firm is a guiding firm (***recent_guider=1***) and the firm bundled in the prior quarter (***bundle_prior=1***) and bundled in the same quarter of last year (***bundle_sqly=1***).
unlikely_guider	An indicator set to 1 if the firm is a guiding firm (***recent_guider=1***) but the firm did not bundle in the prior quarter (***bundle_prior=0***) and did not bundle in the same quarter of last year (***bundle_sqly=0***).
unexpected_guider	An indicator set to 1 if the firm is in the lowest quartile of firm-quarters of the full sample where bundled guidance is least likely to be expected in the current quarter based on the prediction model tabulated in Table 3.
surprise	Actual earnings minus the prevailing median analyst estimate, deflated by stock price 3 trading days prior to the report date of quarterly earnings.
p_surprise	An indicator variable set to 1 if this quarter's earnings surprise exceeds +0.0001.
n_surprise	An indicator variable set to 1 if this quarter's earnings surprise falls below -0.0001.
loss	An indicator variable set to 1 if actual earnings is less than 0.
dispersion	The standard deviation of prevailing analyst estimates for the current period's earnings.
prior_ret	The cumulative stock return over the 90-day period ending 3 trading days prior to the report date of quarterly earnings.
mve	The market value of equity (i.e., price multiplied by shares outstanding) measured 3 trading days prior to the report date of quarterly earnings.

numest	The number of analysts with outstanding estimates 3 trading days prior to the report date of quarterly earnings.
propmb	The proportion of the previous 4 quarters that the firm's reported earnings met or exceeded analysts' prevailing median consensus estimates.
insidertrade$_{qtr}$	The total insider trades (i.e., sales + purchases) of directors and officers (scaled by shares outstanding at the beginning of the quarter) during the current quarter.
insidertrade$_{post15d}$	The total insider trades (i.e., sales + purchases) of directors and officers (scaled by shares outstanding at the beginning of the quarter) during the 15 days after the report date of quarterly earnings.
ceo/cfo_trade$_{qtr}$	The total insider trades (i.e., sales + purchases) of the CEO and CFO (scaled by shares outstanding at the beginning of the quarter) during the current quarter.
ceo/cfo_trade$_{post15d}$	The total insider trades (i.e., sales + purchases) of the CEO and CFO (scaled by shares outstanding at the beginning of the quarter) during the 15 days after the report date of quarterly earnings.
abnews15d	The percentage change in **news** in the last 15 days of the current quarter compared to news in the last 15 days of the same quarter of last year (**news15_sqly**).
abnews30d	The percentage change in **news** in the last 30 days of the current quarter compared to news in the last 30 days of the same quarter of last year (**news30_sqly**).
abnews90d	The percentage change in **news** in the 90 days of the current quarter compared to news in the 90 days of the same quarter of last year (**news90_sqly**).
svol_level	The standard deviation of daily stock returns over the 90-day period ending 3 trading days prior to the report date of quarterly earnings.
abnormal_rvol_pre15d	The standard deviation of daily returns in the 15 days prior to the report date of quarterly earnings for the current quarter less the standard deviation of daily returns in the 15 days prior to the report date of quarterly earnings for the same quarter of last year.
ivol_level	The average level of implied volatility (**ivol**) for a 30-day duration, at-the-money option in the 5 trading days prior to the report date of quarterly earnings.
Δivol_pre15d	The natural logarithm of the ratio of **ivol** (for a 30-day duration standardized option) measured at the close of the day prior to the report date of quarterly earnings to **ivol** measured 15 days prior to the report date of quarterly earnings (i.e., the change in ivol in the 15 days prior to the earnings release).
Δivol_rdq	The natural logarithm of the ratio of **ivol** (for a 30-day duration standardized option) measured at the close of the report date of quarterly earnings to **ivol** measured at the close of the day prior to the report date of quarterly earnings (i.e., the change in ivol on the day of the earnings release).
Δivol_post15d	The natural logarithm of the ratio of **ivol** (for a 30-day duration standardized option) measured 15 days after the report date of quarterly earnings to **ivol** measured as of the close of the report date of quarterly earnings (i.e., the change in ivol in the 15 days following the earnings release).
avgΔivol_pre15d$_{4q}$	The average of **Δivol_pre15d** for the prior 4 quarters.
avgΔivol_post15d$_{4q}$	The average of **Δivol_post15d** for the prior 4 quarters.
Δivol_pre15d_unbundled	The natural logarithm of the ratio of **ivol** (for a 30-day duration standardized option) measured at the close of the day 15 days prior to the issuance of an

	unbundled forecast to **ivol** measured 1 day prior to the issuance of an unbundled forecast (i.e., the change in ivol in the 15 days prior to an unbundled forecast). **Δivol_pre15d_prior** is **Δivol_pre15d_unbundled** measured in the same time of the prior quarter. **Δivol_pre15d_sqly** is **Δivol_pre15d_unbundled** measured in the same time of the same quarter of last year.
vix_level	The level of the Chicago Board Options Exchange Volatility Index on the report date of quarterly earnings.
Δvix	The natural logarithm of the ratio of **vix_level** measured 1 day after the earnings announcement to the **vix_level** measured 1 day prior to the earnings announcement.

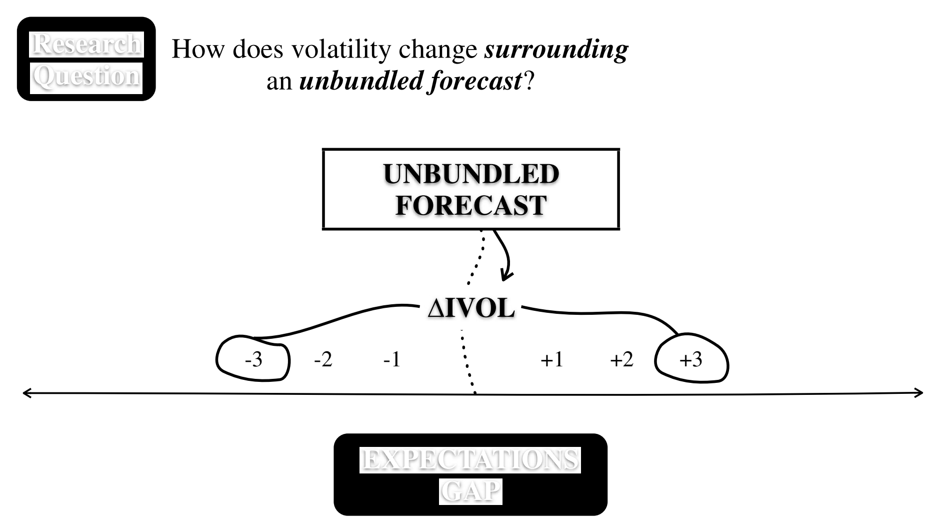
Figure 1 ■ Timeline and Setup

Panel A: This Study



We calculate volatility changes in windows leading up to (RQ #1) and windows following an earnings announcement (RQ #2) in bundled versus unbundled quarters for guiding firms.

Panel B: Rogers, Skinner and Van Buskirk (2009)



Rogers, Skinner and Van Buskirk (2009) calculate the change in volatility in the 7-day window surrounding an unbundled forecast and compare that to the change in volatility for non-forecasting firms facing similar gaps in earnings expectations.

Table 1 ■ Descriptive statistics

The sample consists of 107,307 firm-quarter observations from 2001 through 2010. This table provides descriptive statistics for the full sample partitioned based on the presence of bundled forecast. •••,••,• denote instances where the subsamples differ significantly at the 1%, 5%, and 10% level, respectively, for two-tailed tests. Please refer to the Appendix A for variable definitions.

Full sample (*n*=107,307), partitioned based on bundled earnings guidance

	bundle=1 (*n*=32,910)			bundle=0 (*n*=74,397)			Differences	
	Mean	Median	Std. Dev.	Mean	Median	St. Dev.	Mean	Median
recent_guider	1.000	1	0.000	0.433	0	0.495	•••	•••
guide_cqtr	0.620	1	0.485	0.114	0	0.317	•••	•••
bundle_prior	0.816	1	0.388	0.086	0	0.281	•••	•••
unbundled	0.214	0	0.467	0.037	0	0.266	•••	•••
surprise	0.001	0.001	0.034	–0.010	0.000	0.379	•••	•••
p_surprise	0.671	1	0.470	0.542	1	0.498	•••	•••
n_surprise	0.194	0	0.395	0.354	0	0.478	•••	•••
loss	0.083	0	0.277	0.253	0	0.435	•••	•••
dispersion	0.022	0.013	0.036	0.036	0.014	0.064	•••	•••
prior_ret	0.029	0.039	0.209	0.035	0.040	0.252	•••	•••
mve	6.796	1.355	21.981	3.775	0.594	15.519	•••	•••
numest	6.495	5.000	5.314	5.034	3.000	4.989	•••	•••
propmb	0.808	0.750	0.230	0.655	0.750	0.287	•••	•••
$\text{insidertrade}_{\text{qtr}}$	1.372	0.114	2.521	1.007	0.000	2.273	•••	•••
$\text{insidertrade}_{\text{post15d}}$	0.510	0.000	1.036	0.387	0.000	0.934	•••	•••
$\text{ceo/cfo\_trade}_{\text{qtr}}$	0.276	0.000	0.621	0.184	0.000	0.516	•••	•••
$\text{ceo/cfo\_trade}_{\text{post15d}}$	0.077	0.000	0.206	0.050	0.000	0.169	•••	•••
abnews15d	10.1%	0.0%	128.0%	–2.7%	–25.0%	122.0%	•••	•••
abnews30d	29.5%	0.0%	133.3%	15.7%	0.0%	129.7%	•••	•••
abnews90d	47.2%	9.1%	174.3%	37.0%	0.0%	158.9%	•••	•••

Table 2 ■ Volatility dynamics surrounding earnings announcements

This table provides descriptive statistics for the 47,947 firm-quarter observations of recent guiders with data available from OptionMetrics. (Results are nearly identical when tabulated for the full sample and all statistical differences remain.) •••,••,• denote instances where the two subsamples differ significantly at the 1%, 5%, and 10% level, respectively, for two-tailed tests. Please refer to the Appendix A for variable definitions.

Recent guider sample, partitioned based on bundled earnings guidance (bundle)

	bundle=1 (*n*=26,428)			bundle=0 (*n*=21,519)			Differences	
	Mean	Median	St. Dev.	Mean	Median	St. Dev.	Mean	Median
svol_level	0.025	0.021	0.014	0.031	0.026	0.019	•••	•••
ivol_level	0.447	0.408	0.198	0.512	0.468	0.233	•••	•••
Δivol_pre15d	0.042	0.032	0.162	0.026	0.016	0.182	•••	•••
Δivol_pre3d	0.022	0.017	0.108	0.017	0.011	0.111	•••	•••
Δivol_rdq	–0.028	–0.019	0.161	–0.020	–0.013	0.160	•••	•••
Δivol_post3d	–0.080	–0.058	0.174	–0.056	–0.040	0.173	•••	•••
Δivol_post15d	–0.086	–0.073	0.193	–0.066	–0.059	0.199	•••	•••
vix_level	0.219	0.201	0.108	0.221	0.207	0.096	•••	•••

Table 3 ■ Increased uncertainty and the likelihood of supplying a forecast

This analysis tests the likelihood that an earnings announcement is bundled with a forecast. We expect that pre-earnings announcement ***increases*** in uncertainty are associated with an increased likelihood of bundled guidance. The full sample consists of 107,307 firm-quarter observations from 2001 through 2010; the availability of OptionMetrics data reduces sample size (as indicated) in all specifications that include implied volatility measures. In specification [1], ***vol_level=svol_level***. In specifications [2] and [3], ***vol_level=ivol_level***. Note: ***bundle_prior*** and ***guide_cqtr*** are highly correlated. Following Rogers and Van Buskirk (2013) we include both in our tabulated regressions. All of our results remain when we re-estimate our regressions excluding either ***bundle_prior*** or ***guide_cqtr***. •••,••,• denote significance at the 1%, 5%, and 10% level, respectively, for two-tailed tests. Refer to Appendix A for variable definitions.

		Dependent variable = BUNDLE. Coefficient effect (p-value below)		
		All Firms		Recent Guiders Only
		[1]	[2]	[3]
Proxy for uncertainty:				
abnormal_news		×		
Δivol_pre15d			×	×
Δuncertainty	(+)	+0.020• 0.051	+0.043••• <.0001	+0.067••• <.0001
avgΔuncertainty$_{4q}$	(+)	−0.020••• <.0001	+0.034••• 0.006	+0.042•• 0.027
vol_level	(−)	−0.723••• <.0001	−0.061••• <.0001	−0.088••• <.0001
guide_cqtr	(+)	+0.070••• <.0001	+0.069••• <.0001	+0.065••• <.0001
unbundled	(+)	+0.037••• <.0001	+0.042••• <.0001	+0.038••• <.0001
bundle_prior	(+)	+0.313••• <.0001	+0.341••• <.0001	+0.380••• <.0001
ceo/cfo_trade$_{qtr}$	(+)	+0.011••• <.0001	+0.012••• <.0001	+0.016••• <.0001
ceo/cfo_trade$_{post15d}$	(+)	+0.010• 0.082	+0.022••• 0.001	+0.026••• 0.007

Other controls included: *Industry effects, time effects, level of and changes in the VIX (i.e., vix_level, Δvix), Rogers and Van Buskirk (2013) variables (i.e., p_surprise, n_surprise, |surprise|, loss, dispersion, prior_ret, mve, numest, probmb).*

	[1]	[2]	[3]
n	107,307	72,016	47,947
Pseudo R^2	65.4%	65.1%	50.2%
ROC area	0.925	0.919	0.859

Table 4 ■ Is the run-up in volatility related to the market's expectation of guidance?

Panel A: Is the run-up in volatility greater when the market is more likely to expect guidance? Is the run-up in volatility greater when the firm actually gives guidance?

In this analysis, we test whether the run-up in volatility prior to earnings announcements (as measured by Δ***ivol_pre15d***) is greater when bundled guidance is actually given in the current quarter (i.e., ***bundle*****=1** as compared to ***bundle*****=0**) after we narrow our focus to firm-quarters in which investors are ***likely*** to expect guidance or to firm-quarters in which investors are ***unlikely*** to expect guidance. If run-ups in volatility are driven by investors' expectations of forthcoming guidance, we expect to see greater run-ups when guidance is ***likely*** (i.e., [a]>[b]). In contrast, if run-ups in volatility reflect managers' reactions to rising volatility, we expect to see greater run-ups for the firm-quarters where guidance is actually given (i.e., [1]>[3]; [2]>[4]), regardless of the expectation of guidance. •••,••,• denote significance at the 1%, 5%, and 10% level, respectively, for two-tailed tests. Refer to Appendix A for variable definitions.

		BUNDLE=1		BUNDLE=0		Differences	
		Mean	Median	Mean	Median	Mean	Median
						Managerial reaction?	
		[1]	[2]	[3]	[4]	[1]>[3]	[2]>[4]
		GROUP 1		*GROUP 2*			
LIKELY GUIDERS: (*bundle_sqly=1*) and (*bundle_prior=1*) **Bundle 87.2% of the time**							
Δivol_pre15d	**[a]**	+0.043	+0.036	+0.023	+0.017	+0.020 ••• <0.001	+0.019 ••• <0.001
n		13,498		1,974			
		GROUP 3		*GROUP 4*			
UNLIKELY GUIDERS: (*bundle_sqly=0*) and (*bundle_prior=0*) **Bundle 24.2% of the time**							
Δivol_pre15d	**[b]**	+0.044	+0.033	+0.031	+0.022	+0.013 •• 0.029	+0.011 •• 0.019
n		941		2,951			
					Difference ([a]-[b])	+0.007 0.213	+0.008 0.201
Differences			*Investor anticipation?*				
Δivol_pre15d	**[a]>[b]**	−0.001 0.857	+0.003 0.768	−0.008 0.144	−0.005 0.364		

Table 4 (cont.) ■ Is the run-up in volatility related to the market's expectation of guidance?

Panel B: Holding constant the expectation of guidance

This analysis tests the likelihood that an earnings announcement is bundled with a forecast. In an effort to limit variation in the extent to which investors might reasonably anticipate guidance (i.e., to hold constant the market's expectation of guidance), we examine subsamples where investors are ***likely/unlikely*** to anticipate the presence of the guidance. In all cases, we expect that ***increases*** in uncertainty (as measured by Δ***ivol_pre15d***) are associated with an increased likelihood of bundled guidance. ***LIKELY TO EXPECT GUIDANCE:*** In [1], we focus on the firm-quarters where investors are ***likely*** to expect guidance. In particular, we examine firm-quarters where managers of guiding firms bundled in the same quarter of last year and they also bundled in the prior quarter (***bundle_sqly*=1 and *bundle_prior*=1**); in this subsample, managers guide 87.2% of the time. ***UNLIKELY TO EXPECT GUIDANCE:*** In specification [2], we focus on the firm-quarters where investors are ***unlikely*** to expect guidance. In particular, we examine firm-quarters where managers of guiding firms did not bundle in the same quarter of last year and they also did not bundle in the prior quarter (***bundle_sqly*=0 and *bundle_prior*=0**); in this subsample, managers guide only 24.2% of the time. In specification [3], we use the prediction model in Table 3 to generate the quartile of firm-quarters of the full sample where bundled guidance is least likely to be expected in the current quarter; in this bottom quartile of firm-quarters, managers guide only 2.5% of the time. •••,••,• denote significance at the 1%, 5%, and 10% level, respectively, for two-tailed tests. Refer to Appendix A for variable definitions.

Dependent variable = BUNDLE.
Coefficient effect (t-stat below)

		EXPECT: Likely Guiders [1]	DO NOT EXPECT: Unlikely Guiders [2]	Unexpected Guiders [3]
Δuncertainty	(+)	+0.058 •••	+0.093 •••	+0.015 ••
		<.0001	0.010	0.022
avgΔuncertainty$_{4q}$	(+)	−0.046	−0.032	+0.010
		0.129	0.619	0.391
guide_cqtr	(+)	+0.007	+0.117 •••	+0.045 •••
		0.252	<.0001	<.0001
unbundled	(+)	+0.030 •••	+0.092 •••	+0.053 •••
		<.0001	<.0001	<.0001
bundled_prior	(+)	N.A.	N.A.	N.A.
ceo/cfo_trade$_{qtr}$	(+)	+0.022 •••	+0.004	+0.005
		<.0001	0.763	0.123
ceo/cfo_trade$_{post15d}$	(+)	+0.038 •••	+0.073 ••	+0.001
		0.008	0.036	0.976

Other controls included: *Industry effects, time effects, level of and changes in the VIX (i.e., vix_level, Δvix), vol_level, Rogers and Van Buskirk (2013) variables (i.e., p_surprise, n_surprise, |surprise|, loss, dispersion, prior_ret, mve, numest, probmb).*

	[1]	[2]	[3]
n	15,472	3,892	16,356
% BUNDLE=1	87.2%	24.2%	2.5%
Pseudo R^2	5.6%	22.2%	11.6%
ROC area	0.648	0.758	0.772

Table 5 ■ Is there a run-up in *realized* volatility prior to guidance?

This analysis tests the likelihood that an earnings announcement is bundled with a forecast. In these tests we replace our forward-looking implied volatility measure of uncertainty (i.e., ***Δivol_pre15d***) with a backward-looking realized volatility measure of uncertainty (i.e., ***abnormal_rvol_pre15d***). Specifically, ***abnormal_rvol_pre15d*** equals the standard deviation of daily returns in the 15 days prior to the report date of quarterly earnings for the current quarter less the standard deviation of daily returns in the 15 days prior to the report date of quarterly earnings for the same quarter of last year. If the increase in implied volatility solely reflects investors' anticipation of guidance, then backward-looking realized volatility should not be associated with an increased likelihood of bundled guidance. If the increase in implied volatility reflects a managerial reaction to rising uncertainty, we expect that abnormal realized volatility is associated with an increased likelihood of bundled guidance. •••,••,• denote significance at the 1%, 5%, and 10% level, respectively, for two-tailed tests. Refer to Appendix A for variable definitions.

		Dependent variable = BUNDLE. Coefficient effect (p-value below)	
		All Firms	**Recent Guiders Only**
		[1]	**[2]**
abnormal_rvol_pre15d	(+)	+0.188•••	+0.365•••
		<.0001	<.0001
vol_level	(–)	–0.954•••	–1.668•••
		<.0001	<.0001
guide_cqtr	(+)	+0.068•••	+0.068•••
		<.0001	<.0001
unbundled	(+)	+0.043•••	+0.041•••
		<.0001	<.0001
bundle_prior	(+)	+0.318•••	+0.378•••
		<.0001	<.0001
$\text{ceo/cfo\_trade}_{qtr}$	(+)	+0.012•••	+0.016•••
		<.0001	<.0001
$\text{ceo/cfo\_trade}_{post15d}$	(+)	+0.009	+0.009
		0.118	0.278

Other controls included: *Industry effects, time effects, level of and changes in the VIX (i.e., vix_level, Δvix), vol_level, Rogers and Van Buskirk (2013) variables (i.e., p_surprise, n_surprise, |surprise|, loss, dispersion, prior_ret, mve, numest, probmb).*

n		107,307	65,116
Pseudo R^2		66.6%	51.7%
ROC area		0.927	0.866

Table 6 ■ Is there a run-up in volatility prior to *unbundled* guidance?
In this analysis, we test whether the run-up in volatility prior to an unbundled forecast (as measured by Δ***ivol_pre15d_unbundled***) is greater than the run-up in volatility during the same time in the prior quarter (as measured by Δ***ivol_pre15d_unbundled_prior***) or than the run-up in volatility during the same time in the same quarter last year (as measured by Δ***ivol_pre15d_unbundled_sqly***). If unbundled guidance is unexpected by the market, then evidence of a significant difference between the run-up prior to an unbundled forecast as compared to the run-up during the same time last quarter (i.e., [a]>[b]) or same time in the same quarter of last year (i.e., [a]>[c]) supports the hypothesis that managers react to rising volatility with guidance. We identify contaminating news events in the 3-day window prior to the date of unbundled guidance using the Key Developments database from Capital IQ. Because of data limitations from Capital IQ, we limit this analysis to 6,197 unbundled forecasts occurring after 2004. Of those 6,197 forecasts, 3,655 (59%) contain a contaminating news item in the 3-day window prior to and including the date of the forecast, leaving an uncontaminated sample of 2,542 forecasts. If the same time in the prior quarter or same time in the same quarter last year also includes a contaminating event, we move the window to the closest uncontaminated window. If *uncontaminated* unbundled guidance is unexpected by the market, then evidence of a significant difference between the run-up prior to an unbundled forecast as compared to the run-up during the same time last quarter (i.e., [a]>[b]) or same time in the same quarter of last year (i.e., [a]>[c]) supports the hypothesis that managers react to rising volatility with guidance. •••,••,• denote significance at the 1%, 5%, and 10% level, respectively, for two-tailed tests. Refer to Appendix A for variable definitions.

		Unbundled Guidance *n* **= 8,039**				***Uncontaminated**** **Unbundled Guidance** *n* **= 2,542**			
		Mean		**Med.**		**Mean**		**Med.**	
Δivol_pre15d_unbundled	**[a]**	0.026		0.016		0.016		0.014	
Δivol_pre15d_prior	**[b]**	0.005		0.000		-0.002		-0.001	
Δivol_pre15d_sqly	**[c]**	0.003		0.002		0.001		0.001	
Differences									
[a]>[b]?		0.021	•••	0.016	•••	0.018	•••	0.015	•••
		<0.001		<0.001		<0.001		<0.001	
[a]>[c]?		0.023	•••	0.014	•••	0.015	••	0.013	•••
		<0.001		<0.001		0.013		0.010	

***Note:** Of the forecasts that accompany other value-relevant news, the most frequent contaminating news events are:

Conference presentation calls	**21%**
Client announcements	**19%**
CEO/CFO and other executive board change announcements	**17%**
Product-related announcements	**14%**
Monthly sales announcements/calls	**9%**

Table 7 ■ What explains changes in volatility following earnings announcements?

This analysis examines the relation between the presence of guidance with the current quarter's earnings announcement (i.e., ***bundle*=1**) and the run-down in volatility after the announcement of earnings (i.e., Δ***ivol_post15d***). We expect to observe larger post-earnings-announcement reductions (i.e., more negative changes) in volatility for earnings announcements bundled with guidance. Results are robust to categorizing forecast news based on conditional analyst forecast revisions, as described in Rogers and Van Buskirk (2013). •••,••,• denote significance at the 1%, 5%, and 10% level, respectively, for two-tailed tests. Refer to Appendix A for variable definitions.

		Dependent variable = Δivol_post15d. Coefficient effect (p-value below)					
Earnings news =		**NEGATIVE**		**NEUTRAL**		**POSITIVE**	
		[1]	[2]	[3]	[4]	[5]	[6]
bundle	(–)	–0.014•••		–0.011••		–0.016•••	
		0.002		0.013		<.0001	
negative_bundle	(–)		–0.015•••		–0.010••		–0.018•••
			0.0001		0.043		<.0001
positive_bundle	(–)		–0.014••		–0.012•		–0.015•••
			0.046		0.091		<.0001
neutral_bundle	(–)		–0.015••		–0.011•		–0.016•••
			0.036		0.075		<.0001
avgΔivol_post15d$_{4q}$	(+)	+0.160•••	+0.160•••	+0.279•••	+0.279•••	+0.219•••	+0.219•••
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
Δivol_pre15d	(–)	–0.282•••	–0.282•••	–0.344•••	–0.344•••	–0.305•••	–0.305•••
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
Δivol_rdq	(–)	–0.596•••	–0.596•••	–0.613•••	–0.613•••	–0.667•••	–0.667•••
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
|surprise|	(?)	+0.243••	+0.244••	N.A.	N.A.	+0.465•••	+0.462•••
		0.012	0.012			<.0001	<.0001
ceo/cfo_trade$_{qtr}$	(?)	–0.004	–0.004	+0.001	+0.001	+0.001	+0.001
		0.315	0.314	0.874	0.859	0.556	0.579
ceo/cfo_trade$_{post15d}$	(?)	+0.013	–0.013	–0.020•	–0.035•	–0.009•	–0.010••
		0.254	0.255	0.089	0.093	0.055	0.050
log(Δvix)	(+)	+0.210•••	+0.210•••	+0.180•••	+0.180•••	+0.212•••	+0.212•••
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
vix	(+)	+0.230•••	+0.231•••	+0.236•••	+0.235•••	+0.209•••	+0.208•••
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
vol_level	(?)	–0.157•••	–0.157•••	–0.154•••	–0.154•••	–0.174•••	–0.174•••
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
log(mve)	(–)	–0.017•••	–0.017•••	–0.014•••	–0.014•••	–0.014•••	–0.014•••
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
log(numest)	(–)	–0.001	–0.001	–0.002	–0.002	–0.001	–0.001
		0.831	0.826	0.583	0.541	0.883	0.908
dispersion	(–)	–0.003	–0.004	–0.128	–0.128	–0.035	–0.035
		0.897	0.896	0.119	0.133	0.136	0.138
Industry and time effects included.							
n		9,657	9,657	5,810	5,810	27,891	27,891
Adjusted R^2		27.1%	27.1%	33.0%	33.0%	36.5%	36.5%

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Does return dispersion explain the accrual and investment anomalies?☆

Doina C. Chichernea, Anthony D. Holder*, Alex Petkevich

College of Business and Innovation, University of Toledo, Mail Stop 103, 2801 W. Bancroft St., Toledo, OH 43606-3390, USA

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ABSTRACT

Recent research shows that high return dispersion (RD) is associated with economic conditions characterized by high discount rates, which are not conducive to growth and investment. We propose that RD risk can explain the accrual and investment anomalies. We conduct asset-pricing tests that include RD as a potential risk factor and show that low-accrual and low-investment firms have significantly higher exposure to the risk captured by RD. RD significantly explains future returns and the excess returns to accrual and investment hedge portfolios shrink in magnitude and become insignificant during periods of low RD. We conclude that risk explains the accrual and investment anomalies.

1. Introduction

The accrual anomaly is one of the most long-standing asset-pricing anomalies [see Kothari (2001) and Richardson et al. (2010) for comprehensive reviews of the phenomenon]. Since Sloan (1996) first documented abnormally low (high) stock returns for high-accrual (low-accrual) stocks, the literature has sought to explain the accrual anomaly and its pervasiveness.[1] While some argue that it went away in the years leading up to the financial crisis triggered in 2008 (Green et al., 2011), its subsequent reappearance has reopened the debate about its underlying source. Two main competing explanations have been put forth: (1) investors fixate on bottom-line earnings and do not understand how the persistence of the cash flow and accrual components differs (Sloan, 1996; Richardson et al., 2005) and (2) accruals matter because they capture investment and growth information, which can affect returns because of a general growth mispricing effect (Fairfield et al., 2003) or because of rational risk pricing (Khan, 2008; Wu et al., 2010). Disentangling a mispricing effect from risk pricing in

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* Corresponding author. Tel.: +1 419 530 2560.
E-mail addresses: doina.chichernea@utoledo.edu (D.C. Chichernea), anthony.holder@utoledo.edu (A.D. Holder), alexey.petkevich@utoledo.edu (A. Petkevich).

[1] The accrual anomaly is one of the most robust anomalies documented to date. Fama and French (2008) identify it as one of the anomalies that they cannot explain, persistent in all size groups and using both sorts and regression analyses. Avramov et al. (2013) highlight it as the only exception in their list of anomalies that is robust among high and low credit risk firms in all credit conditions.

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the context of the accrual anomaly is difficult and remains an open debate (Lewellen, 2010), especially given the fact that the firm-level investment and accrual measures are intrinsically correlated (Richardson et al., 2010).

We contribute to this debate by providing a risk-based explanation for both the accrual and investment anomalies. We show that the profitability of the accrual and investment strategies varies systematically over time and that this variation is significantly related to cross-sectional return dispersion (RD), which is a macroeconomic variable linked with other growth-related anomalies. Low-accrual and low-investment portfolios carry a positive risk premium as compensation for RD risk and after 2008, as RD increases, profits from the accrual and investment strategies regain significance. Our results support the notion that accruals contain fundamental investment and growth information and that returns to both the accrual and investment strategies are consistent with rational risk pricing.

The link between RD, aggregate states of the economy, and stock returns has been formally established by models proposed by Gomes et al. (2003) and Zhang (2005). These models predict that RD can be a useful macroeconomic state variable, as it contains information related to general investing conditions faced by firms. High RD periods indicate economic states with higher discount rates, which are not conducive to investment or growth. Jiang (2010) shows, theoretically, that RD is priced in the cross section and argues that the variable captures risk associated with aggregate economic growth and fundamental economic restructuring. Empirical literature provides evidence that RD indicates general macroeconomic conditions and that it is a useful proxy for growth and restructuring-related risk.[2]

If RD efficiently reveals macroeconomic states with high growth-related risks and accruals reflect growth information, then we expect that periods of higher (lower) RD correspond to higher (lower) returns from an accrual-based strategy. Furthermore, we expect that RD explains the time series variation in the profitability of an investment-based strategy, which is exposed to the same type of growth-related risks. Therefore, we hypothesize that both strategies are driven by the same macroeconomic conditions, which can be captured by RD. Empirically, our proposition implies that low-accrual and low-investment firms have higher exposure to RD risk and, thus, generate higher expected returns as a compensation for this risk. We further hypothesize that the profitability of these strategies is time varying and positively correlated with RD. Our results support both of these hypotheses.

Our analysis begins by examining the performance of hedge accrual and investment portfolios (low minus high quintiles). For the entire sample period (1965–2011), the accrual and investment strategies produce annualized raw returns of 7.34% and 12.93%, respectively. Consistent with Green et al. (2011), returns from the accrual strategy peak prior to 1995 (when Sloan first documented the anomaly), partly dissipate from 1996 to 2003, and then become essentially zero between 2004 and 2008. However, when the sample is extended to between 2009 and 2011, significant positive returns reappear. Subsample analysis reveals that the investment strategy exhibits very similar behavior. The reappearance of the accrual and investment anomalies after 2008, when RD has significantly increased, is consistent with our proposed explanation.

We confirm that RD indicates risk by showing that it is significantly priced in the cross section of individual stock returns. Using a two-stage Fama and MacBeth (1973) procedure, we find that RD carries a positive and significant premium under different model specifications. Furthermore, RD is positively priced among the accrual and investment portfolios in the cross section, which is consistent with the idea that low-accrual and low-investment portfolios have significantly higher exposure to the risk captured by RD.

We further examine whether RD can explain the time series variation in the profitability of the accrual and investment strategies. First, we show that accrual and investment hedge portfolios have significant exposure to RD, meaning that low- (high-) accrual and investment portfolios have significantly higher (lower) RD loadings. Specifically, a 1% increase in return dispersion generates a 7.7 basis points increase in the returns of the accrual hedge portfolio and a 12 basis points increase in the investment hedge portfolio. To put this into perspective, the average return of the accrual (investment) hedge portfolio over our sample period is 57 (100) basis points per month. In the presence of RD, the intercepts for the accrual hedge portfolio become insignificant, and for the investment hedge portfolio, they substantially shrink. The explanatory power of RD is not subsumed by other commonly used macroeconomic variables, such as dividend yield, term spread, default spread, and short-term interest rates.

Second, we quantify the economic significance of the RD effect for raw and risk-adjusted returns by documenting the incremental magnitude of the accrual and investment strategies during economic states of high RD. The accrual premium is almost five times higher during states with high RD. The investment premium produces 1.37% per month during high return dispersion states and essentially zero if return dispersion is low. The differences between the risk-adjusted returns present approximately the same magnitudes.

Documenting a significant relation between RD and the accrual and investment anomalies offers at least two distinct contributions to the literature. First, the interpretation of results showing a link between the accrual and investment anomalies is subject to intense debate. For example, Wu et al. (2010) argue that the q-theory (e.g., Tobin, 1969) provides a risk-based explanation for the accrual anomaly, suggesting that its driving force is real investment. However, Richardson et al. (2010) dispute these findings, noting that investment and accruals are mechanically correlated and, thus, that the investment proxy proposed by Wu et al. (2010) cannot be used to explain the accrual anomaly.[3] Our approach of using a

[2] RD is related to unemployment rates (Loungani et al., 1990), business cycles (Christie and Huang, 1994), momentum (Connolly and Stivers, 2003), turnover and macroeconomic news (Connolly and Stivers, 2006), and risk associated with fundamental restructuring (Demirer and Jategaonkar, 2013).

[3] Richardson et al. (2005) make the point that the link between accruals and growth/investment by itself is not sufficient to distinguish between mispricing and risk-based explanations. For example, on the one hand, papers such as Fairfield et al. (2003), Bradshaw et al. (2006), and Dechow et al.

macroeconomic state variable such as RD to explain both of these phenomena allows us to investigate the investment hypothesis as a risk-based explanation for the accrual puzzle without being subject to the mechanical correlation caveat. Second, we explain the predictive power of accruals and investments by relating a model of aggregate risk to these firm characteristics. In doing so, our results contribute to the difficult task of disentangling risk from mispricing explanations for the accrual and investment anomalies as discussed by Lewellen (2010). We provide an economic intuition grounded in theory that lends support to a risk-based explanation for both anomalies, thus unifying seemingly inconsistent results from the literature.

The paper proceeds as follows. In Section 2, we discuss the related literature and present our hypotheses. Section 3 describes our sample, variables, and methodology. In Section 4, we present our main empirical results and discuss their implications. Section 5 discusses the robustness of our conclusions to the use of alternative measures and specifications, and Section 6 concludes.

2. Background and hypotheses development

This section describes the background for our study and develops our testable hypotheses concerning the roles of risk and RD for the accrual and investment anomalies. Section 2.1 discusses the concept of return dispersion. Section 2.2 reviews the relevant literature on the accrual anomaly and its connection with investments and RD, and it develops our testable hypotheses.

2.1. What is return dispersion?

Recent theoretical and empirical work finds that the stock market's cross-sectional dispersion in returns is a leading countercyclical indicator of aggregate market states. The theoretical link between RD, the state of the aggregate economy, and growth has been established by Gomes et al. (2003). By explicitly modeling the production and investment decisions of firms in a general equilibrium framework, the authors show how the cross section of stock prices and returns depends on the state of the economy. Their model has two sources of risk: aggregate productivity shocks (such as changes in the general productivity state of the economy that determine the common productivity of all available projects) and idiosyncratic productivity shocks (such as changes in firm-specific characteristics that determine the productivity of a given firm).

The basic idea is that the cross-sectional distribution of expected returns is determined by a number of aggregate variables as well as a number of firm-specific characteristics.[4] During good economic states, differences among firms are less likely to matter, as low discount rates generate an increase in the overall scale of production, and, in turn, an overall increase in stock prices (hence, a low dispersion among firms' returns). During bad aggregate states, the difference between firm characteristics becomes more important, as firms face different adjustment costs. This results in a high dispersion among firms' risks and, in turn, high dispersion among their returns. The net result is that variation in the cross-sectional dispersion of stock returns indicates variation in the state of the economy; i.e., RD is higher in low productivity states and lower in high productivity states.[5]

The Jiang (2010) theoretical model presents additional intuition for including RD directly in the pricing kernel. This study argues that RD captures two dimensions of systematic risk. One is homogenous and is directly linked with aggregate economic growth and market states, and the other is heterogeneous and relates to fundamental economic restructuring (reallocation of resources), which is associated with future aggregate economic growth and fluctuation.

Empirical literature validates the role of RD as a meaningful variable reflecting macroeconomic conditions and capturing risk related to growth and restructuring. Loungani et al. (1990) provide evidence that RD predicts high unemployment rates, suggesting that RD may be related to economic restructuring. Christie and Huang (1994) find that RD is associated with the business cycle (RD is higher during economic recessions). Connolly and Stivers (2003) show that momentum (reversal) is positively (negatively) related to future RD. Stivers (2003) and Connolly and Stivers (2006) find that RD contains incremental information about the future idiosyncratic volatility and market volatility and relate RD to turnover and macroeconomic news. Demirer and Jategaonkar (2013) present results supporting Jiang's argument that RD captures shocks related to fundamental economic restructuring. Overall, theoretical and empirical literature finds that RD contains information about economic states or economic transitions which is not captured by commonly used risk factors.

(*footnote continued*)
(2008) propose that investors overreact to growth information contained in accruals and, therefore, support a mispricing hypothesis. On the other hand, studies such as Wu et al. (2010) and Zhang (2007) interpret this link in the context of a risk-based hypothesis.

[4] The size of the firm and the ratio of the firm's production scale to its market value are examples of such firm-specific characteristics. These can be empirically proxied by the book-to-market ratio or the earnings-to-price ratio.

[5] The Gomes et al. (2003) model not only introduces a link between RD and aggregate productivity states, but also implies that returns to factors such as size and book-to-market will be negatively related to these aggregate states (and, therefore, positively related to RD). To the extent that accruals reflect a firm's investment and growth characteristics, the returns from the accrual strategy will exhibit the same pattern (i.e., positive relation to RD).

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2.2. Accruals, investments, and return dispersion

The interpretation of the accrual anomaly has sparked intense debate in the literature, with explanations for the phenomenon generally falling into one of two categories: mispricing or risk. On the surface, the accrual anomaly suggests that the market misunderstands the financial accounting information that firms report. Proponents of the earnings fixation hypothesis, which is advocated by Sloan (1996) and other scholars, theorize that investors fixate on bottom-line income and are unable to differentiate between cash earnings and non-cash earnings (accruals). Other studies such as Fairfield et al. (2003), Bradshaw et al. (2006), and Dechow et al. (2008) propose that investors, in general, overreact to growth information contained in accruals. Regardless of the exact channel, the common hypothesis in this strain of literature is that mispricing generates the accrual effect in returns.

Several other studies suggest that the accrual anomaly may reflect risk pricing. For example, Zhang (2007) finds that the magnitude of the accrual anomaly is increasing with the investment information contained in accruals (proxied by the covariance between accruals and employee growth). Wu et al. (2010) present an optimal investment hypothesis consistent with rationality. Khan (2008) shows that a four-factor asset pricing model, which includes cash flow news and discount rate news factors, explains a significant amount of the accrual anomaly. The common hypothesis in this literature track is that the returns to the accrual strategy reflect a premium for the risk associated with low accruals.[6]

Consistent with the inherent link between accruals and asset growth, several studies investigate the relation between the accrual anomaly and growth. For example, Fairfield et al. (2003) interpret accruals as growth in short-term net operating assets (NOA) and argue that the accrual anomaly is a special instance of a more general anomaly that is based on growth in net operating assets. However, Richardson et al. (2005) argue that the results are consistent with the persistence hypothesis of Sloan (1996), as both accruals and growth in long-term NOA are highly subjective (less persistent) and, hence, negatively related to future stock returns. Zhang (2007) shows that accruals reflect fundamental investment information that co-varies in accordance with the other growth attributes of firms and, therefore, finds that the accrual anomaly is consistent with the investment hypothesis. Wu et al. (2010) also argue that real investment is the driving force behind the accrual anomaly and propose an optimal investment hypothesis.

We argue that the growth risk captured by RD is relevant for the accrual and investment anomalies. A necessary but not sufficient condition for our argument is that RD is positively priced in the cross section of returns (i.e., stocks with higher RD risk exposure require a positive risk premium). If that is the case, we can argue that the higher performance of low-accrual and low-investment portfolios is justified by their higher exposure to RD risk. Hence, our first hypothesis relates to the cross section of returns.

H1. RD carries a positive and significant risk premium in the cross section of accrual and investment portfolios.

RD serves as a macroeconomic state variable that contains growth-related information. If the accrual and investment information reflect growth risk (instead of mispricing), theory suggests that returns from these strategies will depend on states of aggregate productivity in the economy as captured by RD. Therefore, returns from an accrual strategy will be related to states of aggregate productivity in the economy (assuming that accruals matter because they contain investment- or growth-related information). Furthermore, returns from an investment strategy will behave similarly to returns from an accrual strategy in terms of their relation with RD. Our second hypothesis, therefore, relates to the time series variation in these anomalies.

H2. The accrual and investment excess returns vary systematically with states of the economy as captured by RD.

The second hypothesis implies that we expect to observe significant differences between the returns of accrual (investment) strategies during periods of high RD relative to periods of low RD (that is, their profitability should be stronger during periods of high RD and weaker or nonexistent during periods of low RD). In addition, the predictive ability of accruals and investments for returns should vary significantly with states of RD, thus generating the time variation in the profitability of these strategies. Supporting evidence for H1 and H2 would suggest that the link with investment and growth is consistent with a risk-based explanation.[7] The accruals (investment) premium is observed because firms with low accruals (investments) have higher exposure to RD risk relative to firms with high accruals (investments).

3. Data and methodology

We obtain financial statement data from the annual Compustat file, and stock return data are obtained from the monthly CRSP files for the period from 1965 to 2011. Consistent with previous research, we drop financials (SIC codes 6000–6999) and utilities (SIC codes 4900–4999), as these two industries are highly regulated and the measures of accruals and

[6] The connection between accruals and conditional equity premiums has also been studied at the aggregate level. Guo and Jiang (2011) find that accruals are closely correlated with the determinants of conditional equity premiums at both the firm and aggregate levels. Our results and interpretation are consistent with their paper.

[7] Under the persistence or mispricing framework, no obvious reason exists to expect a relation between the accrual anomaly and a macroeconomic state variable, such as RD. Furthermore, no obvious reason exists to expect that investments and accrual strategies present similar behavior in relation with RD.

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investments differ significantly from those in other industries. We also eliminate firms with a negative book value of equity. Following Sloan (1996), we calculate total accruals using the indirect balance sheet method as the change in non-cash current assets less the change in current liabilities excluding the change in short-term debt and the change in taxes payable minus depreciation and amortization expense and deflated by lagged total assets[8]:

$$\text{Accrual}_t = \big[(\Delta\text{Current Assets}_t - \Delta\text{Cash}_t) - (\Delta\text{Current Liabilities}_t - \Delta\text{Short}-\text{term Debt}_t - \Delta\text{Taxes Payable}_t) \\ -\text{Depreciation and Amortization Expense}_t\big]/\text{Total Assets}_{t-1} \quad (1)$$

Our investments-to-assets measure is built following Wu et al. (2010) and Lyandres et al. (2008), as the annual change in gross property, plant and equipment plus the annual change in inventories divided by the lagged book value of assets:

$$I/A_t = (\Delta\text{PPE\_Gross}_t + \Delta\text{Inventories}_t)/\text{Total Assets}_{t-1} \quad (2)$$

Our final Compustat sample includes 141,152 firm-year observations with non-missing accruals. We report descriptive statistics on the final Compustat annual data set, in which we annualize the corresponding returns.

The descriptive statistics for the variables of interest presented in Panels A and B of Table 1 are comparable with the results from previous studies (see Zhang (2007), for accruals and Wu et al. (2010), for investments). We follow the literature and annually winsorize variables at 1% and 99% to avoid the effect of outliers (e.g., Zhang, 2007). Accruals tend to be negative, with a mean of −0.026 and a median of −0.031 (compared with −0.023 and −0.030, respectively, presented by Zhang (2007)). Investments-to-assets have a mean of 0.11 (compared with 0.17 presented by Wu et al. (2010)). Future stock returns (defined as buy-and-hold annual returns beginning from the fifth month after a firm's fiscal year end) have a mean of 13.6% and a median of 4%. Similar to Zhang (2007), our correlation matrix shows that returns and growth variables are negatively correlated and that accruals and growth variables are positively correlated (which can be interpreted as preliminary evidence supporting the argument that accruals capture some aspect of growth).

To calculate monthly RD, we use CRSP to obtain returns for all ordinary common shares (share code 10 or 11) traded on NYSE, AMEX and NASDAQ during the period from July 1963 to December 2011. We define RD based on individual stock returns as

$$\text{RD}_t = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(R_{i,t}-R_{M,t})^2} \quad (3)$$

where n is the number of stocks in the market, $R_{i,t}$ is the return of individual stock i in month t, and $R_{M,t}$ is the equal-weighted average market return. Although this measure is similar to those proposed by Jiang (2010) and Stivers and Sun (2010), some important differences exist. Stivers and Sun (2010) use one hundred size and book-to-market portfolios instead of individual stocks for their RD, and Jiang (2010) uses individual stocks that are listed on NYSE and AMEX and excludes the stocks in the lowest size decile. These conditions effectively reduce variation in RD and, thus, eliminate potentially useful information. We argue that a measure that is based on the full universe of individual stocks is more informative for the cross section of returns.[9]

To control for the market return, we construct a relative return dispersion monthly measure (RRD) that is orthogonal to the simple monthly market return and the absolute market return. Following Stivers and Sun (2010), we define RRD as the estimated residual (ε_t) from the following regression:

$$\text{RD}_t = \gamma_0 + \gamma_1 R_{M,t} + \gamma_2 |R_{M,t}| + \varepsilon_t, \quad (4)$$

where RD_t is the simple monthly RD from Eq. (3), $R_{M,t}$ is the concurrent market-level stock return (we use the CRSP value-weighted market index), $|R_{M,t}|$ is the absolute value of the market-level return, and the γs are coefficients to be estimated. Because estimating Eq. (4) over the full sample can introduce a look-ahead bias (an analyst will not have the future market information to obtain the errors in that fashion), we estimate this equation using expanding windows.[10] Following Stivers and Sun (2010), we build three-month moving-average expressions for RD and RRD (RD_{13} and RRD_{13}, respectively, with subscript 13 referring to months $t-1$ to $t-3$). Our main tabulated results pertain to RRD. We report descriptive statistics of our return dispersion measures in Panel C of Table 1 and graph the evolution of RD_{13} and RRD_{13} in Fig. 1 (for comparison with previous literature).

A couple of elements are worth discussion when comparing our RD measures with those used in the literature. First, the mean values are significantly higher than those presented by Jiang (2010) and Stivers and Sun (2010), and this difference is

[8] For robustness, we repeat our analysis using the direct method based on the statement of cash flows, as advocated by Hribar and Collins (2002). The results lead to similar implications as our main analysis (see Section 5).

[9] A counter-argument to our measure is that, while it captures more information because it is based on individual stocks, it is disproportionately affected by small stocks. To mitigate this concern, we repeat our main analysis using the Stivers and Sun (2010) relative return dispersion measure, and we show that this measure is also positively priced among the accrual and investment portfolios in the cross-section.

[10] Specifically, we set our starting point as January 1945, and for each month t, we use observations from the starting point up to month t to estimate Eq. (4) and retain the last error as the RRD for month t. Although our starting point appears to be arbitrarily chosen, we selected it to ensure that we have a sufficient number of observations for the first estimation. Given that we have no reason to expect a structural change in the relation between RD and market return, expanding windows allows us to use more information relative to rolling windows, thus ensuring the stability of the distribution and minimizing the effect of outliers. (Expanding windows are commonly used in the context of controlling for look-ahead bias; see, for example, Guo et al., 2014).

Table 1
Descriptive statistics.

Panel A: Descriptive statistics for stock characteristics

	N	Mean	STD	Min	Q1	Median	Q3	Max
RET	139012	0.136	0.604	−0.843	−0.240	0.040	0.369	2.758
MV	136380	885.66	3094.48	1.20	17.15	70.93	361.57	24474.41
MB	136378	2.792	3.586	0.255	0.975	1.699	3.060	24.502
ACC	141152	−0.026	0.109	−0.372	−0.079	−0.031	0.022	0.344
I/A	139368	0.111	0.226	−0.364	0.008	0.062	0.153	1.327
TA_GR	141152	0.228	0.611	−0.496	−0.017	0.087	0.244	4.074
CAPEXP	138496	0.417	0.592	0.008	0.134	0.240	0.443	4.133

Panel B: Correlations

	RET	MV	MB	ACC	I/A	TA_GR	CAPEXP
RET	1	−0.020	−0.107	−0.039	−0.068	−0.088	−0.067
MV	0.007	1	0.137	−0.034	−0.025	−0.001	−0.042
MB	−0.156	0.420	1	−0.018	0.103	0.168	0.191
ACC	−0.038	−0.010	0.063	1	0.319	0.257	0.151
I/A	−0.059	0.087	0.182	0.346	1	0.654	0.502
TA_GR	−0.069	0.170	0.275	0.383	0.690	1	0.498
CAPEXP	−0.076	0.093	0.277	0.187	0.534	0.483	1

Panel C: Summary statistics for the cross-sectional return dispersion measures

	Mean	STD	Q1	Median	Q3	$\rho(1)$	$\rho(2)$	$\rho(3)$
RD	15.73	5.28	12.27	14.78	18.03	0.68	0.62	0.56
RD_{13}	15.71	4.67	12.43	15.11	17.82	0.87	0.84	0.74
RRD	5.20	4.37	2.67	4.49	6.64	0.57	0.55	0.46
RRD_{13}	5.20	3.68	3.00	4.67	6.62	0.92	0.80	0.67

Panel A presents descriptive statistics of various firm characteristics. Our sample includes all US firms except for utilities (SIC codes 4900–4999), financial firms (SIC codes 6000–6999), and firms with a negative book value of equity, from 1965 to 2011. RET = raw buy-and-hold annual returns beginning from the fifth month after a firm's fiscal year-end; MV = market value at fiscal year-end (PRCC_F*CSHO); MB = market-to-book ratio, which is measured as the market value divided by the book value of equity (SEQ); ACC = total accruals, which is measured as $(\Delta CA-\Delta Cash)-(\Delta CL-\Delta STD-\Delta TP)-DEPEXP$ scaled by average total assets, where ΔCA = change in current assets (ACT), $\Delta Cash$ = change in cash and cash equivalents (CHE), ΔCL = change in current liabilities (LCT), ΔSTD = change in short-term debt (DLC), ΔTP = change in tax payable (TXP), and DEPEXP = depreciation and amortization expense (DP); *I/A* = investment-to-assets, measured as $(\Delta PPE+\Delta INV)/TA_{t-1}$, where ΔPPE is change in gross property, plant and equipment (PPEGT), ΔINV is change in inventories (INVT) and TA_{t-1} is the lagged book value of total assets (AT); TA_GR = growth in total assets, which is measured as $(TA_t–TA_{t-1})/TA_{t-1}$, where TA is total assets (AT); and CAPEXP = capital expenditures scaled by net property, plant, and equipment. All variables are annually winsorized at 1% and 99%. Panel B reports the correlations for firm characteristics (Pearson correlations are shown above the diagonal, and Spearman correlations are shown below). Panel C reports the summary statistics for our primary cross-sectional return dispersion measures (RD and RRD). RD is the cross-sectional standard deviation across the monthly returns of individual stocks (only ordinary stocks with share codes 10 or 11 are included). The monthly relative return dispersion (RRD) is constructed to be orthogonal to the simple and absolute monthly stock market returns by controlling for the look-ahead bias using expanding windows, as described in Section 3. For each one of our measures of return dispersion, we build three-month moving-average expressions calculated over months $t-1$ to $t-3$ (RD_{13} and RRD_{13}, respectively).

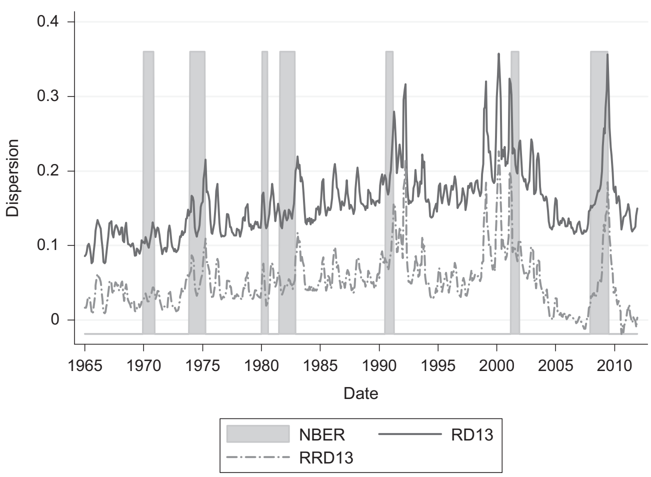

Fig. 1. Return dispersion. This figure presents the three-month moving average of cross-sectional stock returns dispersion (RD_{13}) and the three-month moving average of relative return dispersion (RRD_{13}) defined as residuals from Eq. (4). Shaded areas represent recessions as defined by NBER.

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expected, given our use of the entire cross-section of individual stocks (our mean RD is 15.73%; Stivers and Sun report 3.02% and Jiang reports 9.971%). The standard deviation of our RD measure is also significantly higher than the values that these authors obtained (5.28% versus 1.28% and 2.09%, respectively). Given that we are attempting to capture changes in macroeconomic conditions, we believe that it is important to include all information in our estimations. Second, the mean of our RRD measure is not zero (as reported by Stivers and Sun) because of our expanding window estimation relative to the full sample estimation that is employed by Stivers and Sun (2010). The time series of our three-month RD moving-average expressions displayed in Fig. 1 presents slightly higher autocorrelation (which we control for in our tests using autocorrelation-robust standard errors). The extreme high realizations in 2000 and 2008 correspond to the transitions from the technology boom to the bear market and the financial crisis, respectively.[11]

We perform most of our risk return analysis at a monthly level. To ensure that the accounting information is available to investors prior to portfolio formation and return accumulation periods, we match CRSP stock return data from $t+5$ through $t+16$ (12 months) with accounting information as of time t. For each cross section, we sort stocks into quintiles based on their accruals and investments-to-assets levels. We form portfolios in May of each year t and calculate monthly buy-and-hold returns of these portfolios from June of year t to May of year $t+1$.[12] We calculate the monthly return from an accrual-based strategy as the return to a zero cost portfolio that goes long on low-accrual stocks (Quintile 1) and short on high-accrual stocks (Quintile 5). We refer to this monthly hedge return as ACC_Hedge_t. We follow the same procedure to build investment buy-and-hold hedge strategies (IA_Hedge_t). Table 2 presents the returns distribution characteristics for each accrual and investment quintile portfolios and the respective hedge strategies.

Over our entire sample period, the average raw returns of a buy-and-hold equal-weighted accrual strategy going long on stocks in the lowest accrual quintile and short on stocks in the highest accrual quintile are 0.57% on a monthly basis – the equivalent of 7.34% for a 12-month holding period.[13] The corresponding numbers for the investment strategy are 1% on a monthly basis, corresponding to 12.93% for an annual holding period.

Fig. 2 displays the time series behavior of the annualized payoffs for the accrual and investment strategies, and it illustrates that the hedge portfolios exhibit very similar time series behavior. Both the graph and Panel B of Table 2 document substantial variations in the payoffs for both accrual and investment strategies over time. The first three subperiods (Panel B) correspond to those used by Green et al. (2011) and identify (1) the period before Sloan (1996) was published, when the accrual anomaly was known to few practitioners; (2) the early post-Sloan subperiod (1996–2003), during which the accrual anomaly was well known to both academics and practitioners; and (3) the late post-Sloan period (2004 to 2008), during which the accrual anomaly was highly exploited by various hedge funds. The fourth period (2009–2011) represents the period after the sample considered by Green et al. (2011). Although the period between 2004 and 2008 shows accrual payoffs that are not significantly different from zero [and justifies the conclusion in Green et al. (2011) regarding the demise of the accrual anomaly], these payoffs become significantly positive again after 2008. Interestingly, the payoffs of the investment strategy present very similar behavior in terms of time variation. Fig. 3 focuses on the significant positive returns for both the accrual and investment strategies over the last period in our sample.

These results indicate that the accrual and investment anomalies have reappeared in the most recent period, and they suggest that inferences based on the results presented in Green et al. (2011) appear to be premature.

4. Empirical results

4.1. Return dispersion and expected returns

We start our empirical investigation by showing that RD is generally priced in the cross section of individual stock returns and that the accrual and investment portfolios, in particular, are exposed to the risk captured by RD.

Following Jiang (2010) and Demirer and Jategaonkar (2013), we consider an asset pricing model that directly includes RD into the pricing kernel.[14] The authors argue that one of the sources of risk associated with RD is channeled via fundamental restructuring, which is particularly important for firms with different growth potential. Based on this argument, stocks with

[11] To make sure that our variables contain the same type of information as those in the literature, we replicate the findings of Stivers and Sun (2010) for the value payoff strategy using our measures of cross-sectional dispersion. Untabulated results confirm that our measures can predict the value payoff strategy in a similar manner to the ones proposed by Stivers and Sun (2010). We also repeat their predictive regressions for the accrual and investment payoffs and show that RD/RRD can successfully predict future payoffs for both strategies after controlling for all other macroeconomic variables.

[12] We choose the month of May to form our portfolios because of our timing for matching the accounting information with the stock return data. Because the majority of firms in the sample have December 31 fiscal year-ends and we allow a five-month gap to ensure that accounting information is available to investors, using information as of May to form our portfolios means that the sort considers the latest accounting data for most firms. Results remain qualitatively similar if we allow for different timing for matching the accounting information with the returns data (alternatively we use 3, 4, and 6 months gaps) or if we restrict the sample to only December 31 year-end firms.

[13] We use buy-and-hold returns because this scheme avoids the likely bid-ask biases induced by rebalanced equal-weighted portfolios and does not overweight large stocks as would result from using a value-weighting scheme. For robustness checks, we show that using alternative weighting (return- and value-weighted) schemes for our portfolios also results in insignificant intercepts for the accrual and investment hedge portfolios in the presence of RD/RRD (see the discussion in Section 5).

[14] Depending on the theoretical justification used, one can motivate both the inclusion of levels or of innovations in the macroeconomic variables in the pricing kernel. For example, an ICAPM argument would be more consistent with the use of innovations in the state variables (see, for example, Petkova, 2006; Chen and Petkova, 2012). The use of the level of RD is consistent with the theoretical model and justification provided by Jiang (2010). For robustness

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Table 2
Portfolio return statistics.

Panel A: Accrual and investments portfolios returns

Portfolio	Mean	Q1	Median	Q3	STD	Proportion of negative obs
Accrual portfolios						
ACC1	1.57	−2.49	1.51	5.61	7.10	0.39
ACC2	1.52	−1.94	1.76	5.14	6.04	0.38
ACC3	1.38	−1.89	1.66	4.93	5.96	0.38
ACC4	1.30	−2.34	1.42	5.31	6.28	0.41
ACC5	0.99	−3.27	1.21	5.05	7.22	0.44
ACC_Hedge	0.57	−0.51	0.61	1.63	1.87	0.37
Investment portfolios						
IA1	1.78	−1.98	1.78	5.62	6.88	0.37
IA2	1.56	−2.02	1.74	5.01	6.21	0.38
IA3	1.42	−2.24	1.82	5.23	5.98	0.39
IA4	1.23	−2.46	1.41	5.05	6.35	0.41
IA5	0.78	−3.43	0.99	5.22	7.24	0.45
IA_Hedge	1.00	−0.45	0.93	2.35	2.32	0.33

Panel B: Accrual and Investment Strategies by Sub-periods

	1965–1995	1996–2003	2004–2008	2009–2011
ACC_Hedge				
Mean	0.55	1.05	−0.17	0.73
t-Statistic	5.75	4.59	−1.04	3.05
0.5				
IA_Hedge				
Mean	1.02	1.62	−0.12	0.95
t-Statistic	9.27	5.37	−0.42	2.90

This table reports summary statistics for our main portfolios/strategies. All return statistics are presented in percentages. Portfolio returns are buy-and-hold returns with a May formation month. We sort stocks into quintiles based on their accrual (investments) levels at the beginning of May, and we hold these portfolios for 12 months. ACC1–ACC5 (IA1–IA5) represent the monthly returns of accrual (investments) quintiles. ACC_Hedge represents the difference between low-accrual (ACC1) and high-accrual (ACC5) portfolios at the monthly level. (IA_Hedge is the corresponding monthly investments strategy.) Panel A presents return statistics for the entire sample period, which covers the months from January 1965 to December 2011. Panel B presents the accrual and investment strategies' raw returns by subperiods. (For each subperiod, we report the mean and the *t*-statistic tests that indicate whether the mean is significantly different from zero).

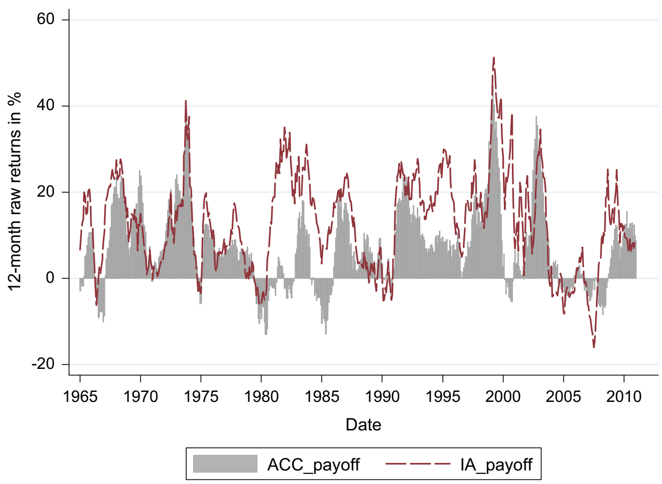

Fig. 2. Time series of accrual and investment strategies payoffs. This figure plots the monthly series of annualized raw returns of an accrual (investment) buy-and-hold hedge return strategy that goes long on stocks in the lowest accrual (investment) quintile and short on stocks in the highest accrual (investment) quintiles. For every month t, returns are annualized with a holding period over months t to $t+11$ (using the portfolios as described in Table 2).

(*footnote continued*)
purposes, we repeat our analysis, run the Fama and MacBeth (1973) cross-sectional regressions using innovations in RD, and obtain qualitatively similar results (see the discussion in Section 5).

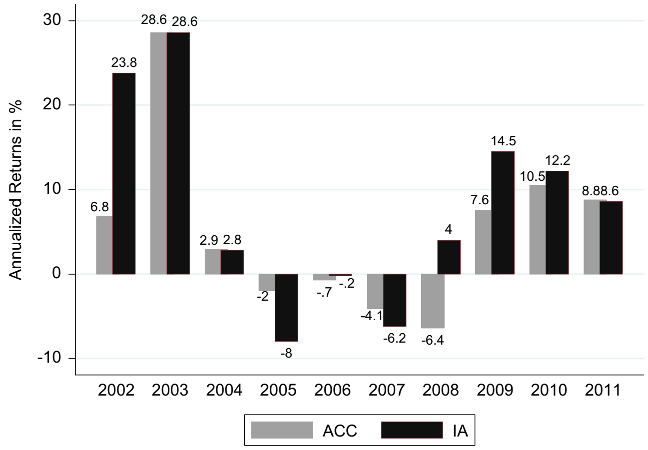

Fig. 3. The accrual and investment strategies by year. This figure presents the average annual returns from an accrual (investment) hedge strategy that goes long on stocks in the lowest accrual (investment) quintile and short on stocks in the highest accrual (investment) quintiles. The returns in the figure are expressed in percentages. ACC represents the annualized accrual hedge portfolio, and IA represents the annualized investments hedge portfolio.

higher sensitivities to RD should carry a positive risk premium, especially during bad times. The expected returns thus are modeled as a function of RD across assets (along with the market return and other common risk factors).

We follow the two-step cross-sectional regression procedure introduced by Fama and MacBeth (1973) to estimate the risk premium associated with RD.[15] In the first stage, we perform time-series regressions to estimate beta loadings for each factor (for example, $\hat{\beta}_{i,RD}$ corresponds to the beta loading of i on the RD macro-variable). We then use these beta loadings from the first stage to estimate the risk premiums in the cross section. Recent literature discusses the choice of appropriate test assets for this type of cross-sectional tests (i.e. portfolios versus individual stocks). Lewellen et al. (2010) and Daniel and Titman (2012) show that using portfolios as test assets (and in particular, the Fama and French 25 size and book-to-market portfolios) can produce spurious correlations and misleading results and therefore suggest using individual stocks for a more rigorous test. Ang et al. (2010) further support this point showing that the most efficient estimates of cross-sectional risk premium in linear factor models are obtained using individual stocks. We therefore present our main results using individual stocks as test assets in the cross-sectional regressions.[16] Table 3 presents the results of this analysis.

We start by estimating a benchmark model (Model 1) that includes the market and the Fama–French factors, and we find that the market premium is the only factor that is priced in the cross section of individual stock returns. We augment this base model to include RD and RRD and, consistent with our prediction, document that both of them carry a positive risk premium. According to Model 2 (3), the risk premium for the RD (RRD) variable is 0.397 (0.294) with a t-statistic of 2.25 (1.82). Moreover, the economical and statistical magnitude of the RD variable is not subsumed by commonly accepted macroeconomic variables (Models 4 and 5). Our results support the hypothesis that RD carries a strong positive and significant premium in the cross section of individual returns.

These results provide general evidence that RD is priced in the cross-section of returns, but they do not specifically address whether accrual and investment portfolios have significantly different exposure to the risk captured by RD. We follow the same two-stage Fama and MacBeth (1973) procedure to estimate the risk exposure of accrual and investment portfolios in the cross-section.[17] To make sure that our results are not driven by the choice of a particular set of test assets, we apply this methodology to three different sets of portfolios by sorting the sample into 25 accrual portfolios, 25 investment portfolios, and 25 (5x5) portfolios sorted on accruals and investments independently.[18]

Table 4 shows that the market premium (γ_{MKT}) tends to be negatively priced across all three sets of portfolios, which is not an uncommon result (see, for example, Frazzini and Pedersen, 2014).[19] More important, we document that the RRD

[15] Among others, the same approach is employed by Jagannathan and Wang (1996), Harvey and Siddique (2000), Lettau and Ludvigson (2001), Ang et al. (2006), Petkova (2006), Sadka (2006), Watanabe and Watanabe (2008), Liu and Zhang (2008), and Jiang (2010).

[16] However, using individual stocks as test assets in cross-sectional regressions can exacerbate the errors-in-variable problem. We use the methodology suggested by Shanken (1992) to correct for this issue. In addition, Asparouhova et al. (2010) makes the point that the cross section of individual firm returns may be biased by bid-ask effects and suggest weighting by lagged returns as a solution. Untabulated results show that using the weighted least square methodology (based on lagged returns weights) with individual stocks produces qualitatively similar results.

[17] For brevity, the remainder of our main tests uses the RRD variable. RD produces qualitatively similar results for every test, which are available upon request.

[18] Our conclusions remain qualitatively similar when we expand the set of test assets to include the Fama and French 25 size and book-to-market portfolios for a total of 50 portfolios. Because our investigation relates to whether RD can explain the accrual and investment anomalies, we do not focus on the cross section of the Fama and French 25 portfolios alone, as it will not directly inform on the ability of RD to explain the relation between accruals/investments and returns.

[19] Beta is positively priced when individual stocks are used as test assets (Table 3) and negatively priced when portfolios are used as test assets (Table 4). Core et al. (2008) document a similar switch in sign for the pricing of beta between portfolios and individual stocks in their Table 4.

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Table 3
Pricing RD/RRD risk in the cross section of individual stock returns.

	(1)	(2)	(3)	(4)	(5)
γ_0	0.292**	0.332***	0.311***	0.398***	0.383***
	(2.36)	(2.86)	(2.70)	(3.46)	(3.32)
γ_{MKT}	0.495**	0.364*	0.385*	0.316*	0.334*
	(2.42)	(1.87)	(1.96)	(1.71)	(1.82)
γ_{SMB}	0.185	0.223	0.227	0.216	0.201
	(1.27)	(1.54)	(1.56)	(1.52)	(1.41)
γ_{HML}	−0.205	−0.168	−0.173	−0.170	−0.179
	(−1.53)	(−1.30)	(−1.34)	(−1.35)	(−1.41)
γ_{RD}		0.397**		0.424**	
		(2.25)		(2.49)	
γ_{RRD}			0.294*		0.404**
			(1.82)		(2.58)
γ_{DIV}				0.00540	0.00656
				(0.89)	(1.08)
γ_{TERM}				−0.0633***	−0.0619***
				(−3.36)	(−3.31)
γ_{DEF}				−0.00343	−0.00350
				(−0.32)	(−0.32)
γ_{RF}				−0.000976	−0.00211
				(−0.27)	(−0.59)
Adj. R^2 (%)	6.5	7.6	7.6	10.5	10.5
N	564	564	564	564	564

This table presents Fama and MacBeth (1973) cross-sectional regressions using the excess returns on individual stocks. For each individual stock, we estimate a time series regression in which we regress the excess returns on the Fama–French three factors and various state variables (including RD/RRD). Following Petkova (2006), we use five state variables. The dividend yield (DIV) is calculated as the difference between the stock market's returns with and without dividends from CRSP; the term spread (TERM) is the difference between the yield of 10-year and 1-year T-bonds; the default spread (DEF) is the yield difference between Moody's BAA and AAA bonds obtained from the Federal Reserve Database; and the short-term T-bill (RF) is the 30-day risk-free rate. In addition, we consider RD/RRD as a state variable (calculated as described in Section 3 and Table 1). The full sample loadings (βs) from the first-stage time series regression are then used in second-stage cross-sectional regressions as independent variables using variations of the following model:

$$R^e_{i,t} = \gamma_0 + \gamma_{MKT}\,\hat{\beta}_{i,MKT} + \gamma_{SMB}\,\hat{\beta}_{i,SMB} + \gamma_{HML}\,\hat{\beta}_{i,HML} + \gamma_{RD}\,\hat{\beta}_{i,RD} + \gamma_{DIV}\hat{\beta}_{i,DIV} + \gamma_{TERM}\,\hat{\beta}_{i,TERM} + \gamma_{DEF}\,\hat{\beta}_{i,DEF} + \gamma_{RF}\,\hat{\beta}_{i,RF} + \eta_{i,t}.$$

The gamma coefficients from the second-stage cross-sectional regressions represent prices of risk. The t-statistics in parentheses are adjusted for errors in variables following the procedure of Shanken (1992). *, **, and *** indicate significance at the 10%, 5% and 1% level, respectively. The sample period is from January 1965 to December 2011.

variable is positively priced in the cross section for each set of test assets. The RRD premium varies between 1.8% and 2.9%. Alternatively, the RRD variable is insignificant in Model 4, possibly because the value and investment premiums are closely related (this high correlation would make HML subsume the power of RRD when the test assets are 25 investment portfolios). Overall, the results suggest that RRD is positively related to the accrual and investment premiums and can explain a significant portion of their profitability.

4.2. Return dispersion and variation in the profitability of accrual and investment strategies

A primary objective of this study is to examine whether RD can explain time series variation in the payoffs to the accrual and investment anomalies. We present two sets of results pertaining to the connection between RD and the variation in profitability of the accrual and investment anomalies. First, we show that accrual and investment hedge portfolios have significant exposure to RRD in the time series. Second, we quantify the effect of RRD by documenting the incremental magnitude of these strategies during states of high RRD.

Our first set of results examines whether firms with low accruals (investments) have significantly different exposure to RRD when compared with firms with high accruals (investments). Given that RRD contains information regarding the production states of the economy, if accruals contain growth information, then we expect that low-accrual (high-accrual) firms will more (less) sensitive to RRD. Because low-accrual and low-investment firms have more assets in place, it makes it more difficult for these firms to adjust during times of low aggregate productivity with higher discount rates, which makes them even riskier in these states. This generates higher returns for the accrual and investment strategies during times of low aggregate productivity states captured by high RRD.

We run time series regressions of buy-and-hold portfolio returns on commonly accepted asset-pricing factors and the RRD variable (portfolios are obtained based on sorts on accruals and investments as described in Section 3).[20] We expect to observe higher RRD beta loadings for portfolios made up of low-accrual and low-investment firms and lower RRD loadings

[20] Our results and conclusions are robust to using alternative weighting schemes as suggested by Asparouhova et al. (2010). See Section 5 for details.

Table 4
Pricing return dispersion risk in the cross section of accruals and investments portfolios.

	25 ACC portfolios		25 IA portfolios		25 ACC × IA portfolios	
Variable	(1)	(2)	(3)	(4)	(5)	(6)
γ_0	5.73***	5.05***	4.60***	3.94***	4.27***	3.46***
	(6.24)	(5.53)	(8.24)	(6.96)	(7.18)	(5.21)
γ_{MKT}	−4.91***	−4.51***	−3.82***	−3.09***	−3.45***	−2.46***
	(−4.91)	(−4.08)	(−6.98)	(−4.91)	(−5.89)	(−3.68)
γ_{SMB}		−0.271		−0.467		−0.882**
		(−0.54)		(−1.27)		(−2.32)
γ_{HML}		1.45***		2.10***		1.27***
		(2.82)		(4.19)		(3.78)
γ_{RRD}	2.43***	2.61***	2.06***	0.907	1.80***	2.90***
	(3.15)	(3.21)	(3.58)	(1.40)	(3.60)	(4.17)
Adj. R^2 (%)	26.2	34.3	28.8	37.1	24.5	36.4
N	564	564	564	564	564	564

This table presents the coefficients from the second stage of two-stage Fama and MacBeth (1973) cross-sectional regressions. We use the following sets of test assets: 25 accrual-sorted portfolios (Models 1 and 2), 25 investment-sorted portfolios (Models 3 and 4), and 25 portfolios based on a 5 × 5 sort by accruals and investments (Models 5 and 6). For each set of test assets, we estimate a time series regression in which we regress the excess returns on the Fama–French three factors and relative return dispersion (RRD). The full sample loadings (βs) from the first-stage time-series regression are then used in second-stage cross-sectional regressions as independent variables using the following model:

$$R^e_{i,t} = \gamma_0 + \gamma_{MKT}\hat{\beta}_{i,MKT} + \gamma_{SMB}\hat{\beta}_{i,SMB} + \gamma_{HML}\hat{\beta}_{i,HML} + \gamma_{RRD}\hat{\beta}_{i,RRD} + \eta_{i,t}.$$

The gamma coefficients reported are the coefficients obtained from the second-stage cross-sectional regressions. The betas used as explanatory variables are loadings obtained in the first stage on the three Fama–French factors (MKTRF, SMB, and HML) as well as RRD, which is defined as described in Table 1. The t-statistics in parentheses are adjusted for errors in variables following the procedure of Shanken (1992). ** and *** indicate significance at the 5% and 1% level, respectively. The sample period is from January 1965 to December 2011.

Table 5
Accrual portfolios factor loadings.

Dependent variable	(1) ACC1	(2) ACC2	(3) ACC3	(4) ACC4	(5) ACC5	(6) ACC_Hedge
Panel A: Benchmark model (FF 3 factors)						
β_0	0.324***	0.326***	0.197***	0.115*	−0.240**	0.564***
	(2.84)	(4.60)	(3.21)	(1.77)	(−2.58)	(6.01)
β_{MKT}	1.052***	1.025***	1.004***	1.012***	1.079***	−0.028
	(30.08)	(40.33)	(43.74)	(45.25)	(31.54)	(−1.09)
β_{SMB}	1.077***	0.810***	0.834***	0.921***	1.106***	−0.029
	(15.54)	(15.72)	(17.41)	(16.96)	(12.16)	(−0.62)
β_{HML}	0.171**	0.274***	0.262***	0.177***	0.0968	0.074
	(2.19)	(5.90)	(6.21)	(3.43)	(1.22)	(1.37)
Panel B: FF 3 factors augmented with RRD						
β_0	−1.08***	−0.478***	−0.397***	−0.631***	−1.26***	0.174
	(−4.55)	(−2.99)	(−3.06)	(−4.49)	(−5.76)	(1.31)
β_{MKT}	1.050***	1.024***	1.004***	1.011***	1.078***	−0.028
	(31.58)	(44.21)	(46.68)	(49.25)	(33.49)	(−1.09)
β_{SMB}	0.948***	0.736***	0.780***	0.852***	1.013***	−0.065
	(14.58)	(14.51)	(16.05)	(15.61)	(11.40)	(−1.47)
β_{HML}	0.170**	0.273***	0.262***	0.176***	0.0963	0.074
	(2.23)	(6.06)	(6.32)	(3.45)	(1.20)	(1.40)
β_{RRD}	0.278***	0.159***	0.117***	0.147***	0.201***	0.077***
	(5.86)	(4.73)	(4.41)	(5.23)	(4.43)	(2.87)

This table reports the factor loadings for each of the quintile buy-and-hold accrual portfolios and the low-minus-high accrual strategy (ACC_Hedge). For each portfolio i, we estimate variations of the following time series model:

$$R^e_{i,t} = \beta_0 + \beta_{i,MKT}\,\mathrm{MKT}_t + \beta_{i,SMB}\,\mathrm{SMB}_t + \beta_{i,HML}\,\mathrm{HML}_t + \beta_{i,RRD}\,\mathrm{RRD}_t + \varepsilon_{i,t},$$

where R^e_t are excess returns of accrual portfolios at time t and MKTRF, SMB, and HML are the Fama–French three factors (expressed as percentages). Relative return dispersion (RRD) is calculated as described in Section 3 and Table 1 (expressed as percentages). Panel A presents the results pertaining to the Fama–French three-factor benchmark model, and Panel B presents the results from the Fama–French model augmented with the RRD state variable. The corresponding t-statistics in parentheses are corrected for autocorrelation and heteroskedasticity using the Newey–West estimator with three lags. *, **, and *** indicate significance at the 10%, 5% and 1% level, respectively. The sample period is from January 1965 to December 2011.

Table 6
Investments portfolios factor loadings.

Dependent variable	(1) IA1	(2) IA2	(3) IA3	(4) IA4	(5) IA5	(6) IA_Hedge
Panel A: Benchmark model (FF 3 factors)						
β_0	0.493***	0.371***	0.270***	0.0623	−0.456***	0.948***
	(4.60)	(4.87)	(4.18)	(0.91)	(−4.47)	(8.97)
β_{MKT}	1.002***	0.980***	0.995***	1.040***	1.152***	−0.150***
	(30.50)	(43.24)	(45.19)	(40.39)	(29.63)	(−5.71)
β_{SMB}	1.127***	0.938***	0.823***	0.874***	0.986***	0.141**
	(16.75)	(23.11)	(18.12)	(12.31)	(10.28)	(2.35)
β_{HML}	0.325***	0.213***	0.176***	0.138**	0.122	0.204***
	(4.73)	(4.40)	(4.06)	(2.43)	(1.47)	(3.49)
Panel B: FF 3 factors augmented with RRD						
β_0	−0.876***	−0.611***	−0.440***	−0.658***	−1.210***	0.338**
	(−4.68)	(−3.80)	(−3.21)	(−3.48)	(−5.13)	(2.00)
β_{MKT}	1.001***	0.979***	0.995***	1.040***	1.151***	−0.151***
	(34.10)	(49.05)	(47.46)	(42.15)	(30.88)	(−5.73)
β_{SMB}	1.002***	0.848***	0.758***	0.808***	0.917***	0.0845
	(15.92)	(23.38)	(17.15)	(11.32)	(9.61)	(1.57)
β_{HML}	0.325***	0.212***	0.176***	0.138**	0.121	0.203***
	(5.02)	(4.74)	(4.08)	(2.40)	(1.44)	(3.73)
β_{RRD}	0.270***	0.194***	0.140***	0.142***	0.150***	0.121***
	(7.56)	(6.07)	(5.13)	(3.53)	(2.93)	(3.38)

This table reports the factor loadings for each of the quintile buy-and-hold investments portfolios and the low-minus-high accrual strategy (IA_Hedge). For each portfolio i, we estimate variations of the following time-series model:

$$R^e_{i,t} = \beta_0 + \beta_{i,MKT}\ \mathrm{MKT}_t + \beta_{i,SMB}\ \mathrm{SMB}_t + \beta_{i,HML}\ \mathrm{HML}_t + \beta_{i,RRD}\ \mathrm{RRD}_t + \varepsilon_{i,t},$$

where R^e_t are excess returns of investment portfolios at time t and *MKTRF, SMB, and HML* are the Fama–French three factors. RRD is calculated as described in Section 3 and Table 1. Panel A presents the results pertaining to the Fama–French three factor benchmark model, and Panel B presents the results from the Fama–French model augmented with the RRD state variable. The corresponding t-statistics in parentheses are corrected for autocorrelation and heteroskedasticity using the Newey–West estimator with three lags. ** and *** indicate significance at the 5% and 1% level, respectively. The sample period is from January 1965 to December 2011.

for high-accrual and high-investment portfolios. For every portfolio, we run the following time series regression:

$$R^e_{i,t} = \beta_0 + \beta_{i,MKT}\ \mathrm{MKT}_t + \beta_{i,SMB}\ \mathrm{SMB}_t + \beta_{i,HML}\ \mathrm{HML}_t + \beta_{i,RRD}\ \mathrm{RRD}_t + \epsilon_{i,t}, \tag{5}$$

where $R^e_{i,t}$ is the excess return of portfolio i at time t and RRD is the relative return dispersion at time t. MKT_t, SMB_t, and HML_t represent the Fama and French (1993) factors controlling for market, size and value premiums, respectively. We conduct our analysis separately for accruals and investment portfolios and present the results in Tables 5 and 6, respectively.

Panel A of Table 5 documents time-series loadings for accrual portfolios using the benchmark Fama–French model. These results suggest that including the three Fama–French risk factors does not explain the differential returns between low and high accrual portfolios. The alphas from the three-factor model almost monotonically decrease across accrual portfolios, and the alpha representing the abnormal returns of the accrual hedge portfolio (ACC_Hedge) is significant, with a magnitude of approximately 56 basis points per month (comparable to 74 basis points of abnormal performance documented by Wu et al., 2010). Comparing Models 1 and 5 of Panel A, market risk exposure is similar for low- and high-accrual firms. In both cases, it is statistically significant and close to one. Similarly, we document that the exposure to the size factor is U-shaped, which suggests that firms in high- and low-accrual portfolios (ACC1 and ACC5, respectively) tend to be small. The difference in exposure to SMB between low- and high-accrual firms is not significant and therefore cannot explain this anomaly.[21]

Panel B of Table 5 presents the same analysis after adding the relative return dispersion variable to our benchmark model. Model 6 shows that the accrual hedge portfolio (ACC_Hedge = ACC1 − ACC5) has positive and significant exposure to RRD, indicating that the low accrual portfolio has relatively higher exposure to the RRD factor compared with the high accrual portfolio. The RRD betas are 0.278 (with a t-statistic of 5.86) and 0.201 (with a t-statistic of 4.43) for low- and high-accrual firms, respectively. More important, according to Model 6, the RRD beta spread is positive and significant (0.0770 with a t-statistic of 2.87).[22]

We repeat the above analysis in the context of buy-and-hold investment-sorted portfolios and present the results in Table 6. While the low-investment portfolio has statistically lower market risk, it has relatively higher exposure to size and

[21] Although both high and low accrual groups are smaller than the rest, untabulated results show no significant difference in the sizes of these extreme accrual groups.

[22] The coefficient on RRD is not monotonic. Given the U-shaped pattern of the coefficient on SMB, one potential concern is that our results for RRD are driven by firm size and that accruals are related to firm size, which is not fully captured by SMB. Our results (untabulated) are robust when we repeat our analysis after eliminating the bottom decile of stocks in terms of size (market capitalization).

value factors, implying that in this case the low-investment portfolio is comprised of relatively smaller and value firms. However, similar to accrual portfolios, Panel A of Table 6 illustrates the inability of the three-factor benchmark model to explain the investment premium (the alphas from the benchmark model monotonically decrease across investments portfolios). Model 6 shows an abnormal performance of the investment hedge portfolio of 94.8 basis points with a t-statistic of 8.97.

Panel B of Table 6 presents the results from the model that includes the RRD variable. Similar to the accrual portfolio analysis, we observe that the low-investment portfolio is also more sensitive to general macro-economic conditions as measured by the RRD variable. In particular, the RRD beta for the IA1 (IA5) portfolio is 0.270 (0.150) with a t-statistic of 7.56 (2.93). More important, as expected, the RRD beta spread between these two portfolios is statistically significant. (Model 6 shows that the hedge investment portfolio presents a coefficient on RRD of 0.121 with a t-statistic of 3.38.)

Overall, these empirical findings suggest that both the investment and accrual premiums are positively related to the risk captured by RRD, supporting our hypothesis that shareholders of low-accrual and low-investment firms face higher risk during low productivity states. Furthermore, including the RRD variable substantially reduces the magnitude of the intercept of the accrual and investment hedge strategies (Models 6 in Panel B of Tables 5 and 6, respectively).[23] Untabulated results confirm that this effect is not subsumed by other commonly used macroeconomic variables. (RRD consistently stays positive and significant for the accrual and investment hedge portfolios even after we include controls for dividend yield, term spread, default, and the risk-free rate.)

Our next question relates to the economic significance of the RRD effect, so we follow a methodology geared toward quantifying the magnitude of the RRD effect for the accrual and investment strategies' returns. Specifically, we split the months in our sample into states based on the realized level of RRD during the month. Following Petkova and Zhang (2005) we define four states of the world: State 1 (Low) corresponds to the 10% lowest observations for RRD; State 2 corresponds to below-average RRD, excluding the 10% lowest observations; State 3 corresponds to above-average RRD excluding the 10% highest observations; and State 4 (High) corresponds to the 10% highest observations for RRD. We then document raw and risk-adjusted returns of the accrual and investment hedge portfolios in each state, and we test whether the difference in performance between high and low RRD states is statistically significant. Table 7 presents the results of this analysis.

The accrual premium monotonically increases from good (low RRD) states (conducive to growth) to bad (high RRD) states (less conducive to growth). Specifically, while the accrual strategy generates 20.5 basis points per month during states with low RRD, it produces 92.4 basis points during periods when RRD is high. The difference in performance of the accrual hedge portfolio between periods with low and high RRD is both economically and statistically significant. Similarly, we find that the investment hedge portfolio generates 136 (-1) basis points during high (low) RRD periods, and the difference in raw returns of the investment strategies between high and low RRD states is economically and statistically significant.

In Panel B of Table 7, we estimate the economic significance of the RRD effect for risk- adjusted returns using the same definition for states. To capture the abnormal (risk-adjusted) performance we run time series regressions of the hedge portfolios for each state on the Fama–French three factors. The abnormal performance of the accrual strategy monotonically increases with states of RRD – specifically, during low (high) states of RRD the abnormal performance of the accrual premium is 23.7 (88.9) basis points. Similarly, the abnormal returns of the investment strategy are higher during high RRD states – the investment hedge portfolio has no significant abnormal performance during low RRD states and a significant performance of 126 basis points in high RRD states. To test whether the difference in abnormal returns between high and low RRD states is statistically significant, for each strategy (accruals/investments) we estimate a regression in which we consider the low RRD state (State 1) as the base state, and we include two dummies identifying the high RRD state (State 4) and everything else (States 2 and 3), respectively. The last column of Panel B reports the coefficient of the dummy variable for the high state (which represents the difference in intercepts between the high and low states) and the coefficients of the State 4 interaction dummies for each of the Fama–French factors (which represent the difference in loadings between the high and low states). During high RRD states the accrual (investment) strategy produces risk-adjusted returns that are 65 (125) basis points higher than during low RRD states (in both cases, the differences are statistically significant). High RRD states also present significantly lower loadings on the HML factor for the accrual strategy and significantly lower loadings on the market factor (and higher loadings for the SMB factor) for the investment strategy.

One potential caveat for the methodology used is that it involves sorting firms into portfolios based on a particular characteristic, which may reflect biases due to transaction costs and bid-ask bounce (as discussed in Asparouhova et al., 2010). As an alternative method, we estimate characteristic rank regressions at an individual firm level (following Mashruwala et al., 2006). We test whether the cross-sectional relation between accruals/investments and returns is dependent on RRD in a pooled panel setting, using the Petersen (2009) methodology to allow for two-way cluster-robust standard errors. Results (untabulated) confirm that the predictive ability of accruals and investments varies significantly with the state of RRD. Specifically, in high RRD states, the magnitude of the negative relation is significantly larger.

[23] Given that RRD is not a return-scaled risk factor, interpreting the intercept as abnormal excess returns may be problematic. However, econometrically, the intercept does represent the unexplained portion in the hedge portfolios' returns, which is significantly reduced after the inclusion of the RRD explanatory variable (and becomes insignificant in the case of accruals).

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Table 7
Economic significance of the return dispersion effect.

	State 1 (Low)	State 2	State 3	State 4 (High)	High-Low
Panel A: Raw returns by RRD state					
ACC_Hedge	0.205	0.627***	0.492***	0.924**	0.719*
	(1.30)	(6.46)	(3.20)	(2.42)	(1.76)
IA_Hedge	−0.011	0.826***	1.49***	1.36**	1.37**
	(−0.06)	(7.60)	(7.83)	(2.65)	(2.52)
Panel B: Risk-adjusted returns by RRD state					
Accrual strategies					
β_0	0.237*	0.444***	0.572***	0.889**	0.653*
	(1.85)	(4.58)	(3.30)	(2.06)	(1.69)
β_{MKT}	0.0111	−0.0155	0.00509	−0.0653	−0.0765
	(0.24)	(−0.74)	(0.11)	(−0.62)	(−0.77)
β_{SMB}	0.113	−0.0799*	−0.160***	0.0791	−0.0338
	(1.26)	(−1.85)	(−2.65)	(1.01)	(−0.21)
β_{HML}	0.171**	0.287***	0.0686	−0.101	−0.272*
	(2.32)	(6.56)	(1.07)	(−0.97)	(−1.94)
Investment strategies					
β_0	0.013	0.641***	1.48***	1.26**	1.25***
	(0.08)	(5.48)	(8.61)	(2.35)	(2.87)
β_{MKT}	−0.0316	−0.0756***	−0.164***	−0.317***	−0.285**
	(−0.39)	(−3.47)	(−3.67)	(−3.04)	(−2.53)
β_{SMB}	0.0231	0.0424	−0.0386	0.354***	0.331*
	(0.19)	(1.15)	(−0.63)	(4.14)	(1.78)
β_{HML}	−0.00702	0.361***	0.227***	0.108	0.115
	(−0.06)	(8.32)	(4.39)	(0.84)	(0.72)

We sort calendar months into groups based on the relative return dispersion (RRD) level realized during each month. Following Petkova and Zhang (2005) we define four states of the world: State 1 (Low) corresponds to the 10% lowest observations for RRD; State 2 corresponds to below-average RRD, excluding the 10% lowest observations; State 3 corresponds to above-average RRD excluding the 10% highest observations; and State 4 (High) corresponds to the 10% highest observations for RRD. Panel A reports the average monthly accrual and investment hedge raw returns (percent) for each state. The last column in Panel A presents the difference in returns (percent) between high and low RRD regimes. Panel B presents risk-adjusted returns, obtained as follows. For each expected RRD state, we regress the accrual and investment hedge portfolios (percent) on the Fama–French factors (percent). The *t*-statistics that correspond to the loadings are presented in parentheses and are corrected for autocorrelation and heteroskedasticity using the Newey–West estimator with three lags. The last column of Panel B presents the differences in risk-adjusted returns and coefficients between the high and low states, obtained as follows. For each strategy (accruals/investments) we estimate a regression in which we consider the low state (State 1) as the base state, and include dummies identifying the high state (State 4) and everything else (States 2 and 3). We report the coefficient of the dummy variable for the high state (which represents the difference in intercepts between the high and low states) and the coefficients of the State 4 interaction dummies for each of the Fama–French factors (which represent the difference in loadings between the high and low state). *, **, and *** indicate significance at the 10%, 5% and 1% level, respectively. The sample period is from January 1965 to December 2011.

5. Robustness checks

We run a battery of robustness checks to ensure that our results are not specific to the sample, methodology, and proxies presented in our main tabulated results. For the sake of brevity, we do not tabulate these results.

The first concern is whether the results are sensitive to the proxies that we use for calculating return dispersion and for measuring accruals. We repeat all results presented in the main tables using RD instead of RRD as a measure for cross-sectional return dispersion. In addition, we use measures of relative return dispersion calculated based on portfolios instead of individual stocks (following Stivers and Sun, 2010) and based on individual stocks after excluding small firms (following Jiang, 2010). Results continue to show a significant relation between return dispersion and the returns to accrual and investment hedge portfolios. Also, one may argue that the indirect method of calculating accruals (based on balance sheet information) is subject to measurement errors in accruals, as described by Hribar and Collins (2002). We repeat our main analysis on the post-1988 sample using the direct method for accruals advocated by Hribar and Collins (2002) and confirm that RD explains the payoffs from accrual-based strategies.

Asparouhova et al. (2010, 2013) make the point that cross-sectional tests for individual returns may be biased by bid-ask effects and propose a lagged return-weighting scheme to address this microstructure bias. We repeat our individual stock level tests using a weighted least squares methodology with the proposed weighting scheme and confirm that RD/RRD significantly explains future returns. At the portfolio level, we confirm that if we use value-weighted or return-weighted portfolios, the accrual and investment hedges vary significantly with our RD/RRD variables, and that their intercepts become insignificant in the presence of RD/RRD.

To ensure that RD captures risk, we repeat our main set of tests using innovations in return dispersion (instead of levels). Specifically, we follow the VAR methodology proposed by Campbell (1996) and Petkova (2006) to obtain innovations in return dispersion, controlling for innovations in other macroeconomic variables. The results show that innovations in RD (RRD) are positively priced in the cross section of individual stock returns and that low-accrual and low-investment firms have higher exposure to innovations in return dispersion measures. Generally, the introduction of macroeconomic variables in cross-sectional asset pricing models can be motivated either (1) as additional risk factors that help to price the cross section of returns by capturing additional sources of risk (see Chen et al., 1986; Maio and Philip, 2013) or (2) as state variables that predict changes in the investment opportunities set (see Campbell, 1993; Chen, 2002). If RD matters because it captures deteriorations in the investment opportunity set, then innovations in this variable will be negatively priced in the cross section.[24] Our cross-sectional results (untabulated) show that innovations in RD/RRD are positively priced, which supports the idea that this macro-variable captures risk, rather than a countercyclical hedging component.[25]

Moreover, our (untabulated) tests provide only weak support for the accrual and investment strategies being countercyclical.[26] We conclude that the connection with accruals/investments is driven by the information related to fundamental economic restructuring, rather than cyclicality. Specifically, RD is likely to capture the uncertainty associated with economic transitions and the flexibility of adaptability to fundamental economic restructuring [in line with Pastor and Veronesi (2009) and Demirer and Jategaonkar (2013)], rather than shocks related to the business cycle.

Another question relates to whether alternative mispricing hypotheses can explain our documented results. For example, Sloan (1996) argues that investors' inability to differentiate between the persistence of earnings and cash flows explains the accrual anomaly, but it is unclear that this will vary systematically with macroeconomic conditions. Systematic variation in the accrual anomaly could be observed under this scenario only to the extent that arbitrageurs' ability to eliminate the accrual mispricing varies with general market conditions.[27] Mashruwala et al. (2006) argue that barriers to arbitrage stemming from the absence of close substitutes (idiosyncratic risk) and transaction costs (in particular, low trading volume) prevent arbitrageurs from driving away accrual-related mispricing. If these barriers to arbitrage vary systematically with RRD, then this would be consistent with our documented results. However, robustness checks indicate that our results are not driven by liquidity or a bid-ask spread bias (consistent with the limits to arbitrage argument). Quantifying the extent to which systematic variation in barriers to arbitrage generates systematic variation in the accrual anomaly is an interesting avenue that we leave open for future research.

6. Conclusion

This paper links return dispersion–a macroeconomic variable that captures states of the aggregate economy–to the accrual and investment anomalies. We document that a positive RD risk premium exists in the cross section of returns and that low-accrual and low-investment firms have higher exposure to this risk. In the time series, the accrual and investment premiums are positively correlated with return dispersion and the predictive ability of the accrual and investment characteristics is significantly stronger in high return dispersion states. The results persist in portfolios and individual stock level tests, and they are robust to a battery of alternative proxies, choice of test assets, sample periods, and control variables.

We argue that our results support a risk-based interpretation for the accrual and investment anomalies. The fact that both strategies present a similar relation to RD implies that the risk that RD captures is related to the growth characteristics of the firms. This supports our claim that the accruals matter in the cross section of returns because they reflect information relevant to the growth/investment characteristics of firms.

Our results have important implications for both academics and practitioners. From an academic perspective, evidence that accruals and investments may be leading indicators of firm growth can explain why accruals and investments are informative with regard to equity premiums at both the aggregate and firm levels. From a trading perspective, we show that the profitability of accrual and investment strategies will strongly co-vary with return dispersion, which is of interest to practitioners attempting to implement such strategies.

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[24] Maio and Santa-Clara (2012, p. 587) succinctly summarize the restrictions imposed by ICAPM on the time-series and cross-sectional behavior of state variables and factors: “If a state variable forecasts positive (negative) changes in investment opportunities in time-series regressions, its innovation should earn a positive (negative) risk price in the cross-sectional test of the respective multifactor model.”

[25] It is difficult to argue that high accrual and/or high investment firms are good hedges (and therefore have lower returns), because that would imply that these firms perform well in bad times, which is not the case. Instead, these firms are the ones that are less flexible and more likely to be negatively affected in periods of high RRD (supported by the fact that the accrual and investment anomalies are stronger in high RRD states, as shown in Table 7).

[26] Wu et al. (2010) present predictive regressions, which suggest (weak) support for the accrual and investment anomalies being countercyclical. We replicate the predictive regression results obtained by Wu et al. (2010), and we also investigate the magnitude of the accrual and investment anomalies conditioning on the National Bureau of Economic Research business cycles. Both methods provide weak evidence in support of the countercyclical nature of these strategies.

[27] See, for example, Lam and Wei (2011), Li and Sullivan (2011), or Pontiff (2006).

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Do financial market developments influence accounting practices? Credit default swaps and borrowers' reporting conservatism ☆

Xiumin Martin [a], Sugata Roychowdhury [b,*]

[a] Washington University, St. Louis, USA
[b] Boston College, USA

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ABSTRACT

This paper investigates whether the initiation of trading in credit default swaps (CDSs) on a borrowing firm's outstanding debt is associated with a decline in that firm's reporting conservatism. CDS investments can modify lenders' payoffs on their loan portfolios by providing insurance on negative credit outcomes. The onset of CDS trading reduces lenders' incentives to continuously monitor borrowers and also their demand that borrowers report conservatively. Additionally, borrowers expect CDS-insured lenders to be more intransigent in renegotiations triggered by defaults and covenant violations. Since conservatism can trigger earlier covenant violations, borrowers have heightened incentives to report less conservatively in the post-CDS period. Using a differences-in-differences research design, we observe a decline in borrowing firms' reporting conservatism after CDS trade initiation. This effect is more pronounced when reputation costs lenders face from reducing monitoring are lower, when debt contracts outstanding at the time of CDS trade initiation have more financial covenants, and when lenders who monitor borrowers more regularly in the pre-CDS period enter into CDS contracts to hedge their credit exposures.

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* Corresponding author.
E-mail addresses: xmartin@wustl.edu (X. Martin), sugata.roychowdhury@bc.edu (S. Roychowdhury).

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1. Introduction

This paper investigates the influence of financial developments in the capital markets on accounting practices. Financial market developments can affect the payoffs and incentives of existing contractual parties to the firm. Since contractual considerations can influence accounting practices (Watts and Zimmerman, 1986), an altered contractual environment can potentially induce changes in these practices. The financial market innovation we focus on is credit default swaps (CDSs), widely used in recent times to manage lenders' credit risk exposures and their regulatory capital. The accounting practice we study is conservatism, in the context of the borrower–lender relationship. Our primary interest is in examining whether the advent of CDS trade initiation on a firm's outstanding debt is associated with a change in that firm's reporting conservatism.

The credit default swap is a contract in which the buyer, generally called the protection buyer, makes a series of payments to the seller, generally called the protection seller. In exchange, the protection buyer receives a payoff from the protection seller if a credit instrument (such as a loan or a bond) goes into default or experiences any other “credit event” specified in the CDS contract (such as restructuring, bankruptcy, or credit-rating downgrade). By acquiring a CDS contract, the protection buyer transfers the credit risk associated with its investment (such as a loan or a bond) to the protection seller, while retaining legal ownership of the investment. The risk-shifting via CDS contracts allows lenders, particularly banks, to better manage their regulatory capital since the risk weight assigned to a loan can be based on the credit rating of the counter-party in the CDS contract rather than the original borrower.[1] As an example, AIG discloses in its Annual Report that $150 billion of its notional CDSs outstanding at the end of 2009 reflected contracts it wrote to provide regulatory capital relief to financial institutions for their corporate loans (Saretto and Tookes, 2013). The overall CDS market has grown tremendously in recent years, with the notional amount increasing from $180 billion in 1998 to $57 trillion at the end of June 2008 (Stulz, 2010).[2]

Investments in CDS contracts by banks can potentially have an influence on the reporting practices of those clients. Upon granting a loan, lenders generally face an asymmetric payoff on their investment: if the borrowing firm remains solvent, lenders receive their principal and earned interest, while bankruptcy entitles them to the orderly liquidation value of the borrower. The literature argues that this asymmetric payoff underlies lenders' demand for conservatism in the financial statements of borrowers (Watts and Zimmerman, 1986; Watts, 2003). Under conservative reporting, which requires stricter verification standards for recognizing good news in earnings relative to bad news, the book value of a firm provides lenders with a lower-bound estimate for the firm's orderly liquidation value. Ensuring that borrowers do not deviate from conservative reporting practices post-loan-initiation arguably requires continuous monitoring by lenders over the life of the loan. Indeed, continuous lender monitoring, in particular by banks, seems to be a salient feature of the traditional lender–borrower relationship (Gorton and Khan, 1993; Roberts and Sufi, 2009; Acharya et al., 2014).

The availability of CDS contracts alters lenders “downside” payoffs and can thus influence the lender–borrower relationship. In the event of borrower insolvency (in practice, any pre-specified credit event in the CDS contract), lenders are now entitled to settlement payouts from CDS sellers. Coverage from a CDS contract thus reduces the asymmetry in the payoffs to lenders' claims, and provides them greater bargaining power upon the occurrence of pre-specified credit events such as defaults and violations (Bolton and Oehmke, 2010). Lenders' less asymmetric claim structure post-CDS, and their higher bargaining power in renegotiations, potentially diminish their reliance on continuous monitoring to protect the value of their claims and relatedly, their demand for conservatism in borrowers' financial reports. Furthermore, lenders' reduced reliance on continuous monitoring is expected to be accompanied by higher intransigence on their part in renegotiations with borrowers who experience credit events (Fink, 2004; Hu and Black, 2006; Bolton and Oehmke, 2010; Stulz, 2010; Subrahmanyam et al., 2014). Since conservative accounting policies are associated with earlier covenant violations (Zhang, 2008; Nikolaev, 2010), borrowers have increased incentives to report less conservatively after CDS trade initiation, because they anticipate tougher renegotiations if they trigger covenant violations. The joint effect of borrowers' incentives to avoid renegotiations and lenders' incentives to avoid monitoring costs can lead to less conservative reporting by borrowers after CDS trade initiation.

A post-CDS reduction in borrowers' reporting conservatism need not necessarily be a foregone conclusion as it can make third parties such as CDS sellers apprehensive about borrowers' credit quality. Note that CDS sellers do not own control rights with respect to the underlying loan and typically eschew any direct contractual involvement with borrowers. Nevertheless, it is possible that lenders maintain their demand for conservatism, to avoid reputation costs (for example, with CDS sellers) arising from negative credit event realizations that are attributed to their reduced monitoring of financial statements. Further, it may be difficult for borrowers to deviate from past conservatism for the sake of maintaining reporting consistency. Other stakeholders to the firm unprotected by CDS investments, such as shareholders and lenders, may step up their monitoring to ensure that borrowers continue to report conservatively. These alternative scenarios illustrate the importance of empirically investigating changes in borrowers' reporting conservatism upon CDS trade initiation.

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[1] BASEL II states that guarantees issued by or protection provided by entities with a lower risk weight than the counterparty exposure is assigned the risk weight of the guarantor or protection provider.

[2] The size of the CDS market fell sharply in the second half of 2008 in the wake of the financial crisis, but was still high at $41 trillion at the end of 2008. The Bank for International Settlements (BIS) has statistics on the CDS market since the end of 2004 based on survey data. See http://www.bis.org/statistics/derstats.htm.

We identify a sample of 529 firms who experience CDS trade initiation between 2002 and 2009. The empirical exercise involves the identification of an event, CDS trade initiation, and an examination of whether there is a change in conservatism around this event. To control for selection bias and endogeneity, we follow the Ashcraft and Santos (2009) matched-sample design. In the first stage of this analysis, we predict CDS trade initiation based on credit rating, leverage, profit margin, size, return volatility and market-to-book.[3] In the second stage, we use the CDS-trade-initiation probability-estimates yielded by the first stage model to construct a sample of 525 unique matched firms from the same industry as the treatment firms, but with no CDS trading throughout the sample period. Finally, in a difference-in-difference regression, we compute the change in conservatism for CDS firms from the two years prior to CDS-trade-initiation to the two years after, and compare that change to the corresponding change for matched non-CDS firms.

We define conservatism as the asymmetric requirement of weaker verification standards for recognizing losses than for recognizing gains. We measure conservatism as the greater timeliness of earnings with respect to negative returns relative to positive returns (Basu, 1997). Our results indicate that the initiation of CDS trading is on average associated with a decline in the financial reporting conservatism of underlying borrowers. The specific coefficients imply that asymmetric timeliness of loss recognition declines by around 20% after the onset of CDS trading. The decline seems economically significant and is statistically significant at the 5% level.

In cross-sectional analyses, we test predictions on when a post-CDS decline in conservatism is more likely. We reason that a decline in reporting conservatism should be more prominent when the underlying borrowers are ex ante more informationally opaque and riskier. Among such borrowers, lenders are likely to face higher monitoring costs prior to CDS trade initiation, and lower reputation costs from the potentially adverse consequences of reducing their demand for conservatism after CDS trade initiation (Parlour and Winton, 2013; Ashcraft and Santos, 2009). Further, if lenders reduce their demand for conservatism in financial statements, then borrowers with poorer *ex ante* credit quality are expected to be more responsive to such a reduction. The evidence indicates that the decline in conservatism is concentrated among borrowers that are smaller and carry speculative-grade credit ratings prior to CDS trade initiation.

Our cross-sectional tests also indicate a greater decline in conservatism at the time of CDS trade initiation when borrowers' outstanding private debt at that time includes more financial covenants. Since conservative reporting is hypothesized to accelerate covenant violations (Zhang, 2008), our finding is consistent with borrowers having higher incentives to avoid violations after CDS trade initiation, presumably because they expect greater lender-intransigence in the associated renegotiations.

We reason that the influence of lenders' incentives to avoid monitoring costs in the post-CDS period will manifest more in firms that are subject to continuous lender monitoring in the pre-CDS period. Banks represent the class of lenders most likely to continuously monitor borrowers, via their sophisticated and timelier private insights into various aspects of a firm's managerial practices, including their reporting choices. Banks also provide the data necessary in their Y-9C reports to identify those among them with a greater likelihood of having entered into CDS contracts on their clients. We find that a decline in conservatism after CDS trade initiation is more pronounced among borrowers with loans outstanding from banks that are likely to have hedged their credit exposures via CDS contracts.

Additional tests examine the possibility that the observed association between CDS trade initiation and a decline in conservatism is endogenous, in the sense that lenders are motivated to enter into CDS contracts when they anticipate a decline in reporting conservatism at the borrower. Our empirical analysis indicates that the decline in borrower conservatism we observe is unlikely driven by the change in conservatism anticipated at the time of CDS trade initiation. Indeed this result is confirmed again when we substitute the matched-sample method with a Heckman two-stage procedure to control for selection bias, and when we employ an expanded prediction model for CDS trade initiation that incorporates banks' tendency to offload credit risk (Minton et al., 2009). Our results are not sensitive to alternative identification of matched control firms. Finally, they are also robust to using a conservatism measure that relies on earnings time-series properties (Basu, 1997) and not on equity returns.

The primary contribution of our study is in providing evidence that financial market developments influence financial reporting practices because they alter contractual parties' payoffs and incentives. In particular, CDS trade initiation in a firm's outstanding debt leads to a decline in its reporting conservatism because it alters the firm's relationship with its lenders.

The rest of the paper proceeds as follows. Section 2 discusses related literature and develops testable hypotheses. Section 3 describes sample selection and presents descriptive statistics. Section 4 introduces variable measurement and empirical methods. Section 5 reports empirical findings. We conclude in Section 6.

2. Related literature and hypothesis development

2.1. The CDS market

Single-name CDSs are typically written on specific securities issued by firms, for example public bonds outstanding. CDS buyers make payments to CDS sellers via insurance premiums expressed as an annualized percentage of the notional value

[3] The first-stage model indicates that CDS trade initiation is more likely for firms with higher credit rating, leverage, profit margin and size, and lower return volatility, consistent with adverse selection concerns in the CDS market creating a bias towards firms with higher credit quality and transparency.

of the transaction. For example, if the CDS spread of the underlying firm is 0.5%, a bank buying $10 million worth of protection from the CDS seller must pay the seller $50,000 annually. The payments continue until either the CDS contract expires or until the occurrence of a pre-specified credit event (e.g., default, bankruptcy, credit-rating downgrade or restructuring). See Appendix A for a sample CDS contract. There are typically two types of CDS sellers: (a) monoline insurers such as AIG and Ambac who primarily operate on the sell-side and (b) financial institutions and hedge funds including J.P. Morgan and Goldman Sachs who serve as market-makers. Both types of CDS sellers hedge their open risk exposures on CDSs across various derivative instruments and across numerous investors in each instrument (Weistroffer, 2009).

CDS contracts provide a convenient channel for hedging to lenders, even though the loans responsible for lenders' credit risk exposures to the underlying borrowers are distinct from the specific securities (i.e., bonds) that CDS contracts are written on.[4] The CDS protection benefits banks with respect to regulatory requirements. BASEL II states that by entering into CDS contracts, a bank can substitute the credit risk of the borrower by the credit risk of the CDS seller in computing risk-weighted assets (BASEL II, page 49, Article 141). CDS purchases can therefore allow for lower commitment of regulatory capital to the loan, which in turn frees funds for alternative productive investments. The CDS insurance also allows originating lenders to maintain lending relationships with their borrowers while reducing the risk profile of their loan portfolios (Venokur et al., 2008; Saretto and Tookes, 2013).

CDSs are derivative instruments, and hence are available for trade not only to lenders seeking insurance on their loan exposures, but also to speculators (Stulz, 2010; Lewis, 2010). Nonetheless, there is evidence that banks are increasingly using the CDS market to hedge the credit exposures they originate through their lending business.[5] In 2006, banks entering into CDS contracts related to their loan portfolios constituted 20% of the market for CDS purchases. By comparison, banks writing CDS contracts on their loan portfolios constituted only 9% of total CDS selling, implying that banks in general maintain net purchase positions, reflecting their incentives to use CDSs for hedging and managing regulatory capital (British Bankers Association (BBA), 2006, also see Appendix B).

2.2. CDS contracts, lender monitoring and borrowers' conservatism: primary hypothesis

CDS contracts allow loan originators to "economize" on their regulatory capital and share their risk exposures with the rest of the economy (Deutsche Bank Research, 2009). The literature has investigated whether lenders pass on the benefits from CDS investments to their clients. Ashcraft and Santos (2009) fail to find evidence that CDS trade initiation is associated negatively with interest spreads that lenders demand from their corporate borrowers. However, Saretto and Tookes (2013) document that S&P 500 firms with CDS contracts trading on their debt are able to maintain higher leverage ratios and longer debt maturities, consistent with such firms benefiting from fewer supply-side frictions in lending.

A traditional lender–borrower relationship is typically characterized by lending institutions, in particular banks, continuously monitoring borrowers after loan initiation (Fama, 1985; James, 1987; Roberts and Sufi, 2009; Acharya et al., 2014). A key question in the literature has been whether the development of the CDS market weakens lenders' incentives to monitor borrowers (Duffee and Zhou, 2001; Morrison, 2005; Ashcraft and Santos, 2009; Marsh, 2009; Stulz, 2010; Parlour and Winton, 2013). A similar issue exists with other credit-risk-transfer mechanisms such as loan sales in the primary and secondary market (Pennacchi, 1988; Gorton and Pennacchi, 1995; Ball et al., 2008; Bushman and Wittenberg-Moerman, 2012). The CDS market, however, differs from the loan sale market in some important respects. In a loan sale, both the risk exposure on the loan and control rights, including the right to monitor and administer the loans, are typically transferred to the loan buyer.[6] Even in cases that loan sales are partial, as when lead arrangers bring in syndicate participants, the latter are in a better position to detect any shirking in monitoring by the originating lender than CDS sellers, who do not have any direct access to the borrower. In contrast, in a CDS contract, the credit risk transfers to the CDS seller, but control rights remain with the original lender. Thus, the agency issues are potentially more severe with CDS contracts (Parlour and Winton, 2013).

CDS availability significantly alters the lender–borrower dynamic. Consider a bank that invests in a CDS contract on an underlying borrower's bonds. Upon the occurrence of a pre-specified credit event, for example a payment default, renegotiations are less crucial for the bank to preserve the value of its claim, because of its existing CDS insurance. This provides the bank incentives to (a) be more inflexible in renegotiations and (b) rely on credit event triggers rather than continuous monitoring to ensure the value of its claim. Hu and Black (2006) and Bolton and Oehmke (2010) refer to this as the phenomenon of the "empty creditor." Subrahmanyam et al. (2014) document that bankruptcy probability and credit risk assessments by rating agencies both increase with CDS trade inception, a finding that persists after controlling for selection bias therein, as well post-CDS changes in firm fundamentals such as leverage. They attribute the heightened financial risk of borrowers to lenders' intransigence in the post-CDS period.

In the context of the traditional lender–borrower relationship, accounting conservatism is hypothesized to provide an efficient means for debt-holders to monitor their credit risk (Watts and Zimmerman, 1986; Basu, 1997; Watts, 2003; Frankel

[4] For example, JP Morgan Chase reports $48 billion in notional CDS purchases to hedge the credit risk of its loan portfolio in its 2009 Annual Report (Saretto and Tookes, 2013).

[5] According to a survey by the British Bankers Association (2006) half of the protection banks bought in the CDS market in 2005 and 2006 were to cover exposures resulting from their lending activities.

[6] Loan sales without recourse constitute the vast majority of transactions (see Gupta et al., 2008).

and Litov, 2008; Zhang, 2008; Nikolaev, 2010; Ahmed et al., 2002; Gormley et al., 2012; Tan, 2013; Donovan et al., 2014). Conservative financial reporting, by recognizing economic losses in a timely manner and deferring the recognition of economic gains, ensures that borrowers' net asset values are understated. Thus, under conservatism, net asset values provide a lower bound on borrowers' ability to repay their debt obligations (Roychowdhury and Watts, 2007). Further, asymmetrically timely loss recognition under conservative reporting is expected to accelerate debt covenant violations and facilitate timelier transfer of control to debt-holders (Zhang, 2008; Nikolaev, 2010). Borrowers' incentives to report less conservatively after loan origination to avoid covenant violations are typically mitigated by continuous monitoring of their financial statements by lenders.

If lenders shift away from continuous monitoring because their claims are insured via CDSs, borrowers now have incentives to report less conservatively. Firms do not necessarily observe the timing of their lending banks' investments into specific CDS contracts, but they can observe CDS trade initiation on their own outstanding bonds. Further, lenders' weakened incentives to monitor the conservatism in borrowers' financial statements can manifest in several ways, including fewer requests for timely financial statements, fewer clarification requests regarding those statements and less frequent on-site visits to verify reported numbers.[7] The reduced scrutiny from lenders seeking to lower monitoring costs provides borrowers the opportunity to report less conservatively. The expected intransigence of lenders in post-CDS renegotiations makes violations particularly unattractive for borrowers and provides them with incentives to report less conservatively.[8]

Systematic empirical evidence regarding a decline in lender monitoring upon CDS trade initiation is limited. Marsh (2009) documents a less positive stock return reaction to borrowers announcing new loans from banks known to transfer credit risk via collateralized loan obligations (CLOs), consistent with the market anticipating weaker monitoring by such banks.[9] Ashcraft and Santos (2009) find that debt financing costs are higher for risky and informationally opaque firms after the onset of CDS trading, which they interpret as evidence of a reduction in lender monitoring among this subset of firms.

Wang and Xia (2014) document that firms borrowing from banks active in loan securitizations (via CLOs) enjoy looser covenants at loan origination, and appear to take on more risk than those borrowing from non-securitization banks. They conclude that banks exert less monitoring effort after loan securitizations, but do not investigate CDSs. Inconsistent with Wang and Xia (2014), Sustersic (2012) finds that new debt agreements in the post-CDS period are more likely to include financial covenants, with less "slack," relative to those initiated in the pre-CDS period. Interestingly, Sustersic (2012) finds no evidence of increased covenant violation probability in the post-CDS period; her results raise the possibility that borrowers report less conservatively after CDS trade initiation, and thus avoid an otherwise higher level of covenant violation, given the more numerous and tighter covenants. To our knowledge, the specific issue of whether lenders reduce their scrutiny of their borrowers' financial statements upon acquiring CDS contracts, or whether borrowers exhibit any change in their reporting practices, is unaddressed in the literature. Our paper tests the following null hypothesis:

H1 (null). The onset of CDS trading in a firm is not associated with a reduction in the firm's reporting conservatism.

H1 is stated in null form because other economic forces exist that could possibly influence the change in lender monitoring and borrower conservatism upon CDS trade initiation, but the net influence of these forces is often ambiguous. For example, it is possible that the demand for conservatism arising from parties other than banks is also altered with the availability of CDS contracts. Parties such as shareholders (with the board of directors and auditors as their fiduciary agents) and public debt-holders not invested in CDSs possibly increase their monitoring of financial statements and their demand for conservatism in anticipation of reduced lender monitoring. However, it is not clear that such parties can completely substitute for the expert monitoring by lenders, in particular banks. Further, CDS contractual provisions can specify that the bank's claim on the underlying firm is junior to those of other parties, motivating banks to retain their demand for conservatism (Sufi, 2007). In spite of this, such modifications in practice tend to be rare; CDS counterparties typically rely on the International Swaps and Derivatives Association Master Agreement to draw up contracts (see Deutsche Bank Research, 2009, and the discussion of standard CDS contracts in Appendix A). Similarly, on the one hand, it is possible that the responsibility for monitoring of financial statements passes from lenders to CDS sellers. On the other hand, the absence of private contractual agreements between CDS sellers and underlying borrowers limits the ability of the former to monitor borrowers on an ongoing basis after CDS trade initiation. Rather, CDS sellers, the largest of whom are monoline insurers, typically establish diversified portfolios of credit risk in which losses generated by one contract are compensated by premiums earned from other contracts. Finally, CDS sellers can price-protect in anticipation of reduced lender monitoring and can also increase CDS prices for lenders if they observe heightened post-CDS borrower default. Nevertheless, the implications of price-protection by CDS sellers are far from obvious. CDS-sellers typically price-protect only on average

[7] As Arping (2012) argues, managers at borrowing firms can typically detect any weakening of monitoring intensity in general.

[8] Other factors can also motivate managers at borrowing firms to report less conservatively in the absence of lender monitoring. Managerial compensation is often linked to earnings, for example via bonus plans. Conservative reporting, by delaying the recognition of gains relative to losses, introduces a deferred component to managers' compensation (Leone et al., 2006). It is also argued that reporting conservatism restricts managers' ability to operate or invest in projects that are potentially detrimental to the firm's health but generate private benefits for managers (Ball and Shivakumar, 2005). In addition, Roychowdhury (2010) points to the possibility that conservative reporting can weaken managers' incentives to invest in risky projects.

[9] Marsh (2009) does not observe the same evidence with banks investing in CDSs, but cautions that his sample is not appropriate for the test, since it excludes firms actively traded in the CDS market.

across both lenders and speculators *ex ante*, and cannot always attribute *ex post* borrower defaults to reduced lender monitoring. We test this latter possibility in our cross-sectional analysis, discussed next.

2.3. CDS contracts and underlying borrowers' conservatism: cross-sectional hypotheses

2.3.1. The role of reputation costs

If lenders reduce their demand for conservatism after acquiring CDSs, they may face reputation costs with CDS sellers and other loan syndicate participants (in cases that the lenders are also lead arrangers) if the loan subsequently performs poorly. This can respectively manifest in higher CDS prices in subsequent transactions with CDS sellers and/or lower willingness of potential syndicate participants to participate in future loans. Thus, lenders' propensity to lower monitoring of financial statements after entering into CDS contracts is expected to be greater when reputation effects are weaker.

Parlour and Winton (2013) argue that reputation effects in the CDS market will be weaker when riskier borrowers are involved. The intuition is as follows: if borrowers already deemed to be riskier were to default or experience any other credit event, it is more difficult for external parties to attribute this negative outcome to a lack of lender monitoring. Consequently, CDS-protected lenders are more likely to reduce monitoring of riskier borrowers. The evidence in Ashcraft and Santos (2009) suggesting a more pronounced decline in lender monitoring among riskier borrowers post-CDS-trade initiation is consistent with Parlour and Winton (2013). In the loan syndication market, Gopalan et al. (2011) find that the reputation loss suffered by lead arrangers in the event of borrower bankruptcies is lower when outstanding loans to the insolvent borrowers already have high yields (consistent with these loans being deemed as high-risk).

Furthermore, since continuous monitoring of riskier and opaque borrowers should be costlier, we expect that lenders protected by CDS investments will find it more efficient to rely on pre-specified credit events to trigger renegotiations or payments by CDS sellers. In turn, riskier borrowers will generally tend to be closer to triggering covenant violations and renegotiations, and hence are expected to be more responsive to any decline in lenders' demand for conservatism. Thus, we expect any decline in conservatism after CDS-trade initiation to be more pronounced for riskier borrowers with more opaque information environments. We identify firms that are smaller in size and have credit ratings below investment grade as riskier firms with lower-quality information environments. Thus, we test the following prediction:

H2 (alternate). A decline, if any, in conservatism after the onset of CDS trading is more pronounced for smaller borrowers and borrowers with credit rating below investment grade.

2.3.2. The role of covenants

Zhang (2008) documents that firms who report more conservatively are timelier in violating covenants upon the realization of a negative event, proxied for by a negative price shock. Nikolaev (2010) documents a positive association between conservatism and the presence of financial covenants in public debt contracts, interpreting this as evidence of the complimentary role they play in facilitating timely transfer of control to lenders. In general, the literature suggests that conservatism is more likely to facilitate transfer of control to lenders in the presence of financial covenants. Upon CDS trade initiation, we expect borrowers to have greater incentives to lower conservatism in response to reduced lender scrutiny when their existing debt contracts include more financial covenants. This is particularly true because borrowers rationally expect lenders to be more inflexible in renegotiations triggered by covenant violations when lenders are CDS-protected (Hu and Black, 2006; Bolton and Oehmke, 2010; Subrahmanyam et al.,2014). In formulating our hypothesis, we focus on the number of financial covenants in private debt contracts with banks. Private debt contracts are much more likely to include financial covenants than public debt (Begley and Freedman, 2004; Chava and Roberts, 2008), and banks/financial institutions are also more likely to hedge their underlying exposures via sophisticated derivative instruments such as CDSs (Acharya and Johnson, 2007).

H3 (alternate). A decline, if any, in conservatism after the onset of CDS trading is more pronounced for borrowers with a larger number of financial covenants in their existing private debt contracts at the time of CDS trade initiation.

2.3.3. Lender identity and continuous monitoring

CDS trade initiation and its influence on lenders' monitoring of financial statements is relevant only when the lender–borrower relationship is characterized by continuous monitoring in the first place. In other words, if post-loan initiation, lenders rely not on continuous monitoring but on credit events such as defaults or violations to trigger further scrutiny of borrowers even in the pre-CDS period, then CDS investments have little scope of altering lenders' monitoring strategy. We identify borrowers that are subject to regular monitoring by their lenders in the pre-CDS period by focusing on CDS firms that have loans outstanding to banks. Fama (1985) describes banks as providers of "inside debt", in that they have the greatest access to private information and are most likely class of lenders to monitor the firm closely after loan initiation. Consistent with this James (1987) finds a positive equity return upon the announcement of new bank credit agreements. Additionally, consistent with continuous monitoring after loan initiation, Roberts and Sufi (2009) document that a large majority (75%) of private credit agreements are renegotiated, with only a small minority (18%) of these renegotiations motivated by defaults and/or covenant violations. Data available for banks also enables us to identify whether lending banks exhibit a greater likelihood of having invested in CDS contracts on underlying borrowers upon CDS availability. This identification provides the additional advantage of isolating instances when CDS investments are made by banks hedging underlying loans, rather than by traders assuming speculative positions.

In summary, we test the following hypothesis:

H4 (alternate). A decline, if any, in conservatism after the onset of CDS trading is more pronounced among borrowers whose banks exhibit a greater likelihood of having hedged their respective loan exposures via CDS contracts upon CDS availability.

3. Sample selection

3.1. Firms with traded CDS contracts

CDS contracts are traded in the over-the-counter (OTC) market, almost entirely populated by institutional investors. Unlike an organized exchange such as the NYSE, the information on CDS trading must be gathered from market participants on the basis of their voluntary participation in periodic surveys. We collect information on CDS contracts from Datastream. Datastream covers approximately 13,000 single-name CDS contracts for firms domiciled in 70 countries. Among U.S. firms, there are 8,041 single-name CDS contracts with either senior debt (93%) or subordinated debt (7%) as the underlying securities.[10] Datastream collects CDS data from two main sources: CMA Datavision CDS series and Thomson Reuters CDS series. We only focus on the CMA CDS series because Mayordomo et al. (2014) find that CMA database quotes lead the price discovery process relative to quotes provided by other databases including Markit, GFI, Reuters EOD and JP Morgan. CMA in turn collects data directly from the trading desks of buy-side CDS market participants. Note that the CMA series are no longer offered through Datastream after the 3rd quarter of 2010. This change does not affect our empirical analysis, as our sample of CDS trade initiations ends in 2009.

We identify 1,193 U.S. firms that have single-name CDS contracts traded between January 2002 and December 2009. The CDS sample ends in 2009 to facilitate computation of asymmetric timeliness of loss recognition after CDS trade initiation for all firms in the sample. For each of these firms, we identify the first fiscal year that the firm trades at least one US-dollar-denominated CDS contract. We merge these 1,193 firms with Compustat and CRSP to collect financial variables used in the subsequent empirical analyses.[11] After deleting financial firms and requiring all firms to have at least one observation during both pre- and post-CDS trade-initiation periods, we are left with 529 unique U.S. non-financial firms with required financial variables.

3.2. Matched control firms

The initiation of CDS contracts balances credit risk preferences between the protection seller and the protection buyer. In particular, firms' credit risk and growth opportunities potentially influence the demand and supply of CDS contracts (Ashcraft and Santos, 2009). To address this sample selection issue, we follow Ashcraft and Santos (2009) and implement the matched-sample design developed in the literature. Specifically, we augment the model in Ashcraft and Santos (2009) and estimate the following logistic model to predict the initiation of CDS trading (firm subscripts are suppressed for brevity):

$$\begin{aligned}\text{Prob}(\text{CDS}_t = 1) = \Phi(&\beta_0 + \beta_1 \text{INVESTMENT GRADE}_{t-1} + \beta_2 \text{RATING}_{t-1} + \beta_3 \text{LEV}_{t-1} + \beta_4 \text{PROFIT MARGIN}_{t-1} \\ &+ \beta_5 \text{SIZE}_{t-1} + \beta_6 \text{RETURN VOLATILITY}_{t-1} + \beta_7 \text{MB}_{t-1}) + \varepsilon_t \end{aligned} \tag{1}$$

where CDS is an indicator variable equal to one for firms with CDSs traded between 2002 and 2009, and zero otherwise. We include INVESTMENT GRADE, RATING, LEV, and PROFIT MARGIN to account for firms' credit risk. INVESTMENT GRADE is an indicator variable equal to one if a firm has an S&P credit rating above BB+, and zero otherwise. RATING is an indicator variable equal to one if a firm has an S&P credit rating, and zero otherwise.[12]

LEV is book leverage, equal to a firm's total debt (short-term debt plus long-term debt) scaled by total assets. PROFIT MARGIN is net income scaled by sales. We also include firm size (SIZE), return volatility (RETURN VOLATILITY), and market-to-book ratio (MB) to consider the effect of overall information environment and growth opportunities on the demand and supply of CDS contracts. SIZE is the natural logarithm of market value of equity. RETURN VOLATILITY is the standard

[10] Single-name CDS contract is one where there is just one reference entity. The reference entity can be any borrower, but is most often one of a few hundred widely traded companies (corporate or financials) or a handful of governments (sovereigns). The CDS contract that we are interested in is the single-name one where the reference entity is a corporation. In addition to the single-name CDSs, there are basket default swaps (BDSs), index CDSs, and funded CDSs (also called a credit-linked notes) etc.

[11] The 1,193 firms include multiple subsidiaries for the same parent holding firms. For such firms, we collect financial variables for the parent holding firms only when merging with the Compustat and CRSP databases.

[12] We have tested robustness to using an ordinal variable capturing the credit rating of the firm, in lieu of the indicator variables INVESTMENT GRADE and RATING. All our subsequent results are robust to this alternative specification of the first stage model.

Table 1
Logistic regression results on probability of CDS trade initiation.

Dependent variable = Prob(CDS = 1)			
Variable	Coeff. Est.		p-Value
Intercept	−6.485		< 0.001
INVESTMENT GRADE	0.691		< 0.001
RATING	1.356		< 0.003
LEV	1.476		< 0.001
PROFIT MARGIN	0.106		< 0.001
SIZE	0.439		< 0.001
RETURN VOLATILITY	−2.201		< 0.001
MB	0.023		0.331
Pseudo R^2		0.46	
Model significance	1,940.55		< 0.001
Likelihood ratio	21,145.97		< 0.001
Percent concordant		91.50%	
Percent discordant		8.11%	
Number of firm-years		138735	

This table reports coefficient estimates from estimating a logistic model to predict the onset of credit default swap (CDS) trading. The dependent variable, CDS, is equal to 1 if a CDS is traded on a firm, and 0 otherwise. Independent variables include INVEST GRADE, an indicator variable equal to 1 if a firm has a S&P credit rating above BB+, and 0 otherwise; RATING, an indicator variable equal to 1 if a firm has a S&P credit rating, and 0 otherwise; SIZE, natural logarithm of market value; MB, the ratio of market value of equity to book value of equity; LEV, leverage equal to total debt scaled by total assets; PROFIT MARGIN is net income scaled by sales; RETURN VOLATILITY is standard deviation of monthly stock return within a fiscal year. The sample period spans 1997–2009, containing firms without CDS traded and firms with CDS traded during this period. For firms with CDS traded, only firm-years prior to the onset of CDS trading are included in the sample. Robust standard errors are estimated and are clustered at the firm level.

deviation of monthly stock return within a fiscal year, and MB is the ratio of market value of equity to book value of equity. We use all Compustat firms with available information during the period 1997–2009.[13]

Table 1 reports regression results of estimating Eq. (1). As shown, the model specified in Eq. (1) predicts the onset of CDS trading well, as evidenced by good model fit, high proportion of concordant pairs (91.5%) and low proportion of discordant pair (8.1%). The results indicate that firms with higher credit rating, leverage, profit margin and market cap, along with lower stock return volatility are more likely to have CDS trade initiation during the sample period. These findings are generally in line with an adverse selection explanation: given banks (potential protection buyers) possess superior private information about the debt instruments that they originated, the protection seller is more likely to offer CDS contracts for firms with less credit risk (firms with higher credit rating and higher profit margin) and a more transparent information environment (larger firms). The positive relation between leverage and the likelihood of CDS trade initiation suggests greater market demand of credit risk protection (via CDS contracts) for high-leverage firms.

Next, we utilize a matching procedure to construct a control sample of non-CDS firms (i.e., firms with no CDSs trade during the sample period). Specifically, based on the estimation results of Eq. (1), we obtain the estimated likelihood of CDS trade initiation for all Compustat firms. For each CDS firm (i.e., firms with a CDS trade during the sample period), we identify three non-CDS firms within the CDS firm's two-digit SIC industry that have the closest estimated likelihood to the CDS firm. The comparison of estimated likelihoods is made in the fiscal year prior to the year of CDS-trade-initiation.[14] We allow the same non-CDS firm to be matched to multiple CDS firms to minimize the distance in their estimated probability of CDS trade initiation.[15] However, once assigned as a match, a control (i.e., non-CDS) firm enters the sample only once every year, even if it serves as a match for more than one treatment (i.e., CDS) firm; thus, every control firm-year observation is unique. The matched-sample design generates 525 unique non-CDS-firm matches for the 529 CDS firms.

3.3. Descriptive statistics

Table 2 Panel A presents the sample distribution based on the CDS-trade-initiation year for the CDS sample and the matched non-CDS sample. The year 2004 witnessed the largest number of firms with CDS trade initiation (297 firms, or 56.1% of the CDS sample). The number of CDS trade initiations quickly declined afterwards for two reasons. First, since we select only the first traded CDS contract for each underlying firm, by construction we will observe a decline in the number of

[13] Our results are robust to setting the initial year of prediction to 2002, that is, the year of the first CDS trade initiation in our sample (and using corresponding explanatory variables from 2001) and therefore estimating the model parameters over 2001–2009.

[14] Our process of identifying more than one matching non-CDS firm for every CDS firm is similar to that in Lee (1997) and Chen and Martin (2011).

[15] We limit the distance in their estimated probability of CDS trade initiation to within 20% points. As a result, some CDS firms may have fewer than three matching non-CDS firms.

Table 2
Sample distribution.

Panel A: Sample distribution by CDS onset year for both CDS and non-CDS firms

	CDS		Non-CDS	
Year	*N*	%	*N*	%
2002	1	0.19	2	0.38
2003	128	24.2	237	45.14
2004	297	56.14	184	35.05
2005	41	7.75	32	6.1
2006	13	2.46	17	3.24
2007	41	7.75	43	8.19
2008	3	0.57	5	0.95
2009	5	0.95	5	0.95
Total	529	100	525	100

Panel B: Sample distribution by industry

	CDS		Non-CDS	
Industry (based on 1-digit SIC)	*N*	%	*N*	%
Mining, mineral and construction	57	10.78	40	7.62
Food, apparel, petroleum refining, and paper and printing	122	23.06	113	21.52
Rubber, stone, computer, transportation equipment	125	23.63	130	24.76
Railroad transportation and electric and gas	107	20.23	121	23.05
Retail and wholesale	55	10.40	51	9.72
Business service	47	8.88	55	10.47
Public service	13	2.46	12	2.28
Government service	3	0.57	3	0.58
Total	529	100	525	100

This table reports sample distribution by the CDS onset year in Panel A and by industry in Panel B, for both CDS firms and their matched firms (Non-CDS). For the match firms, the CDS onset year is assumed from their matched CDS firms.

Table 3
Summary statistics.

Panel A: Pre-CDS trading period

	CDS		Non-CDS		Mean diff
Variable	Mean	Median	Mean	Median	
EPS	0.033	0.055	0.023	0.050	0.010*
R	0.178	0.153	0.186	0.153	−0.008
D	0.273	0.000	0.293	0.000	−0.021
SIZE	8.849	8.770	8.123	7.969	0.726***
MB	1.142	0.884	1.240	0.920	−0.099**
LEV	0.297	0.268	0.291	0.270	0.005

Panel B: Post-CDS trading period

	CDS		Non-CDS		Mean diff
Variable	Mean	Median	Mean	Median	
EPS	−0.007	0.042	−0.010	0.038	0.003
R	0.093	0.057	0.094	0.059	−0.001
D	0.429	0.000	0.432	0.000	−0.003
SIZE	8.424	8.307	7.627	7.480	0.798***
MB	1.112	0.786	1.333	0.817	−0.221***
LEV	0.328	0.309	0.325	0.308	0.003

This table reports sample mean and median for main variables in the empirical analysis for both CDS firms and their matching firms (non-CDS) for both pre-CDS onset period and post-CDS onset period. The pre-CDS onset period covers two years prior to the onset of CDS and the post-CDS onset period covers two years after the onset of CDS. For non-CDS firms, the onset year is assumed from their matching firms. The sample period spans 2000–2011. EPS is net income scaled by prior year market value of equity; *R* is 12 month compounded returns starting 9 months before the fiscal year end. *D* is an indicator variable coded 1 if *R* is less than 0, and 0 otherwise. SIZE, natural logarithm of market value; MB, the ratio of market value of equity to book value of equity; LEV, leverage equal to total debt scaled by total assets.

Table 4
Pearson and Spearman correlations between selected variables.

	Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	EPS	1.00	**0.21**	**−0.19**	**0.32**	**0.13**	**−0.22**	0.01	**0.12**
(2)	*R*	**0.09**	1.00	**−0.73**	**0.08**	**0.08**	−0.03	−0.01	**0.11**
(3)	*D*	**−0.10**	**−0.83**	1.00	**−0.13**	**−0.07**	**0.06**	0.00	**−0.15**
(4)	SIZE	**0.16**	**0.09**	**−0.13**	1.00	**0.28**	**−0.33**	**0.23**	**0.13**
(5)	MB	0.01	**0.14**	**−0.15**	**0.38**	1.00	**−0.23**	**−0.06**	−0.01
(6)	LEV	**−0.07**	−0.04	**0.05**	**−0.31**	**−0.43**	1.00	0.02	**−0.08**
(7)	CDS	**0.04**	0.00	0.00	**0.24**	−0.04	0.03	1.00	**−0.05**
(8)	POST	**0.16**	**0.13**	**−0.15**	**0.14**	**0.08**	**−0.09**	**−0.05**	1.00

This table reports Pearson (above diagonal) and Spearman (below diagonal) corrections among variables used in the empirical analysis. The sample period spans 2000–2011. EPS is net income scaled by prior year market value of equity; *R* is 12 month compounded returns starting 9 months before the fiscal year end. *D* is an indicator variable coded 1 if *R* is less than 0, and 0 otherwise. SIZE is natural logarithm of market value of a firm; MB is market value of equity to book value of equity of a firm; LEV is leverage equal to total debt scaled by total assets; CDS is an indicator variable equal to 1 if a firm has a CDS traded over the sample period. POST is an indicator variable equal to 1 if a year falls in the two years after the onset of CDS trading, and 0 if a year falls in the two years before the onset of CDS trading for CDS firms. The match firms take on the same value of POST as the matched CDS firms in the pre- and post-CDS-trade-initiation year, respectively. Bold figures indicate significant level less than 1%.

CDS trade initiation over time. Second, the drastic decline may also foreshadow the looming financial crisis—by the end of 2008, CDS trades were initiated on only 3 new firms (0.6% of the CDS sample). By construction, we observe similar distribution for non-CDS firms. Table 2 Panel B reports the sample distribution by industry. As shown, CDS firms are primarily concentrated in the rubber, stone, computer, and transportation equipment industries (23.6% of the CDS sample). In addition, 23.1% of all CDS firms belong to the food, apparel, petroleum refining, and paper and printing industries, while 20.2% belong to the railroad transportation and electric and gas industries.

Table 3 reports descriptive statistics of variables used in subsequent analyses across the CDS sample and the matched non-CDS sample. The two samples exhibit characteristics that are generally similar in economic magnitudes. However, there are a few statistically significant differences between the two samples. During the two-year period prior to CDS trading, CDS firms have slightly better earnings performance. In addition, CDS firms are significantly larger in market capitalization and exhibit lower growth potential (lower MB).[16] The differences in firm size and growth between CDS firms and non-CDS firms are similar during the two-year period *after* the onset of CDS trading, although earnings performance becomes statistically similar between these two groups of firms. The similar magnitudes of differences between firm characteristics across CDS and non-CDS firms in Panels A and B suggest that these characteristics are unlikely to be driving the increasing difference in conservatism between CDS and non-CDS firms as one moves from Panel A to Panel B.

We report Pearson and Spearman correlations among variables used in our empirical tests in Table 4. As shown in Column (7), the correlations between CDS (an indicator variable equal to one for CDS firms, and zero for non-CDS firms) and earnings performance, firm size, growth, and leverage confirm the univariate patterns observed in Table 3.

4. Empirical methodology

4.1. Measurement of accounting conservatism

The aspect of conservatism we are interested in is the asymmetric timeliness of earnings in recognizing losses versus gains. We measure conservatism following Basu (1997), that is, the greater timeliness of earnings with respect to negative returns relative to positive returns. In particular, we estimate the following pooled cross-sectional model with standard errors clustered at the firm level (firm subscripts are suppressed for brevity):

$$EPS_t = \beta_0 + \beta_1 D_t + \beta_2 R_t + \beta_3 D_t \times R_t + \varepsilon_t \tag{2}$$

where EPS is net income for fiscal year t scaled by year-beginning market value of equity; *R* is the 12-month compound stock returns ending three months after the end of fiscal year t; *D* is a indicator variable equal to one if *R* is negative, and zero otherwise.

In the above model, the sensitivity of earnings to economic gains is captured by β_2 and the sensitivity of earnings to economic losses is captured by $(\beta_2 + \beta_3)$. If verification standards imposed for recognizing losses are lower than those imposed for recognizing gains, earnings will recognize economic losses in a timelier manner than economic gains. Hence, the association between earnings and stock returns should be incrementally higher when stock returns are negative, i.e., $\beta_3 > 0$ (Basu, 1997). We thus use β_3 to measure the extent to which earnings are reported conservatively. In the robustness tests, we also use Basu (1997)'s earnings time-series model to measure asymmetric timeliness of loss recognition.

[16] The probability-score-match controls only for the extent to which a combination of these firm characteristics (SIZE, MB, LEV) contribute to the probability of CDS trade initiation, rather than the individual characteristics.

4.2. Research design

We use the difference-in-difference method in all empirical tests. Specifically, to examine the influence of CDS trade initiation on accounting conservatism, we expand Basu's (1997) baseline model as specified in Eq. (2) by including two indicator variables: the first identifies whether a firm has at least one CDS traded over the sample period and the second captures whether a firm-year observation falls in the two-year period after CDS trade initiation. We estimate the following model using ordinary least square regression:

$$\begin{aligned}\mathrm{EPS_t} = {} & \beta_0+\beta_1 R_t+\beta_2 D_t+\beta_3 D_t\times R_t+\beta_4\mathrm{CDS}+\beta_5\mathrm{CDS}\times R_t\\ & +\beta_6\mathrm{CDS}\times D_t+\beta_7\mathrm{CDS}\times D_t\times R_t+\beta_8\mathrm{POST}+\beta_9\mathrm{POST}\times R_t\\ & +\beta_{10}\mathrm{POST}\times D_t+\beta_{11}\mathrm{POST}\times D_t\times R_t+\beta_{12}\mathrm{CDS}\times\mathrm{POST}\\ & +\beta_{13}\mathrm{CDS}\times\mathrm{POST}\times R_t+\beta_{14}\mathrm{CDS}\times\mathrm{POST}\times D_t\\ & +\boldsymbol{\beta}_{15}\mathbf{CDS}\times\mathbf{POST}\times\mathbf{D_t}\times\mathbf{R_t}+\sum_{j=1}^{N}\lambda_j\mathrm{ADDITIONAL\ CONTROLS_j}\\ & +\sum_{i=1}^{K}\gamma_i\mathrm{INDUSTRY_i}+\sum_{m=1}^{N}\delta_m\mathrm{YEAR}_m+\varepsilon_t\end{aligned} \tag{3}$$

where CDS is an indicator variable equal to one for firms with a CDS traded during the sample period, and zero for matched control firms. POST is an indicator variable equal to one (zero) if an observation falls in the two-year period following (preceding) CDS trade initiation for both the CDS firm and its matched control firms. Since sample CDS trade initiations span 2002 to 2009, the examination of change in conservatism from two years before to two years after CDS trade initiation implies that the overall period of our analysis extends from 2000 to 2011. Industry and year fixed effects are included. Standard errors are clustered at the firm level to account for serial correlation within a firm (Petersen, 2009).[17] All the other variables are as defined in Eq. (2). To ensure that the results are not entirely driven by matched control firms, we also estimate Eq. (3) for CDS firms only (thereby dropping all terms relating to the indicator variable CDS).

Prior studies suggest that firm size, market-to-book ratio, and leverage may affect accounting conservatism (e.g., Basu, 1997; LaFond and Roychowdhury, 2008; LaFond and Watts, 2008). Therefore, we include these firm characteristics and their interactions with the three terms in Basu's (1997) model in Eq. (3) as additional control variables.

Our primary interest is the effect of CDS trade initiation on asymmetric timeliness of loss recognition (H1). Hence, we test whether the coefficient β_{15}, which captures the change in accounting conservatism of CDS firms relative to their matched firms, is significantly different from zero.

5. Empirical results

5.1. Primary tests

Table 5 reports regression results on the change in asymmetric loss recognition timeliness around the onset of CDS trading. The first two columns of Table 5 summarize results of estimating Eq. (3). As shown, the coefficient on $D\times R$ is significantly positive (coefficient=1.216, p-value <0.001), suggesting that non-CDS firms are more timely in recognizing economic losses than economic gains in the two-year period prior to CDS trading. The coefficient on CDS $\times D\times R$, which captures the difference in conservatism between CDS and non-CDS firms prior to the initiation of CDS trading, is positive and statistically significant (coefficient=0.231, p-value=0.015). Hence, prior to CDS trading, CDS firms exhibit higher levels of accounting conservatism than their matched non-CDS firms.

Comparing the pre-trading period with the post-trading period, non-CDS firms appear to have no change in the timeliness of recognizing economic losses in the two-year period after CDS trading, as evidenced by the statistically insignificant coefficient on POST $\times D\times R$ (coefficient $=-0.012$, p-value=0.884). Importantly, we find a significantly negative coefficient on CDS × POST $\times D\times R$ (coefficient $=-0.295$, p-value=0.036), suggesting that relative to matched control firms, CDS firms reduce asymmetric timeliness in loss recognition after the onset of CDS trading. The combined coefficient on CDS × POST $\times R$ and CDS × POST $\times D\times R$ (-0.254) is significantly negative, indicating that CDS firms also experience a significant decline in overall (and not just asymmetric) timeliness of loss recognition after CDS trade initiation compared to their match firms. These findings reject the null and support the notion that CDS firms experience a decline in accounting conservatism around the initial years of CDS trading. Economically, the incremental decline in asymmetric timeliness for CDS firms relative to non-CDS firms is about 20% of the accounting conservatism level of the CDS firms before the onset of CDS trading (=0.295/(1.216+0.231)).[18]

Next, we estimate Eq. (3) for CDS firms only to ensure that our findings are not driven by the change in accounting conservatism for matched control firms. We therefore exclude all terms related with the indicator variable CDS and control

[17] Results are quantitatively similar if we cluster the standard errors at the year and two-digit SIC industry levels.

[18] This decline of 20.3% represents a net amount, inclusive of a 21.2% decline in the conservatism of CDS firms around CDS trade initiation. The matched non-CDS firms exhibit a (statistically insignificant) decline of 0.09% in their conservatism around the pseudo-CDS-trade-initiation dates assigned to them. For a comparison of magnitudes, Ettredge et al. (2012) findings imply a 46% increase in asymmetric timeliness of earnings following earnings restatements.

Table 5
OLS regression results on the relation between asymmetric loss recognition timeliness and the onset of CDS trading.

	Dependent variable = EPS_t			
	CDS firms and matched firms		CDS firms only	
Variable	Coeff. Est.	*p*-Value	Coeff. Est.	*p*-Value
R_t (β_1)	−0.076	0.295	−0.037	0.847
D_t (β_2)	0.148	0.014	0.327	0.002
$D_t \times R_t$ (β_3)	1.216	0.000	1.589	0.000
CDS (β_4)	−0.017	0.193		
CDS × R_t (β_5)	−0.033	0.308		
CDS × D_t (β_6)	0.048	0.024		
CDS × $D_t \times R_t$ (β_7)	0.231	0.015		
POST (β_8)	−0.023	0.023	0.009	0.572
POST × R_t (β_9)	0.024	0.260	0.045	0.052
POST × D_t (β_{10})	0.038	0.045	−0.029	0.144
POST × $D_t \times R_t$ (β_{11})	−0.012	0.884	**−0.293**	**0.012**
CDS × POST (β_{12})	0.005	0.708		
CDS × POST × R_t (β_{13})	0.041	0.208		
CDS × POST × D_t (β_{14})	−0.073	0.010		
CDS × POST × D_t × R_t (β_{15})	**−0.295**	**0.036**		
Additional controls	Included		Included	
Intercept (β_0)	0.087	0.000	−0.047	0.625
Year and industry fixed effects	Included		Included	
F-test: ($\beta_{13}+\beta_{15}$)	−0.254	0.059		
F-test: ($\beta_9+\beta_{11}$)			−0.248	0.001
Number of firm-years	4,428		1,996	
Adjusted R^2 (%)	34.51		17.17	

This table reports multivariate regression results on the relation between Basu's (1997) measure of asymmetric loss recognition timeliness and the onset of CDS trading. The sample period spans 2000–2011. Firms in financial industries are excluded. The dependent variable is EPS, defined as net income scaled by prior year's market value of equity. *R* is twelve-month buy-and-hold returns starting nine months before the fiscal year end. *D* is an indicator variable equal to one if *R* is negative, and zero otherwise. CDS is an indicator variable equal to one if a firm has a CDS contract traded over the sample period, and zero for matched control firms. The control sample is chosen based on the matched-sample design, using the estimated probability of CDS trade initiation as described in Table 1. POST is an indicator variable equal to one if a year falls in the two-year period after the CDS-trade-initiation year, and zero if a year falls in the two-year period prior to the CDS-trade-initiation year for CDS firms. The match control firms take on the same value of POST as the matched CDS firms in the pre- and post-CDS-trade-initiation year, respectively. Additional controls include firm size, market-to-book ratio, book leverage, and their corresponding interaction terms with *R*, *D*, and *D* × *R*. Year and industry fixed effects are included. *P*-values are derived based on robust standard errors clustered at the firm level.

for several firm attributes that may affect accounting conservatism. The last two columns of Panel A report the results. We find that the coefficient on POST × *D* × *R* is significantly negative, supporting the notion that CDS firms experience a decline in accounting conservatism after the onset of CDS trading.

Taken together, results presented in Table 5 suggest that regardless of whether CDS firms are benchmarked with matched control firms or are used as their own controls, they become less asymmetric timely in reporting economic losses after the onset of CDS trading. Thus, CDS trade initiation has a net negative effect on accounting conservatism of borrowing firms.

5.2. Cross-sectional tests

5.2.1. The role of reputation costs

To test H2, we examine whether the change in accounting conservatism around CDS trading initiation varies with firm size, and credit rating. We partition our sample of treatment and control firm-years into two groups based on size and credit rating and estimate Eq. (3) within each subsample.

Table 6, Panel A presents results for two sub-samples partitioned based on size – specifically, firms below median market value of equity and those above. As shown, the coefficient on CDS × POST × *D* × *R* is significantly negative for firms with below median market value (coefficient = −0.518, *p*-value = 0.005), but insignificant for firms with above median market value (coefficient = 0.132, *p*-value = 0.544). An *F*-test of the statistical difference in this coefficient estimate across these two subsamples yields a *p*-value of 0.037.

Panel B presents results for two sub-samples partitioned based on S&P long-term credit rating – specifically, firms below investment-grade rating and those above. We find that the coefficient on CDS × POST × *D* × *R* is significantly negative for firms with below investment grade ratings (coefficient = −0.377, *p*-value = 0.023). We observe a smaller and insignificant

Table 6
Cross-sectional analysis of the relation between asymmetric loss recognition timeliness and the onset of CDS trading conditional on firm size and credit rating.

Panel A: Conditional on firm size

	Dependent variable $=\text{EPS}_t$			
	Below median MVE		Above median MVE	
Variable	Coeff. Est.	p-Value	Coeff. Est.	p-Value
R_t (β_1)	−0.011	0.941	−0.050	0.329
D_t (β_2)	0.121	0.456	0.068	0.235
$D_t \times R_t$ (β_3)	1.005	0.002	0.780	0.041
CDS (β_4)	−0.051	0.039	0.006	0.407
CDS × R_t (β_5)	−0.027	0.606	−0.036	0.037
CDS × D_t (β_6)	0.085	0.018	0.007	0.710
CDS × $D_t \times R_t$ ($\beta 7$)	0.289	0.026	0.098	0.351
POST (β_8)	−0.038	0.018	−0.001	0.865
POST × R_t (β_9)	0.052	0.106	−0.005	0.783
POST × D_t (β_{10})	0.058	0.032	−0.005	0.801
POST × $D_t \times R_t$ (β_{11})	−0.025	0.813	−0.117	0.271
CDS × POST (β_{12})	0.022	0.391	−0.010	0.301
CDS × POST × R_t (β_{13})	0.051	0.352	0.026	0.232
CDS × POST × D_t (β_{14})	−0.147	0.002	0.010	0.725
CDS × POST × $\boldsymbol{D \times R_t}$ ($\boldsymbol{\beta_{15}}$)	**−0.518**	**0.005**	**0.132**	**0.544**
Additional controls	Included		Included	
Intercept (β_0)	−0.279	0.005	0.048	0.079
Year and industry fixed effects	Included		Included	
F-test: ($\beta_{13}+\beta_{15}$)	−0.467	0.0593	0.158	0.462
F-test: β_{15} across subsamples (p-value)		−0.65 (0.037)		
Number of firm-years	2,214		2,214	
Adjusted R^2 (%)	34.49		15.04	

Panel B: Conditional on credit rating

	Dependent variable $=EPS_t$			
	Below investment grade		Above investment grade	
Variable	Coeff. Est.	p-Value	Coeff. Est.	p-Value
R_t (β_1)	−0.025	0.783	−0.007	0.863
D_t (β_2)	0.167	0.078	0.005	0.878
$D_t \times R_t$ (β_3)	1.131	0.000	0.064	0.750
CDS (β_4)	−0.030	0.133	−0.004	0.537
CDS × R_t (β_5)	−0.030	0.457	−0.014	0.474
CDS × D_t (β_6)	0.072	0.025	−0.010	0.511
CDS × $D_t \times R_t$ (β_7)	0.276	0.016	0.026	0.765
POST (β_8)	−0.034	0.009	0.004	0.664
POST × R_t (β_9)	0.033	0.194	0.003	0.852
POST × D_t (β_{10})	0.058	0.019	−0.006	0.743
POST × $D_t \times R_t$ (β_{11})	0.029	0.754	−0.094	0.532
CDS × POST (β_{12})	0.008	0.682	0.004	0.542
CDS × POST × R_t (β_{13})	0.047	0.252	0.004	0.838
CDS × POST × D_t (β_{14})	−0.108	0.006	−0.004	0.862
CDS × POST × $\boldsymbol{D_t \times R_t}$ ($\boldsymbol{\beta_{15}}$)	**−0.377**	**0.023**	**−0.089**	**0.603**
Additional controls	Included		Included	
Intercept (β_0)	−0.109	0.050	0.057	0.027
Year and industry fixed effects	Included		Included	
F-test: ($\beta_{13}+\beta_{15}$)	−0.330	0.071	−0.085	0.614
F-test: β_{15} across subsamples (p-value)		−0.288 (0.075)		
Number of firm-years	3,000		1,428	
Adjusted R^2 (%)	30.55		11.93	

Table 6 (*continued*)

Panel C: Conditional on lender reputation factor

Variable	Dependent variable = EPS_t			
	Below median reputation factor		Above median reputation factor	
	Coeff. Est.	p-Value	Coeff. Est.	p-Value
$R_t(\beta 1)$	−0.028	0.776	0.046	0.552
$D_t(\beta 2)$	0.161	0.062	0.089	0.032
$D_t \times R_t(\beta 3)$	1.241	0.000	0.553	0.000
CDS($\beta 4$)	−0.036	0.104	0.002	0.856
CDS $\times R_t(\beta 5)$	−0.042	0.312	−0.001	0.973
CDS $\times D_t(\beta 6)$	0.071	0.035	−0.002	0.868
CDS $\times D_t \times R_t(\beta 7)$	0.342	0.000	0.030	0.484
POST($\beta 8$)	−0.034	0.126	0.020	0.064
POST $\times R_t(\beta 9)$	0.067	0.053	0.000	0.993
POST $\times D_t(\beta 10)$	0.069	0.022	−0.014	0.371
POST $\times D_t \times R_t(\beta 11)$	0.024	0.768	−0.094	0.209
CDS × POST($\beta 12$)	0.015	0.626	−0.012	0.271
CDS × POST $\times R_t(\beta 13)$	0.038	0.512	0.010	0.729
CDS × POST $\times D_t(\beta 14)$	−0.146	0.003	0.034	0.080
CDS × POST $\times D_t \times R_t(\beta 15)$	**−0.585**	**0.005**	**0.177**	**0.478**
Additional controls	Included		Included	
Intercept (β_0)	−0.276	0.001	−0.068	0.107
Year and industry fixed effects	Included		Included	
F-test: ($\beta_{13}+\beta_{15}$)	−0.547	0.005	0.187	0.463
F-test: β_{15} across subsamples (p-value)		−0.762 (0.014)		
Number of firm-years	2214		2214	
Adjusted R^2 (%)	33.2		19.9	

This table reports cross-sectional analysis of firm size, credit rating, and the common factor constructed based on the former two variables on the relation between asymmetric timely loss recognition and the onset of CDS trading. The sample period spans 2000–2011. Firms in financial industries are excluded. The dependent variable is EPS, defined as net income scaled by prior year's market value of equity. In Panel A, the sample is partitioned into large firms and small firms based on the full sample median market value of equity prior to the year of CDS onset. In Panel B, the sample is partitioned into firms with investment-grade credit rating and firms without investment-grade credit rating prior to the year of CDS onset. In Panel C, the sample is partitioned into high lender reputation and low lender reputation based on the full sample median lender reputation factor. Lender reputation factor is derived from the principal component analysis based on the two variables: natural logarithm of firm market value of equity and long-term S&P credit rating. Credit rating is defined by an ordinal variable ranging between 1 (AAA) and 19 (CCC-) for firms with S&P long term debt rating; we assign a value of 20 for firms in default stage, and 21 for firms with no debt rating. R is twelve-month buy-and-hold returns starting nine months before the fiscal year end. D is an indicator variable equal to one if R is negative, and zero otherwise. CDS is an indicator variable equal to one if a firm has a CDS contract traded over the sample period, and zero for matched control firms. The control sample is chosen based on the matched-sample design, using the estimated probability of CDS trade initiation as described in Table 1. POST is an indicator variable equal to one if a year falls in the two-year period after the CDS-trade-initiation year, and zero if a year falls in the two-year period prior to the CDS-trade-initiation year for CDS firms. The match control firms take on the same value of POST as the matched CDS firms in the pre- and post-CDS-trade-initiation year, respectively. Additional controls include firm size, market-to-book ratio, book leverage, and their corresponding interaction terms with R, D, and $D \times R$. Year and industry fixed effects are included. P-values are derived based on robust standard errors clustered at the firm level.

decline in conservatism for firms with credit rating above investment grade (coefficient = −0.089, p-value = 0.603). The difference in the decline in conservatism between the two groups is significant at the 10% level.

In Panel C we construct a common factor, Reputation Factor, based on both firm size and credit rating using principle-components. Size is defined as natural logarithm of market value of equity. Credit rating is defined by an ordinal variable ranging between 1 (AAA) and 19 (CCC-) for firms with S&P long term debt rating; we assign a value of 20 for firms in default stage, and 21 for firms with no debt rating. The common factor thus captures the contribution of both size and credit rating to ex ante risk of borrower default, which is expected to be associated negatively with lenders' incentives to maintain post-CDS monitoring out of concern for reputation costs. As constructed, Reputation Factor varies positively with size and negatively with credit rating. We partition the sample based on whether the value of Reputation Factor for a particular firm-year is above or below the median value for that year. The results show that the coefficient on CDS × POST × $D \times R$ is significantly negative for firms with low Reputation Factor (coefficient = −0.585, p-value < 0.005), but insignificant for firms with high Reputation Factor (coefficient = 0.177, p-value = 0.478). An F-test of the statistical difference in this coefficient estimate across these two subsamples yields a p-value of 0.014. The decline in conservatism for CDS firms when their lenders are likely to bear lower reputation costs is about 35% of their conservatism level in the pre-CDS period (= (−0.585 + 0.024)/(0.342 + 1.241)).

The results in Panels A, B and C collectively indicate that the post-CDS decline in borrower conservatism is more pronounced when banks entering into CDS contracts face lower reputation costs (as in borrowers with smaller size and

Table 7
Cross-sectional analysis of the relation between asymmetric loss recognition timeliness and the onset of CDS trading conditional on loan contracts with financial covenants.

	Dependent variable = EPS_t			
	Number of financial covenants > 3		Number of financial covenants < 2	
Variable	Coeff. Est.	*p*-Value	Coeff. Est.	*p*-Value
$R_t(\beta 1)$	−0.043	0.727	−0.173	0.415
$D_t(\beta 2)$	0.117	0.277	0.080	0.597
$D_t \times R_t(\beta 3)$	1.002	0.001	0.838	0.027
CDS($\beta 4$)	−0.010	0.670	−0.013	0.349
CDS × $R_t(\beta 5)$	−0.081	0.034	0.066	0.301
CDS × $D_t(\beta 6)$	0.024	0.605	−0.004	0.913
CDS × $D_t \times R_t(\beta 7)$	0.231	0.243	−0.191	0.449
POST($\beta 8$)	−0.008	0.678	−0.030	0.228
POST × $R_t(\beta 9)$	0.029	0.472	0.086	0.182
POST × $D_t(\beta 10)$	0.028	0.387	−0.038	0.434
POST × $D_t \times R_t(\beta 11)$	−0.053	0.738	−0.496	0.005
CDS × POST($\beta 12$)	−0.024	0.103	0.033	0.164
CDS × POST × $R_t(\beta 13)$	0.123	0.031	−0.064	0.402
CDS × POST × $D_t(\beta 14)$	−0.029	0.534	−0.038	0.468
CDS × POST × $D_t \times R_t(\beta 15)$	**−0.497**	**0.006**	**0.246**	**0.397**
Additional Controls	Included		Included	
Intercept (β_0)	−0.037	0.580	−0.065	0.251
Year and industry fixed effects	Included		Included	
F-test: ($\beta_{13}+\beta_{15}$)	−0.374	0.024	0.182	0.274
F-test: β_{15} across subsamples (*p*-value)		−0.556 (0.067)		
Number of firm-years	1153		711	
Adjusted R^2 (%)	37.01		33.04	

This table reports cross-sectional analysis based on financial covenants in loan contracts to the firms in our sample. The sample period spans 2000 to 2011. Banks lending to CDS and non-CDS firms in the sample are identified using data obtained from the LPC (Loan Pricing Corporation)'s Dealscan database. Loan contracts that are outstanding at least two years prior to the CDS trade initiation date but mature at least two years after that date are identified from the LPC database. Among all loans outstanding, the number of financial covenants is measured for the loan with the maximum number of financial covenants in the year prior to the onset of CDS trading. The sample is partitioned into more (few) covenants groups in which firms have loans contracts outstanding with the number of financial covenants exceeding 3 (below 2). The dependent variable is EPS, defined as net income scaled by prior year's market value of equity. *R* is twelve-month buy-and-hold returns starting nine months before the fiscal year end. *D* is an indicator variable equal to one if *R* is negative, and zero otherwise. CDS is an indicator variable equal to one if a firm has a CDS contract traded over the sample period, and zero for matched control firms. POST is an indicator variable equal to one if a year falls in the two-year period after the CDS-trade-initiation year, and zero if a year falls in the two-year period prior to the CDS-trade-initiation year for CDS firms. The match control firms take on the same value of POST as the matched CDS firms in the pre- and post-CDS-trade-initiation year, respectively. Additional controls include firm size, market-to-book ratio, book leverage, and their corresponding interaction terms with *R*, *D*, and $D \times R$. Year and industry fixed effects are included. *p*-Values are derived based on robust standard errors clustered at the firm level.

poorer credit ratings) from reducing monitoring. We do not observe any evidence of a decline in conservatism among larger firms with higher credit ratings, suggesting either lenders do not reduce their demand for conservatism among such firms or borrowers maintain their consistency with respect to conservative accounting practices (presumably to satisfy the demands of other stakeholders).

5.2.2. *The role of covenants*

In examining the role of covenants (H3), we first identify the number of financial covenants in firms' private debt contracts from the LPC (Loan Pricing Corporation)'s Dealscan database. Due to data availability requirements, we are left with a smaller sample size of 3,074 firm-years containing 417 unique CDS firms and 317 unique matched non-CDS firms. We next identify all loan contracts outstanding in the fiscal year *prior* to CDS trade initiation and maturing *after* CDS trade initiation. Among these loan contracts, we consider the one with the maximum number of financial covenants because this number likely represents the binding covenant intensity. Subsequently we partition the sample based on whether the number of loan covenants exceeds the sample top quartile (i.e., number of covenants > 3) or whether that number is below the bottom quartile (i.e., number of covenants < 2). Table 7 reports results for this partition. Firms exhibit a much more prominent decline in conservatism when the number of financial covenants in existing loan contracts at the time of the CDS trade initiation is above the 75th percentile. From an economic perspective, the accounting conservatism of CDS firms declines about 45% relative to their pre-CDS trade initiation period. When the number of financial covenants in existing loan contracts at the time of the CDS is below the 25th percentile, firms do not exhibit a significant decline in conservatism.

5.3. The issue of lender identity

We first identify banks with outstanding loans to the CDS firms and the matched control firms in our sample. The partial effect for a bank of investing in a CDS contract on a borrower would be to lower the risk weight assigned to the loan on that borrower and to increase the bank's CDS holdings.[19] However, it is difficult to observe the effect of a CDS contract on a single borrower on the bank's risk-weighted assets or on its CDS portfolio. Therefore, we employ a reverse approach. For each bank, we can observe whether there is a change in the proportion of total assets bearing a risk weight lower than 100% in a given year, and also whether their overall CDS holdings increases/decreases in any given year. We reason that banks for whom the proportion of assets weighted at lower than 100% rises, or banks that exhibit an increase in overall CDS holdings, *in the same year as* CDS trade initiation on an underlying borrower are more likely to have hedged their exposure to the specific borrower via the newly available CDS contracts.

Table 8 presents results of testing H4. In Panel A we present results for two sub-samples partitioned based on whether there was an increase in the proportion of banks' assets risk-weighted at lower than 100% in the same year as CDS trade initiation. We identify banks lending to CDS and non-CDS firms in our sample using data obtained from the LPC (Loan Pricing Corporation) Dealscan database, and the risk weights on banks' assets from Federal Reserve's Y-9C reports. We find that the coefficient on $\text{CDS} \times \text{POST} \times D \times R$ is significantly negative for firms whose banks exhibit an increase in the proportion of assets that bear risk weights lower than 100% (coefficient$=-0.452$, p-value$=0.003$), but is actually positive and statistically significant for firms whose banks do not exhibit an increase in the proportion of assets that bear risk weights lower than 100% (coefficient$=0.286$, p-value$=0.028$). An F-test of the statistical difference in this coefficient estimate across these two subsamples yields a p-value of 0.003.

Table 8, Panel B presents results for two sub-samples partitioned on whether banks exhibit an increase in CDS portfolio holdings in the same year as CDS trade initiation on underlying borrowers. CDS portfolio holdings of banks are obtained from Federal Reserve's Y-9C reports. As shown, the coefficient on $\text{CDS} \times \text{POST} \times D \times R$ is significantly negative for firms whose banks exhibit an increase in CDS holdings in the year of CDS trade initiation (coefficient$=-1.020$, p-value$=0.000$), but insignificant for firms whose banks do not exhibit an increase in CDS holdings (coefficient$=-0.113$, p-value$=0.310$). An F-test of the statistical difference in this coefficient estimate across these two subsamples yields a p-value of 0.100.

Finally, Panel C presents results based on identifying firms whose banks exhibit either an increase in the proportion of assets bearing risk weights below 100% or an increase in CDS holdings. We find that the coefficient on $\text{CDS} \times \text{POST} \times D \times R$ is significantly negative when either condition is satisfied (coefficient$=-0.522$, p-value$=0.000$). Economically, the decline in conservatism for CDS firms when their lenders are likely to enter into CDS contracts for hedging is about 27% of their conservatism level in the pre-CDS period ($=(-0.522+0.022)/(0.245+1.584)$). In contrast, the conservatism level for CDS firms relative to their counterparts when lenders unlikely enter into CDS contracts actually increases significantly in the post-CDS period relative to matched control firms (coefficient$=0.437$, p-value$=0.003$). This may be evidence of a selection bias: banks that do not hedge their exposures to underlying borrowers even when CDS contracts are available are likely to be the ones that intend to increase their monitoring of borrowers' financial statements. An F-test of the statistical difference in this coefficient estimate across the two subsamples yields a p-value below 0.000 (rounded).[20]

We conduct a variety of tests to check the robustness of our results. First, we modify the first-stage prediction model following Minton et al. (2009), to incorporate bank propensity to invest in derivative securities, including interest rate, foreign exchange, equity and commodity derivatives. The findings we obtain in Tables 5–7 with respect to both our primary and cross-sectional hypotheses are robust to using this first stage model. Second, we identify as matched control firms the *two* rather than the three nearest neighbors (with replacement) within 20% of the CDS-trade-initiation probability score for each treatment firm. We also modify the thresholds to include control firms within 5% rather than 20% of the treatment firm's CDS-trade-initiation probability score. Finally, we use a *one year* window rather than a two-year window for the pre- and post-CDS-trade-initiation analysis. The results (untabulated) are robust to all these alternative procedures.

5.4. Additional analysis

5.4.1. Endogeneity between expected change in conservatism and CDS trade initiation

In our final analysis, we examine the possibility that CDS trade initiation is more likely when lenders anticipate a decline in borrower conservatism. While existing literature does not raise this possibility, it has a testable empirical prediction: a negative association between *expected* change in conservatism and CDS trade initiation. Note that in our primary tests, we

[19] Loans to corporate entities are assigned a risk weight between 20% and 150% under the standardized approach to credit risk. The risk weight declines if the bank is hedged on its exposure to a specific borrower via CDS contracts if the credit rating of the CDS sellers is higher than that of the borrower. According to Basel II, a risk weight of 150% is assigned to loans rated below BB-, 100% to loans rated above BB- but below AA-, and 20% for loans with CDS protection where CDS sellers are rating above AA-.

[20] We repeat all our cross-sectional analyses in Section 5.2 within the sample of firms that are likely to have hedged their credit exposures via CDSs (that is, firms whose banks exhibit either an increase in the proportion of assets bearing risk weights below 100% or an increase in CDS holdings). The results on cross-sectional variation obtained in Tables 6 and 7 are robust to using this sub-sample; that is, we find a more pronounced decline in conservatism (a) when borrowers are risky and informationally opaque ex ante, and (b) when borrowers' debt contracts outstanding at the time of CDS trade initiation include a larger number of financial covenants.

Table 8
Cross-sectional analysis of the relation between asymmetric loss recognition timeliness and the onset of CDS trading conditional on bank characteristics.

Panel A: The proportion of banks' assets bearing lower risk weights

	Dependent variable = EPS_t			
	Increase in proportion of assets with lower risk-weight		No increase in proportion of assets with lower risk-weight	
Variable	Coef.	$P>t$	Coef.	$P>t$
$R_t(\beta 1)$	−0.190	0.121	0.015	0.880
$D_t(\beta 2)$	0.279	0.004	0.167	0.018
$D_t \times R_t(\beta 3)$	1.734	0.000	1.010	0.000
CDS(β4)	0.004	0.855	−0.047	0.010
CDS × $R_t(\beta 5)$	−0.091	0.054	0.086	0.035
CDS × $D_t(\beta 6)$	−0.003	0.928	0.042	0.138
CDS × $D_t \times R_t(\beta 7)$	0.173	0.121	−0.147	0.069
POST(β8)	0.003	0.914	−0.005	0.802
POST × $R_t(\beta 9)$	0.011	0.804	0.045	0.254
POST × $D_t(\beta 10)$	0.001	0.980	−0.021	0.514
POST × $D_t \times R_t(\beta 11)$	−0.101	0.378	−0.345	0.000
CDS × POST(β12)	−0.027	0.368	0.032	0.179
CDS × POST × $R_t(\beta 13)$	0.099	0.129	−0.041	0.453
CDS × POST × $D_t(\beta 14)$	−0.042	0.422	0.000	0.998
CDS × POST × $D_t \times R_t(\beta 15)$	**−0.452**	**0.003**	**0.286**	**0.028**
Additional controls	Included		Included	
Intercept (β_0)	0.016	0.825	−0.069	0.192
Year and industry fixed effects	Included		Included	
F-test: ($\beta_{13}+\beta_{15}$)	−0.353	0.010	0.245	0.038
F-test: β_{15} across subsamples (p-value)		−0.598 (0.003)		
Number of firm-years	1,135		1,651	
Adjusted R^2 (%)	33.13	35.01		

Panel B: Bank CDS holding change

	Dependent variable = EPS_t			
	Increase in CDS holdings		No increase in CDS holdings	
Variable	Coef.	$P>t$	Coef.	$P>t$
$R_t(\beta 1)$	−0.361	0.014	0.001	0.991
$D_t(\beta 2)$	0.115	0.357	0.226	0.000
$D_t \times R_t(\beta 3)$	1.633	0.000	1.151	0.000
CDS(β4)	0.023	0.461	−0.025	0.131
CDS × $R_t(\beta 5)$	−0.248	0.001	0.036	0.312
CDS × $D_t(\beta 6)$	0.074	0.148	0.017	0.524
CDS × $D_t \times R_t(\beta 7)$	0.742	0.000	−0.067	0.350
POST(β8)	0.003	0.903	−0.002	0.931
POST × $R_t(\beta 9)$	−0.046	0.370	0.064	0.075
POST × $D_t(\beta 10)$	0.027	0.522	−0.002	0.946
POST × $D_t \times R_t(\beta 11)$	0.076	0.554	−0.173	0.045
CDS × POST(β12)	−0.099	0.052	0.013	0.541
CDS × POST × $R_t(\beta 13)$	0.354	0.001	−0.019	0.685
CDS × POST × $D_t(\beta 14)$	−0.118	0.158	−0.028	0.453
CDS × POST × $D_t \times R_t(\beta 15)$	**−1.020**	**0.000**	**−0.113**	**0.310**
Additional controls	Included		Included	
Intercept (β_0)	0.142	0.160	−0.189	0.002
Year and Industry fixed effects	Included		Included	
F-test: ($\beta_{13}+\beta_{15}$)	−0.665	0.002	−0.133	0.188
F-test: β_{15} across subsamples (p-value)		−0.906 (0.101)		
Number of firm-years	435		2,351	
Adjusted R^2 (%)	37.02		33.01	

Panel C: Banks with an increase in either the proportion of assets bearing lower risk weights or in CDS holdings

	Dependent variable = EPS_t			
	Increase in either the proportion of assets bearing lower risk weights or in CDS holdings		No increase in either	
Variable	Coef.	$P>t$	Coef.	$P>t$
$R_t(\beta 1)$	0.112	−0.393	0.026	0.803
$D_t(\beta 2)$	0.252	0.004	0.194	0.010

Table 8 (*continued*)

$D_t \times R_t(\beta3)$	1.584	0.000	1.104	0.000
CDS(β4)	0.002	0.899	−0.047	0.021
CDS × $R_t(\beta5)$	−0.086	0.046	0.095	0.036
CDS × $D_t(\beta6)$	0.009	0.793	0.037	0.241
CDS × $D_t \times R_t(\beta7)$	0.245	0.014	−0.240	0.007
POST(β8)	0.004	0.856	0.000	1.000
POST × $R_t(\beta9)$	−0.005	0.895	0.073	0.102
POST × $D_t(\beta10)$	0.005	0.880	−0.028	0.461
POST × $D_t \times R_t(\beta11)$	0.022	0.816	−0.482	0.000
CDS × POST(β12)	−0.030	0.265	0.039	0.138
CDS × POST × $R(\beta13)$	0.118	0.048	−0.070	0.242
CDS × POST × $D_t(\beta14)$	−0.047	0.320	0.012	0.795
CDS × POST × $D_t \times R_t(\beta15)$	**−0.522**	**0.000**	**0.437**	**0.003**
Additional controls	Included		Included	
Intercept (β_0)	−0.127	0.086	−0.082	0.315
Year and industry fixed effects	Included		Included	
F-test: ($\beta_{13}+\beta_{15}$)	−0.404	0.001	0.367	0.005
F-test: β_{15} across subsamples (*p*-value)		−0.960 (0.000)		
Number of firm-years	1,296		1,490	
Adjusted R^2 (%)	0.311		0.369	

This table reports cross-sectional analysis of characteristics of banks lending to the firms in our sample. The sample period spans 2000–2011. Firms in financial industries are excluded. The dependent variable is EPS, defined as net income scaled by prior year's market value of equity. Panel A presents results for two sub-samples partitioned on whether there was an increase in the proportion of banks' assets risk-weighted at lower than 100% relative to total bank assets in the same year as CDS trade initiation. Banks lending to CDS and non-CDS firms in the sample are identified using data obtained from the LPC (Loan Pricing Corporation)'s Dealscan database, and the risk weights on banks' assets are from Federal Reserve's Y-9C reports. Panel B presents results for two sub-samples partitioned based on whether banks exhibit an increase in CDS portfolio holdings in the same year as CDS trade initiation on underlying borrowers. CDS portfolio holdings of banks are obtained from Federal Reserve's Y-9C reports. Panel C presents for situations in which either the conditions in Panel A or Panel B hold. In other words, banks exhibit an increase in either lower-risk-weighted assets or an increase in CDS portfolio holdings. *R* is twelve-month buy-and-hold returns starting nine months before the fiscal year end. *D* is an indicator variable equal to one if *R* is negative, and zero otherwise. CDS is an indicator variable equal to one if a firm has a CDS contract traded over the sample period, and zero for matched control firms. The control sample is chosen based on the matched-sample design, using the estimated probability of CDS trade initiation as described in Table 1. POST is an indicator variable equal to one if a year falls in the two-year period after the CDS-trade-initiation year, and zero if a year falls in the two-year period prior to the CDS-trade-initiation year for CDS firms. The matched control firms take on the same value of POST as the CDS firms in the pre- and post-CDS-trade-initiation year, respectively. Additional controls include firm size, market-to-book ratio, book leverage, and their corresponding interaction terms with *R*, *D*, and $D \times R$. Year and industry fixed effects are included. *p*-Values are derived based on robust standard errors clustered at the firm level.

are interested in whether there is an actual *ex post* decline in conservatism after CDS trade initiation as lenders lower monitoring of financial statements. Key to distinguishing between the two possibilities is the measurement of, and the imposition of a control for, expected change in conservatism. Accordingly, we modify our empirical research design to match control firms to treatment firms based on expected change in conservatism.

To accommodate the cross-sectional nature of our conservatism measure, we develop a novel approach for measuring expected change in conservatism. Khan and Watts (2009) demonstrate that the asymmetric timeliness of earnings (i.e., the Basu measure) varies monotonically across deciles of CSCORE, a firm-specific measure of conservatism. We partition firms in the Compustat universe into quintiles of CSCORE in the year prior to CDS trade initiation, that is, year $t-1$ (where year t is the year of CDS trade initiation). We then estimate the cross-sectional Basu measure within each of these quintiles and assign the corresponding asymmetric timeliness coefficient to all firms in that quintile. Holding quintile membership constant, we measure the cross-sectional Basu measure for year $t+1$, that is, the year after CDS trade initiation. The actual change in the asymmetric timeliness coefficient for the CSCORE quintile from year $t-1$ to $t+1$ serves as a proxy for the expected change in conservatism for every firm within that quintile. Thereafter, we augment our first stage model with expected change in conservatism.

The association between CDS trade initiation and expected change in conservatism is significantly negative. Note that our measure of expected conservatism suffers from hindsight bias, since it relies on actual change in conservatism measured *ex post*. Therefore, caution is warranted in interpreting the negative association observed in the first stage as a causal relation between expected conservatism change and CDS trade initiation. This potentially reduces the power of our second-stage regression to detect an actual change in conservatism for CDS firms. Upon matching on the CDS trading probability score from the modified first stage model, we detect no difference in *expected* change in conservatism between matched and control firms. In the second stage, we still observe an actual decline in conservatism among CDS firms upon CDS trade initiation, with this decline being much more pronounced relative to the matched non-CDS firms identified earlier, as shown in Table 9.[21]

[21] The sample size reduces slightly due to the enhanced data requirements for estimating our first stage model, which adversely influences the extent to which we can find matches for CDS firms.

Table 9
Robustness analysis – change in conservatism included in the first stage model.

	Dependent variable$=EPS_t$		
Variable	Coeff. Est.		p-Value
R_t (β_1)	-0.028		0.767
D_t (β_2)	0.182		0.007
$D_t \times R_t$ (β_3)	1.105		0.000
CDS (β_4)	-0.035		0.044
CDS $\times R_t$ (β_5)	-0.017		0.666
CDS $\times D_t$ (β_6)	0.036		0.157
CDS $\times D_t \times R_t$ (β_7)	0.154		0.185
POST (β_8)	-0.006		0.534
POST $\times R_t$ (β_9)	0.011		0.626
POST $\times D_t$ (β_{10})	-0.007		0.761
POST $\times D_t \times R_t$ (β_{11})	-0.110		0.302
CDS $\times$ POST (β_{12})	0.005		0.744
CDS $\times$ POST $\times R_t$ (β_{13})	0.048		0.177
CDS $\times$ POST $\times D_t$ (β_{14})	-0.022		0.487
CDS $\times$ POST $\times D_t \times R_t$ (β_{15})	**-0.256**		**0.085**
Additional controls	Included		
Intercept (β_0)	-0.088		0.143
Year and industry fixed effects	Included		
F-test: ($\beta_{13}+\beta_{15}$)	-0.208		0.097
Number of firm-years		4,002	
Adjusted R^2 (%)		29.05	

This table reports regression results on the relation between Basu's (1997) measure of asymmetric loss recognition timeliness and the onset of CDS trading based on a first stage model that includes expected change in asymmetric loss recognition timeliness from one year before to one year after the onset of CDS trading. For computing expected change in asymmetric timeliness, firms in Compustat are sorted into quintiles each fiscal year based on CSCORE, which in turn is computed following Khan and Watts (2009). For every firm-year, the change in the Basu coefficient from year -1 to year $+1$ for the CSCORE quintile the firm belongs to serves as that firm's expected change in conservatism. The sample period spans 2000–2011. The dependent variable is EPS, defined as net income scaled by prior year's market value of equity. R is twelve-month buy-and-hold returns starting nine months before the fiscal year end. D is an indicator variable equal to one if R is negative, and zero otherwise. CDS is an indicator variable equal to one if a firm has a CDS contract traded over the sample period, and zero for matched control firms. POST is an indicator variable equal to one if a year falls in the two-year period after the CDS-trade-initiation year, and zero if a year falls in the two-year period prior to the CDS-trade-initiation year for CDS firms. The matched control firms take on the same value of POST as the CDS firms in the pre- and post-CDS-trade-initiation year, respectively. Additional controls include firm size, market-to-book ratio, book leverage, and their corresponding interaction terms with R, D, and $D \times R$. Year and industry fixed effects are included. p-Values are derived based on robust standard errors clustered at the firm level.

5.4.2. Alternative control for selection bias in CDS trade initiation

The difference-in-difference research design used in our main analysis should mitigate the concern that our results are driven by firm characteristics that conceivably also determine CDS trade initiation. To further test the robustness of our analysis to an alternative specification, we use the Heckman two-stage procedure where the first stage models the probability of firms experiencing CDS trade initiations, and the second stage model includes the inverse mills ratio derived from the first stage to control for the selection bias. We estimate model (1) in the first stage; the second stage results are reported in column (1) Table 10. The coefficient on the inverse-mills ratio is positive, but statistically insignificant at conventional levels. The coefficient on POST $\times D_t \times R_t$ continues to be negative and statistically significant, with a p-value of 0.014. In addition, we expand the first stage model by including the expected change in accounting conservatism as discussed in the previous sub-section; the corresponding second stage results are presented in column (2). The coefficient on the inverse-mills ratio in this specification is significantly positive, indicating the presence of selection bias. Importantly, our results on a significant decline in borrower conservatism upon CDS trade initiation are robust to this alternative procedure of controlling for selection bias.

5.4.3. Robustness to using non-returns based measure of conservatism

CDS trade initiation potentially influences equity price changes (see for example Boehmer et al., forthcoming), and in turn can conceivably influence the returns-based Basu measure of conservatism. Note that the magnitude and even direction of this influence is not obvious, and it is unlikely that any influence of CDS trade initiation on stock prices can generate the collective evidence we report. Nevertheless, to check robustness to a non-returns-based measure of conservatism, we utilize an alternative measure of asymmetric loss recognition based on an earnings time-series model (Basu, 1997; Ball and Shivakumar, 2005). Specifically, we estimate the following equation using ordinary least square regression with standard errors clustered at the firm level based on the sample consisting of both CDS firms and matched

Table 10
Robustness analysis – Heckman two-stage tests.

	Dependent variable $=\text{EPS}_t$			
	(1)		(2)	
Variable	Coeff. Est.	*p*-Value	Coeff. Est.	*p*-Value
R_t (β_1)	−0.109	0.497	−0.112	0.481
D_t (β_2)	0.271	0.001	0.270	0.001
$D_t \times R_t$ (β_3)	1.518	0.000	1.526	0.000
POST (β_8)	−0.005	0.676	−0.003	0.797
POST $\times R_t$ (β_9)	0.050	0.018	0.048	0.025
POST $\times D_t$ (β_{10})	−0.022	0.259	−0.022	0.251
POST $\times D_t \times R_t$ (β_{11})	**−0.270**	**0.014**	**−0.269**	**0.014**
Inverse mills ratio	0.046	0.105	0.054	0.046
Additional controls	Included		Included	
Intercept (β_0)	−0.200	0.097	−0.221	0.059
Year and industry fixed effects	Included		Included	
F-test: ($\beta_{13}+\beta_{15}$)				
F-test: ($\beta_9+\beta_{11}$)	−0.220	0.036	−0.221	0.034
Number of firm-years	1,996		1,996	
Adjusted R^2 (%)	17.56		18.12	

This table reports the second-stage regression results on the relation between Basu's (1997) measure of asymmetric loss recognition timeliness and the onset of CDS trading using Heckman two-stage procedure with CDS firms only. In the first stage, the sample consists of 138,735 firm-year observations, the same sample in Table 1. In column (1), the first stage selection model includes all the explanatory variables used in the first stage model as shown in Table 1. In column (2), the first stage selection model includes all the explanatory variables used in the first stage model as shown in Table 1, as well as the expected change in asymmetric loss recognition timeliness between one year before and one year after CDS trade initiation. For computing expected change in asymmetric timeliness, firms in Compustat are sorted into quintiles each fiscal year based on CSCORE, which in turn is computed following Khan and Watts (2009). For every firm-year, the change in the Basu coefficient from year −1 to year +1 for the CSCORE quintile the firm belongs to serves as that firm's expected change in conservatism. The sample period spans 2000–2011. The dependent variable is EPS, defined as net income scaled by prior year's market value of equity. *R* is twelve-month buy-and-hold returns starting nine months before the fiscal year end. *D* is an indicator variable equal to one if *R* is negative, and zero otherwise. POST is an indicator variable equal to one if a year falls in the two-year period after the CDS-trade-initiation year, and zero if a year falls in the two-year period prior to the CDS-trade-initiation year. Additional controls include firm size, market-to-book ratio, book leverage, and their corresponding interaction terms with *R*, *D*, and $D \times R$. Year and industry fixed effects are included. *p*-Values are derived based on robust standard errors clustered at the firm level.

control firms.

$$\begin{aligned}\Delta E_t = {} & \gamma_0+\gamma_1\Delta E_{t-1}+\gamma_2 D_{t-1}+\gamma_3 D_{t-1}\times\Delta E_{t-1}\\ & +\gamma_4\text{CDS}+\gamma_5\text{CDS}\times\Delta E_{t-1}+\gamma_6\text{CDS}\times D_{t-1}+\gamma_7\text{CDS}\times D_{t-1}\times\Delta E_{t-1}\\ & +\gamma_8\text{POST}+\gamma_9\text{POST}\times\Delta E_{t-1}+\gamma_{10}\text{POST}\times D_{t-1}+\gamma_{11}\text{POST}\times D_{t-1}\times\Delta E_{t-1}\\ & +\gamma_{12}\text{CDS}\times\text{POST}+\gamma_{13}POST\times\text{CDS}\times\Delta E_{t-1}+\gamma_{14}\text{CDS}\times\text{POST}\times D_{t-1}\\ & +\boldsymbol{\gamma_{15}}\textbf{CDS}\times\textbf{POST}\times\mathbf{D}_{t-1}\times\boldsymbol{\Delta}\mathbf{E}_{t-1}+\sum_{j=1}^{N}\lambda_j\text{ADDITIONAL CONTROLS}_j\\ & +\sum_{i=1}^{K}\gamma_i\text{INDUSTRY}_i+\sum_{m=1}^{N}\delta_m\text{YEAR}_m+\varepsilon_t \end{aligned} \tag{4}$$

where ΔE_t is current year's earnings change, ΔE_{t-1} is previous year's earnings change, *D* is an indicator variable equal to one for previous earnings decline (i.e., $\Delta E_{t-1}<0$) and zero otherwise, and the other variables are as defined in Eq. (3). In the above equation, we allow earnings persistence to differ between earnings increase and earnings declines. More timely recognition of losses than gains implies that earnings increases are more persistent than earnings declines. Hence, a reduction of accounting conservatism around the CDS-trade-initiation year would require that the coefficient on $\text{CDS}\times\text{POST}\times D_{t-1}\times\Delta E_{t-1}$, γ_{15}, be significantly positive.

Results presented in Table 11 corroborate those presented in Table 5.[22] The coefficient on $\text{CDS}\times\text{POST}\times D_{t-1}\times\Delta E_{t-1}$ is significantly positive at the 5% level (coefficient = 1.308, *p*-value = 0.017), implying that reversals in earnings declines are less in the years following CDS trade initiation. Our finding reinforces the conclusion that CDS firms experience a decline in the asymmetric timeliness of loss recognition after the onset of CDS trading.

[22] There is a reduction in sample size, because we impose the requirement that for every year, enough data be available to compute earnings changes for the following year. Since CDS trade initiations span 2002 to 2009, the sample period for this test extends from 1999 to 2011, given that we require lagged data to estimate changes in the earnings time-series measure of conservatism.

Table 11
Non-returns based measure of conservatism.

Earnings time-series measure	Dependent variable = ΔEPS_t	
	CDS firms and matched firms	
Variable	Coeff. Est.	*p*-Value
ΔE_{t-1} (γ_1)	0.163	0.662
D_{t-1} (γ_2)	−0.069	0.149
$D_{t-1} \times \Delta E_{t-1}$ (γ_3)	−0.184	0.822
CDS (γ_4)	−0.022	0.010
CDS × ΔE_{t-1} (γ_5)	0.307	0.044
CDS × D_{t-1} (γ_6)	0.000	0.982
CDS × $D_{t-1} \times \Delta E_{t-1}$ (γ_7)	−0.520	0.139
POST (γ_8)	−0.019	0.036
POST × ΔE_{t-1} (γ_9)	0.426	0.014
POST × D_{t-1} (γ_{10})	0.001	0.960
POST × $D_{t-1} \times \Delta E_{t-1}$ (γ_{11})	−0.910	0.010
CDS × POST (γ_{12})	0.006	0.640
CDS × POST × ΔE_{t-1} (γ_{13})	−0.499	0.043
CDS × POST × D_{t-1} (γ_{14})	0.012	0.611
CDS × POST × $D_{t-1} \times \Delta E_{t-1}$ (γ_{15})	**1.308**	**0.017**
Additional controls	Included	Included
Intercept (γ_0)	−0.119	0.000
Year and industry fixed effects	Included	
Number of firm-years	4,209	
Adjusted R^2 (%)	28.86	

This table reports multivariate regression results on the relation between an earnings time-series measure of asymmetric loss recognition timeliness and the onset of CDS trading. The sample period for this test spans 1999–2011. The period includes one extra year (1999) relative to Tables 5–10, due to the requirement of lagged data for estimation of the earnings-time-series-based measure of conservatism. Firms in financial industries are excluded. The dependent variable is ΔE_t, the change in annual earnings before extraordinary item, scaled by lagged total assets. D is an indicator variable equal to one if ΔE_{t-1} is negative, and zero otherwise. CDS is an indicator variable equal to one if a firm has a CDS contract traded over the sample period, and zero for matched control firms. The control sample is chosen based on the matched-sample design, using the estimated probability of CDS trade initiation as described in Table 1. POST is an indicator variable equal to one if a year falls in the three-year period after the CDS-trade-initiation year, and zero if a year falls in the three-year period prior to the CDS-trade-initiation year for CDS firms. The matched control firms take on the same value of POST as the CDS firms in the pre- and post-CDS-trade-initiation year, respectively. Additional controls include firm size, market-to-book ratio, book leverage, and their corresponding interaction terms with ΔE_{t-1}, D_{t-1}, and $D_{t-1} \times \Delta E_{t-1}$. Year and industry fixed effects are included. *p*-Values are based on robust standard errors clustered at the firm level.

6. Conclusion

Our paper provides evidence that the availability of CDS trades to a firm's lenders leads to a decline in that firm's reporting conservatism. Our findings are consistent with borrowers' incentives to report less conservatively after CDS trade initiation to avoid triggering violations, because they expect CDS-protected lenders to be less accommodating in renegotiations. Even in the presence of heightened incentives, borrowers would be constrained from reporting less conservatively if lenders were to maintain their monitoring. An actual decline in conservatism is thus also indicative of a slackening in lenders' post-CDS scrutiny of financial statements. The results thus imply that either (a) other stakeholders to the firm cannot replicate the monitoring by banks necessary to maintain borrowers' reporting conservatism and/or (b) that banks demand a level of conservatism higher than the equilibrium demand from other stakeholders.

It is possible that the lower reporting conservatism after CDS trade initiation encourages borrowers to also take actions that transfer wealth from debt-holders to shareholders via asset substitution, underinvestment, dividend overpayment, etc. In that sense, the structure of the CDS market during the sample period examined in this study may be off-equilibrium. On the other hand, the threat of more unfavorable renegotiations with lenders upon the occurrence of payment defaults, covenant violations and other credit events possibly disciplines borrowers *ex ante* from expanding attempts to transfer wealth from debt-holders. Thus, CDS availability potentially alters the lender–borrower relation to one that de-emphasizes continuous monitoring and financial reporting conservatism, and relies instead on the discipline imposed by the threat of lender inflexibility in renegotiations triggered by credit events. A thorough investigation into these possible scenarios following the onset of CDS trading is beyond the scope of this study, but can serve as a fertile area for future research.

Appendix A. The credit default swap contract

Credit default swaps are generally documented using industry-standard derivative master agreements and standard CDS terms. Unlike equity shares or bonds, which are traded primarily on regulated exchanges, CDS are traded mainly over-the-counter (OTC). In principle, therefore, the contracting parties can agree upon the terms and conditions of the CDS individually – such as definitions of the credit events or settlement procedures. In practice, to facilitate documentation, avoid disputes regarding the occurrence of credit events and settle contracts, CDS contracting parties generally refer to the International Swaps and Derivatives Association (ISDA) Master Agreement. These general terms and conditions – established by ISDA, the central industry body – were introduced in 1999 and have been continuously developed since then. A revised version of the agreement was released in 2003, while the latest amendments were made in 2009 (see Deutsche Bank Research, 2009).

A.1. Sample term sheet for a credit default swap (traded by XYZ Bank PLC)

Draft terms – credit default swap

1. General terms

Trade Date	Aug 5, 2003
Effective Date	Aug 6, 2003
Scheduled Termination Date	Jul 30, 2005
Floating Rate Payer ('Seller')	XYZ Bank plc, London branch
Fixed Rate Payer ('Buyer')	ABC Investment Bank plc
Calculation Agent	Seller
Calculation Agent City	New York
Business Day	New York
Business Day Convention	Following
Reference Entity	Jackfruit Records Corporation
Reference Obligation	Primary Obligor: Jackfruit Records
Maturity	Jun 30, 2020
Coupon	0%
CUSIP/ISIN	xxxxx
Original Issue Amount	USD 100,000,000
Reference Price	100%
All Guarantees	Not Applicable

2. Fixed payments

Fixed Rate Payer Calculation Amount	USD 7,000,000
Fixed Rate	0.3% per annum
Fixed Rate Payer Payment Date(s)	Oct 30, Jan 30, Apr 30, Jul 30, starting Oct 30, 2003
Fixed Rate Day Count Fraction	Actual/360

3. Floating payments

Floating Rate Payer Calculation Amount	USD 7,000,000
Conditions to Payment (Or Seller)	Credit Event Notice (Notifying Parties: Buyer Notice of Publicly Available Information: Applicable (Public Source: Standard Public Sources. Specified Number: Two)
Credit Events	Bankruptcy Failure to Pay (Grace Period Extension: Not Applicable. Payment Requirement: $1,000,000)
Obligation(s)	Borrowed money

4. Settlement terms

Settlement Method	Physical Settlement
Settlement Currency	The currency in which the Floating Rate Payer Calculation Amount is denominated
Terms Relating to Physical Settlement	
Physical Settlement Period	The longest of the number of business days for settlement in accordance with the then – current market practice of any Deliverable Obligation being Delivered in the Portfolio, as determined by the Calculation Agent, after

	consultation with the parties, but in no event shall be more than 30 days
Portfolio	Exclude Accrued Interest
Deliverable Obligations	Bond or Loan
Deliverable Obligation Characteristics	Not Subordinated Specified Currency – Standard Specified Currencies Maximum Maturity: 30 years Not Contingent Not Bearer Transferable Assignable Loan Consent Required Loan
Restructuring Maturity Limitation	Not Applicable
Partial Cash Settlement of Loans	Not Applicable
Partial Cash Settlement of Assignable Loans	Not Applicable
Escrow	Applicable

5. Documentation

Confirmation to be prepared by the Seller and agreed to by the Buyer. The definitions and provisions contained in the 2003 ISDA Credit Derivatives Definitions, as published by the International Swaps and Derivatives Association, Inc., as supplemented by the May 2003

Supplement, to the 2003 ISDA Credit Derivatives Definitions (together, the ‘Credit Derivatives Definitions’), are incorporated into the Confirmation

6. Notice and account details

Telephone, Telex and/or: Facsimile Numbers and Contact Details for Notices	Buyer Phone: Fax: Seller: A.N. Other Phone: +1 212-xxx-xxxx Fax: +1 212-xxx-xxxx
Account Details of Seller	84-7512562-85

A.2. *Risks and characteristics*

Credit risk. An investor's ability to collect any premium will depend on the ability of XYZ Bank plc to pay.

Non-marketability. Swaps are not registered instruments and they do not trade on any exchange. It may be impossible for the transactor in a swap to transfer the obligations under the swap to another holder. Swaps are customized instruments and there is no central source to obtain prices from other dealers.

Appendix B

Panel A: Buyers of protection by institution type

Type of institution	2000	2002	2004	2006
Banks (including securities firms)	81	73	67	59
Banks – trading activities	–	–	–	39
Banks – loan por tfolio	–	–	–	20
Insurers	7	6	7	6
Monoline insurers	–	3*	2	2
Reinsurers	–		3	2
Other insurance companies	–	3	2	2
Hedge funds	3	12	16	28
Pension funds	1	1	3	2
Mutual funds	1	2	3	2
Corporates	6	4	3	2
Other	1	2	1	1

Panel B: Sellers of protection by institution type

Type of institution	2000	2002	2004	2006

Banks (including securities firms)	63	55	54	44
Banks—trading activities	–	–	–	35
Banks—loan portfolio	–	–	–	9
Insurers	23	33	20	17
Monoline insurers	–	21*	10	8
Reinsurers	–		7	4
Other insurance companies	–	12	3	5
Hedge funds	5	5	15	32
Pension funds	3	2	4	4
Mutual funds	2	3	4	3
Corporates	3	2	2	1
Other	1	0	1	1

*Monoline insurers and reinsurers combined.

This appendix shows the breakdown of market share in percentage for CDS market participants by type of institutions. The source is British Bankers Association (BBA) Credit Derivatives Report (2006).

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Accounting information transparency and decision making effectiveness: evidence from financial businesses in Thailand

Satiya Klinsukhon
PhaprukeUssahawanitchakit
Mahasarakham University, Thailand

Keywords
Accounting Information Transparency, Decision Making Effectiveness

Abstract

The purpose of this study is to examine the effect of accounting information transparency on decision making effectiveness via mediating influences, which include financial report quality and information advantage. The author improves novel components of accounting information transparency: disclosure, accuracy, and clarity. Data was collected from 238 Thai firms, divided into two categories: financial institutions and insurance companies. The statistics used to analysis multiple regression analysis. The result indicates that accounting information transparency has significantly positive influence on financial report quality and two of three dimensions of accounting information transparency have significantly positive influence on information advantage. Moreover, financial report quality and information advantage have significantly positive influence on decision making effectiveness.

1. Introduction

Recent crisis involves the actions taken by Toshiba Corporation in the wake of an accounting scandal. Between 2006 – 2014 Toshiba overstated operating profits by more than $1.2 billion (The Japan Times News,2015). Unethical behavior intended to break the rules and regulations to manipulate information was presented in the financial statements. The financial statements did not present accurate and useful information. Such accounting scandals weredue to the lack of financial transparency, imperfect regulations and unethical behavior (Hanson, 2003, Holzner et al., 2002). Furthermore, in the aftermath of Enron, WorldCom and other corporate scandals, the call went forth from various stakeholders for more "transparency" in accounting, auditing and corporate governance (Arya, et al., 2003). In the meantime, academic accountants began the task of identifying the attributes and mechanisms of corporate transparency (Anctil et al., 2004, Bushman et al., 2004). In the end, the US was to rule out Sarbanes-Oxley Acts to create transparency in financial reporting and business operations in a more ethical manner.Sarbanes-Oxley Act section 404 provides established internal controls and procedures for financial reporting and documents.It also tests and maintains internal controls and procedures to ensure their effectiveness. (SOX, 2002). Together, section 409 and Securities and Exchange Commission (SEC) require annual financial report disclosures for information transparency because information transparency plays an important role for its users, as most user require financial statements to support their decision making in the future (Reck, 2004). Nevertheless, not only more information transparency is needed, but also reliable information. Therefore, information transparency is an important issue for all companies because it helps to build stakeholder's confidence on their investment decisions. (Yu, 2005, Elliott et al., 2009).

The Corruption Perceptions Index 2014, ranked by Transparency International, shows the result of Thailand perceived transparency score at 38/100 and ranked at 85th from 175 countries, 12thof 28 countries in Asia Pacific (Report the Corruption Perceptions Index, 2014). The result suggests that Thailand have corruption problems as well as the lack of transparency. Furthermore, the findings in 2015 from a corporate governance assessment of 588 listed companies also shows that there is disclosure and transparency category having the score of 80 percent (Corporate Governance Report of Thai Listed Company, 2015). Thus, transparency in the preparation of financial statements helps build users' confidence and promote effective decision making. In Thailand, the concept of transparency is not a new concept although it is not widely practiced in every businesses. In financial businesses, it is believed that transparency can help attract more professionals and investors in the property market. Transparency has therefore become more significant in the financial businesses due to the demand from investors (Schulte et al., 2005).

The financial business have revealed sensitive information, accurate to stakeholders and financial decisions. Disclosure of information as an indicator of transparency in the operation, is a key factor in building confidence among all stakeholders of the financial business's operational integrity and a mechanism to monitor the implementation. (Guide governance of Government Savings Bank, 2015). This little study focuses on the transparency of financial businesses in Thailand. The literature, however, has been hampered by methodological issues over what actually constitutes "transparency", as well as the lack of a quantitative indicator which has substantial coverage across countries and time (Williams, 2014).Within accounting information, this ideal of transparency leads to an influential belief that by making financial information and processes more visible to users, related information and processes would be made more available and accessible to users, providing them with greater control and enabling enhanced decision making. (Roberts ,2009).

The aim of this study is to investigate the relationships between accounting information transparency, including three dimensions (disclosure, accuracy, and clarity) and decision making effectiveness through impact on financial report quality and information advantage.

In this study the key research questions are: (1) How does each dimension of accounting information transparency influence on financial report quality,information advantage and decision making effectiveness? (2) How does financial report quality influence on decision making effectiveness? (3) How does financial report quality and information advantage influence on decision making effectiveness?

The study is structured as follows: Firstly, the researcher provides the relevant literatures and hypotheses development. Secondly, the researcher explains the methodology, including data collection procedure and measurement, measure validation, and statistical technique. Next, the researcher discusses the results of this study, then explains the contributions. Finally, the summary is provided along with the limitation of this study.

2. Literature Review and Hypothesis Development

This study investigates the relationship between accounting information transparency and decision making effectiveness through the impact on mediators as financial report quality and information advantage. All hypotheses in this research proposed to have a positive effect. The conceptual model presents the relationship between all constructs in Figure 1.

This study explains and predicts the relationship between variables under the concept of agency theory.

One possible reason for agency problems is a result of the information asymmetry (Sengupta, 1998). The basic insight of the agency theory is that one party (principal) hires another (agent) to take charge of a specific task, but the former suffers from an information asymmetry, which introduces a problem in terms of motivating the agent. The agency problem shows that it is hard for internal agent to deliver credible information to external information users. Thus, according to Zuo, G. (2012), transparency consists of greater disclosure, high quality disclosure and understandable information. Transparency helps to reduce such agency problem as information asymmetry.

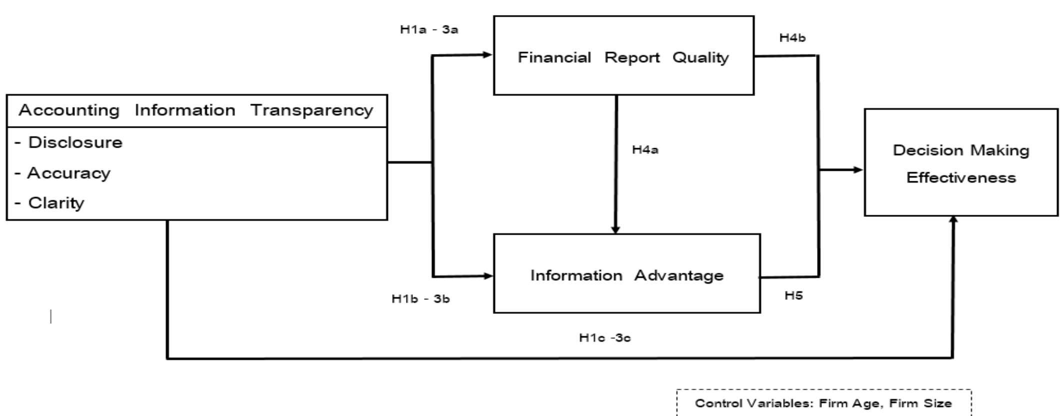

Figure 1 : Conceptual Model of Accounting Information Transparency and Decision Making Effectiveness

2.1 Accounting Information Transparency

Accounting information plays an important role for its users, especially in decision-making. Information of accounting in financial statements represents the financial effects of past events and transactions, which can be used to support decision making in the future. In addition, the non-financial information also supports decision-making for users of financial statements. According to Barth and Schipper (2008), financial reporting transparency is identified as, on the one hand, disclosure for information in the financial statements are underlying economics; on the other hand, information disclosure in the financial statements are readily understandable by internal and external information users. Florini (2007) defines transparency as the degree of information ~~is~~ available to outsiders, allowing them to make decision and/or to assess the decision of insiders. Furthermore, transparency is related to quality of information such that information needed should be easily understood, factually accurate by the intended audience and presented in a feature that promotes adoption of the desired behaviors (O'Malley and Thompson, 2009). Further definition of financial transparency is comprehensibility, clarity, and clearness, and excellent corporate governance (Hanson, 2003, Holzner et al., 2002). Accurate, clear, and disclosed information can be considered to hold a strong degree of transparency. (Schnzackenberg, 2009). In this study, accounting information transparency is defined as reliable accounting information which helps users to accurately make decisions. The characteristics of the information quality include: 1) the level of disclosed information presented, which will be available to interested parties. This disclosure must be timely appropriate, relevant and easy to understand. 2) the level of accuracy which complies with standard accounting rules. 3) clarity, focusing on the benefits of the information, which is accurate, complete, adequate, reliable and relevant to decision making. Therefore, if the company has accounting information transparency, it will enable the company to have financial report quality, information advantage to be used in effective decision making. In this study, the construct of accounting information transparency has three dimensions, consisting of disclosure, accuracy and clarity (Schnackenberg, 2009). The details of each dimension are described below.

Disclosure

Disclosures are generally defined as announcements which employ a disseminate policy, accounting technique and make somewhat verifiable forecasts (Diamond &Verrecchia, 1991). In Nada Lahrech, AbdelmounaimLahrech and Youssef Boulaksil (2014), a significant relationship between the disclosure level of quantitative and qualitative information in Islamic banking financials and the profit allocation ratio is studied. Disclosure is meant to include both the *availability* of that representation to interested parties as well as the *quantity* of information presentation. Core (2001) identifies disclosure quality as an agent to disclosure policy optimization in a firm. Such studies conclude that *quality* is a separate and identifiable element to disclosure. In this study, disclosure is defined as *timeliness,* referring to the timely presentation of financial information; *relevance* refers to the extent to which these reports provide users with the information required to make effective decisions; and *openness* refers to the understandability and accountability (Cottarelli, 2012). Therefore, firms that produce their accounting information disclosure following the timeliness, relevance and openness tend to increase the quality of financial report and reliability of the information, as well as enhance quality of decision making. Therefore, the hypotheses are posited as follows:

Hypotheses 1: The higher the disclosure is, the more likely that firms will gain greater (a) financial report quality, (b) information advantage, and (c) decision making effectiveness.

Accuracy

Accounting standards are the basic concepts focusing on the preparation and presentation of financial statements for external users (IASB, 2009).The regulations are corporate governance that reforms the firm's transparency, and the firms that follow the related regulations will increase the information's transparency (Waroonkun and Ussahawanitchakit, 2011). In this study, accuracy is defined as the accounting information that strictly follows the accounting standards, regulation and the follow up changes in those standards including constant focus on the understanding and interpretation of the accounting standards to help the organization present financial reports correctly and completely (Kohlbeck and Warfield, 2010). Therefore, firms which prepare accounting information following the standards tend to increase the quality of financial report and reliability of the information, as well as enhance quality of decision making. Therefore, the hypotheses are posited as follows:

Hypotheses 2: The higher the accuracy is, the more likely that firms will gain greater (a) financial report quality, (b) information advantage, and (c) decision making effectiveness.

Clarity

Clarity are defined as the focus on the utility of accounting information which is accurate, adequate, reliable,complete, and relevant for decision making to establish the reliability of accounting information for stakeholders. This will eventually lead to the added value of the firm. Financial information usefulness is very important for both internal and external users to support decision making related to the operations (Reck, Vernon and Gotlob, 2004).

Hypotheses 3: The higher the clarity is, the more likely that firms will gain greater (a) financial report quality, (b) information advantage, and (c) decision making effectiveness.

2.2 Financial Report Quality

Financial report quality are the accuracy, timeliness, completeness, consistency, and relevance of the used information system applied to the problem solving. Furthermore, it also covers used information, business performance, which includes role in the procedures and the operation of the business, both non-monetary and monetary (Neely and Cook, 2011). Therefore, the information will affect the operation of the business (Delone and Mclean, 2003; Chitmun, Ussahawanitchakit, 2012), resulted in the decision to take benefit from an information system in operation. In addition, financial reporting quality will affect information reliability, effectiveness of decision making, and useful information. In this study,financial report quality refers to the information comprehensiveness and support for the success of businesses, the information to assess and reflect the accuracy of situation which can be used to support better decision making than the competitors. Therefore, the hypotheses are posited as follows:

Hypotheses 4: The higher the financial report quality is, the more likely that firms will gain greater (a) information advantage, and (b) decision making effectiveness.

2.3 Information Advantage

Information advantage is defined as both the financial information and non-financial information which can reflect the actual operational condition effectively, and can be a good indicator of the profitability of the business both at present and in the future. Information advantage helps an organization's process to increase efficiency and effectiveness (Glomstead, 2001) and decision making. Information advantage is the greater qualitative characteristic of accounting information which can enhance the organization's capacity to analyze, assess, and forecast the economic events with accuracy and clarity (PWC, 2010). Financial information usefulness refers to good results of the reports that reflect the position of financial and operating results, which are accurate and reliable, and can be used to support decision making or forecasting of future performance (Fisher and Kingma, 2001).The purpose of financial information is to provide relevant and timely information for users to support decision making (Pongsatitpat and Ussahawanitchakit, 2012). Decision making is concerned with actions in the future (Bello, 2009) or financial information that is the foundation of internal financial information to assist managers to make business decisions. Krumwiede et al. (2007) and Zager and Zager (2006) state that information advantage is financial information usefulness in the context of the decision making process.

2.4 Decision Making Effectiveness

Decision making effectiveness is defined as the ability to use data to make effective, timely, and appropriate decisions to achieve the desired purpose. Accounting systems have been considered important organizational mechanisms which are critical for effective decision management and control in a business (O'Donnell and David, 2000). Successful decision making is the achievement in the selection among company choices which enables organizations to reach their objectives or goals. Ability of manager to manage relies on good decision making, which is a selection of the most efficient course of action to achieve desired objective. In selecting the most appropriate choice, a manager needs information related to alternative solutions such as cost information quality (Barfield et al., 1997). Moreover, prior research suggested that effective decision making is an assessment to the extent that the decision maker achieves the desired purpose related to business performance (Barfied et al., 1997; Ponikvar et al., 2009; Dimitratos et al., 2011). Thus, in this study, decision making effectiveness refers to companies which make accurate and timely decisions helping the organization to reach the desired goals. In this study, firms which have information advantage tend to make better decisions.Thus, the hypotheses are proposed as follows:

Hypotheses 5: The higher the information advantage is, the more likely that firms will gain greater decision making effectiveness.

3. Research Methods

3.1 Sample Selection and Data Collection Procedure

The sample of this study is financial businesses in Thailand consist of 238 firms divided into two categories: financial institutions and insurance companies. Database in this research is drawn from the Bank of Thailand and Insurance Thailand on their websites: www.bot.or.th and www.thai.insurancethailand.info. Accounting executives and accounting managers of each business are chosen as key participants. The data were collected via questionnaires, in which 228 out of 238 were returned. The mailing was 238 surveys, the returned questionnaires 10 mailing. Thus successful questionnaires mailed 228. Among the completed and returned surveys, only 78 were usable. The effective response rate was thus 34.21%. The response rate for a mailed survey with an appropriate follow-up procedure, if greater than 20%, is considered acceptable (Aaker, Kumar and Day, 2001).

3.2 Test of Non-Response Bias

Empirical research has been checked for non-response bias and to detect and consider possible problems with non-response errors, the investigation and assessment of non-response-bias are tested with the early and late wave data as recommended by Armstrong and Overton (1977). The mean of demographic variables of the two waves is tested by t-test whether the means are different between respondents. The result showed no significant differences. Thus, a non-response bias is not considered a problem in this study.

3.3 Variable Measurements

All variables were obtained from the survey and all items of the questions are measured by a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Constructs in the conceptual model are developed and modified from prior research. Thus, in this study, the variable measurements of the dependent variable, independent variables, mediating variable and control variables are described below.

Dependent Variable

Decision making effectiveness is defined as companies which make accurate and timely decisions helping the organization to reach the desired goals. In this study, firms which have information advantage tend to make better decision.

Independent Variables

This research consists of seven independent variables: accounting information transparency, and two outcomes. Accounting information transparency as the first one is the core construct of this study. This variable is measured by three attributes: disclosure, accuracy, and clarity. Moreover, these attributes reflect the accounting information that is in compliance with accounting standards and regulations to obtain information that is reliable and useful for decision-making, as well as to prepare information for reporting to management and stakeholders effectively. The measure of each attribute is detailed as follows:

Disclosure is defined as *timeliness,* referring to the timely presentation of financial information; *relevance* refers to the extent to which these reports provide users with the information required to make effective decisions; and *openness* refers to the understandability and accountability

Accuracy is defined as the accounting information that strictly follows the accounting standards, regulation and the follow up changes in those standards including constant focus on the understanding and interpretation of the accounting standards to help the organization present financial reports correctly and completely.

Clarity is defined as the focus on the utility of accounting information which is accurate, adequate, reliable,complete, and relevant for decision making to establish the reliability of accounting information for stakeholders.

Financial report quality is defined as the information comprehensiveness and support for the success of businesses, the information to assess and reflect the accuracy of situation which can be used to support better decision making than the competitors.

Information advantage is defined as good results of the reports that reflect the position of financial and operating results, which are accurate and reliable, and can be used to support decision making or forecasting of future performance.

Control Variables

In this study, the control variables consist of firm age and firm size.

Firm age is defined as the number of years a firm or the period of time has been in operation (Jonas and Diamanto, 2006) and there is a significant relationship between firm growth and firm age (Capelleras and

Rabetino, 2008). In this study, firm age is measured by the number of years a firm has been in operation using a dummy variable of 1, which means the firm has been in business for more than 15 years; and 0 which means otherwise.

Firm size determines the success of the organization and the value of organizational performance (Serrano-Cinca et al., 2005). In this study, firm size is measured by the total assets of the firm using a dummy variable of 1, which means the firm has total assets of more than 10,000,000,000 baht, while 0 means otherwise.

3.4 Reliability and Validity

Reliability of collected data was tested by Cronbach's alpha coefficients to measure internal reliability of respondents' answer for all items in the questionnaires which are greater than 0.70 (Nunnally and Bernstein, 1994). Cronbach's alpha coefficientsof constructs have values ranging 0.826 – 0.907. For testing the validity, this study produces an exploratory factor analysis (EFA) to test the construct validity of the instrument by examining the underlying relationships of a large number of items, and to determine whether they can be reduced to a smaller set of factors. This analysis has a high potential to inflate the component loading. Therefore, as a higher rule-of-thumb, a cut-off value of 0.40 is accepted (Hair et al., 2010). Factor loading have value ranging 0.715 – 0.939, all factor loadings greater than the 0.40 cut-off are statistically significant. Table 1 presents the results for both factor loadings and Cronbach's alpha for multiple-item scales in this study.

Table 1 : Results of Measure Validation

Items	Factor Loadings	Cronbach Alpha
Disclosure (DC)	.715 - .896	.826
Accuracy (AC)	.866 - .897	.907
Clarity (CL)	.765 - .939	.859
Financial Report Quality (FRQ)	.841 - .890	.872
Information Advantage (IA)	.766 - .933	.887
Decision Making Effectiveness (DME)	.868 - .938	.899

Table 1 shows that all variables have a factor loading score between 0.718 - 0.944 indicating that there is construct validity. Furthermore, Cronbach's alpha coefficients for all variables are presented between 0.831 - 0.921. Consequently, the reliability of all variables is adopted.

3,5 Statistical Techniques

Multiple regression analysis is an appropriate method for examining the hypothesized relationships.

In this study, the model of the relationships is depicted as follows:

Equation 1: $FRQ = \beta_{01} + \beta_1 DC + \beta_2 AC + \beta_3 CL + \beta_4 FA + \beta_5 FS + \varepsilon_1$

Equation 2: $IA = \beta_{02} + \beta_6 DC + \beta_7 AC + \beta_8 CL + \beta_9 FA + \beta_{10} FS + \varepsilon_2$

Equation 3: $IA = \beta_{03} + \beta_{11} FRQ + \beta_{12} FA + \beta_{13} FS + \varepsilon_3$

Equation 4: $DME = \beta_{04} + \beta_{14} FRQ + \beta_{15} IA + \beta_{16} FA + \beta_{17} FS + \varepsilon_4$

Equation 5: $DME = \beta_{05} + \beta_{18} DC + \beta_{19} AC + \beta_{20} CL + \beta_{21} FA + \beta_{22} FS + \varepsilon_5$

4. Results and Discussion

The descriptive statistics and correlation matrix for all variables are shown in Table 2. It can be seen that the potential problems relating to multicollinearity, variance inflation factors (VIFs) were used to provide information on the extent to which non-orthogonality among independent variables inflates standard errors. The VIFs range from 1.036 to 4.138, well below the cut-off value of 10 as recommended by Neter, Wasserman and Kutner (1985), meaning that the independent variables are not correlated with each other. Therefore, there are no substantial multicollinearity problems encountered in this study.

Table 2 : Descriptive Statistics and Correlation Matrix

Variable	DC	AC	CL	FRQ	IA	DME
Mean	4.468	4.224	4.423	4.396	3.990	4.158
S.D.	0.474	0.583	0.588	0.553	0.684	0.578
DC	1					
AC	0.541**	1				
CL	0.873**	0.622**	1			
FRQ	0.855**	0.731**	0.922**	1		
IA	0.469**	0.729**	0.412**	0.578**	1	

DME	0.483**	0.766**	0.508**	0.613**	0.830**	1

<.05,*p<.01

Table 3 : Results of Regression Analysis

Independent	**Dependent Variables**				
	Eq.1	**Eq.2**	**Eq.3**	**Eq.4**	**Eq.5**
Variables	**FRQ**	**IA**	**IA**	**DME**	**DME**
DC	0.252***	0.288**			0.123
	(0.061)	(0.134)			(0.139)
AC	0.255***	0.757***			0.730***
	(0.042)	(0.092)			(0.096)
CL	0.552***	- 0.285			-0.044
	(0.066)	(0.145)			(0.151)
FRQ			0.577***	0.182**	
			(0.091)	(0.076)	
IA				0.759***	
				(0.078)	
FA	-0.112	-0.224	-0.159	0.124	-0.078
	(0.066)	(0.145)	(0.182)	(0.125)	(0.151)
FS	0.051	-0.068	-0.165	0.038	-0.010
	(0.069)	(0.153)	(0.190)	(0.130)	(0.159)
Adjusted R^2	0.919	0.605	0.369	0.717	0.573
Maximum VIF	4.087	4.087	1.029	1.649	4.087

*p<0.1, **p<0.05, ***p<0.01[a] Beta coefficients with standard errors in parenthesis.

Table 3 presents results for multiple regression of hypotheses 1a-3a, hypotheses 1b-3b, and hypotheses 1c-3c. The results of relationships among the three dimensions of accounting information transparency (including disclosure, accuracy and clarity), financial report quality, information advantage, and decision making effectiveness are shown in Eq.1, 2, and 5. Eq.1 also presents the relationships between accounting information transparency and financial report quality are provided in Table 3. The results show significant positive effects of disclosure (β_1 = 0.252, p<0.01), accuracy (β_2 = 0.255, p<0.01), and clarity (β_3 = 0.552, p<0.01) on financial report quality. These results indicate that the businesses with higher accounting information transparency consist of disclosure, accuracy and clarity will have greater financial report quality consistent with the study of Roberts (2009), IASB (2009) and Kohlbeck and Warfield (2010). Hence, **Hypotheses 1a, 2a, and 3a are supported.** However, Eq.2 presents the relationships between accounting information transparency and information advantage. The results show significant positive effects of disclosure (β_6 = 0.288, p<0.05) and accuracy (β_7 = 0.757, p<0.01) on information advantage. These results show that the businesses with higher accounting information transparency consist of disclosure and accuracy will have greater information advantage (Roberts, 2009). Thus, **Hypotheses 1b and 2b are supported and 3b is not supported**. Moreover, Eq.5 indicate that accuracy of accounting information transparency has a significant positive influence on decision making effectiveness (β_{19} = .730, p<.01). Thus, **Hypothesis 2c is supported and 1c and 3c are not supported** consistent with the study of Diamond and Verrecchia (1991), Price et al.(2011) and Reck, Vernon and Gotlob, (2004) who found that accounting information transparency has an impact on decision making.

Moreover, the finding in Eq.3 indicates that financial report quality is positively correlated with information advantage (β_{11} = 0.577, p<0.01). Thus, **Hypotheses 4a is supported**. These results suggest that the businesses with higher financial report quality will have higher information advantage consistent with the study of Delone and Mclean (2003). Finally, the findings in Eq.4 shows that financial report quality and information advantage are positively correlated with decision making effectiveness (β_{14} = 0.182, p<0.05; β_{15} = 0.759, p<0.01). Thus, **Hypotheses 4b and 5 are supported.** These results suggest that the businesses with higher financial report quality and information advantage will have higher decision making effectiveness (Fisher and Kingma, 2001;Bruce et al, 2002;Reck, Vernon and Gotlob, 2004; Zager and Zager 2006; and Krumwiede et al., 2007).

5. Contributions

5.1 Theoretical Contribution

This study provides a clearer understanding of the relationships among three dimensions of accounting information transparency and decision making effectiveness of financial businesses in Thailand via financial report quality and information advantage. The study is intended to expand on the theoretical contributions of previous knowledge and literature of accounting information transparency. Another contribution is the form of the identification of three dimensions of accounting information transparency for empirical study, which provides an important theoretical contribution expanding on all or some dimensions that are positively related to financial report quality, information advantage, and decision making effectiveness.

5.2 Managerial Contribution

This study helps accounting executives identify and justify key components of the three dimensions of accounting information transparency, which may be critical in severe market competition. In addition, this also assist them to understand the importance of accounting information transparency (disclosure, accuracy, and clarity) which may contribute to accurate, timely, and beneficial decision making of the organizations.

6. Conclusion

The purpose of this study is to examine the relationships between accounting information transparency including three dimensions (disclosure, accuracy, and clarity) and decision making effectiveness through impact on financial report quality and information advantage. The finding indicates that all dimensions of accounting information transparency have significantly positive influence on financial report quality and two of three dimensions of accounting information transparency have significantly positive influence on information advantage. However, only accuracy of accounting information transparency has significantly positive influence on decision making effectiveness. In addition, financial report quality has significantly positive influence on information advantage. Moreover, financial report quality and information advantage have significantly positive influence on decision making effectiveness.

This study has some limitation in that it focuses on only financial businesses in Thailand and the sample used is too small.

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Voluntary disclosure and earnings management: evidence from the Brazilian capital market*

Silvia Consoni
Universidade Federal do Paraná, Departamento de Ciências Contábeis, Curitiba, PR, Brazil

Romualdo Douglas Colauto
Universidade Federal do Paraná, Departamento de Ciências Contábeis, Curitiba, PR, Brazil

Gerlando Augusto Sampaio Franco de Lima
Universidade de São Paulo, Faculdade de Economia, Administração e Contabilidade, Departamento de Contabilidade e Atuária, São Paulo, SP, Brazil

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ABSTRACT

This study examines the association between the voluntary disclosure of economic and financial information and earnings management. The outlined arguments on the subject are based on the assumption that consistent voluntary disclosure policies may reduce earnings management. The analysis is conducted on a random sample of 66 non-financial Brazilian listed companies in the 2005-2012 period. To measure voluntary disclosure, the index proposed by Consoni and Colauto (2016) is used. As a proxy for earnings management, discretionary accruals (DA) are estimated based on the model by Dechow, Sloan, and Sweeney (1995). The relationship between these measurements is analyzed using a model of simultaneous equations and by the random effects regression method with panel data. A significant negative relationship was expected *a priori*; however, the main result of the study indicates that voluntary disclosure and earnings management are not simultaneously determined or associated. Although the results obtained contradict certain theoretical assumptions, there are alternative explanations for this finding. The empirical set of evidence in this research, in addition to those in previous studies, should be interpreted with caution because there is no consensus on the measures for voluntary disclosure and earnings management. Second, several companies in Brazil may not be interested in providing high-quality voluntary disclosure because most of their shareholders enjoy private benefits of control. This issue reduces the importance of the potential market demand for information, stratifies information asymmetry, and does not prevent earnings management.

Keywords: accounting information, voluntary disclosure, earnings management, emerging markets, discretionary accruals.

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1. INTRODUCTION

Although it is well known that corporate disclosure brings advantages such as greater stock market liquidity and a lower cost of capital (Botosan 1997, 2006; Lopes & Alencar 2010; Welker 1995), managers are not always willing to increase the level of accounting disclosure. In addition to these benefits, there are most likely competing elements that may justify tighter managerial control over information, contributing to the importance of decisions about whether to disclose information.

Managers generally have access to more specific and accurate information about a company's business than do other market actors, but they may want to disclose or retain that information to serve their personal interests (Demsetz & Lehn, 1985). According to Watts and Zimmerman (1986), in deciding which information to report, managers attempt to evaluate how alternative methods will affect their wealth.

According to Dye (1988), a manager enjoys an advantage over stockholders with regard to information because it is difficult for the latter to directly observe the company's performance and therefore identify its future business prospects. In this sense, Scott (2012) observes that this information asymmetry creates ideal conditions for selective and distorted information reporting and a temptation to moral hazard. Thus, greater information asymmetry allows managers to use their discretion for the specific purpose of managing accounting results.

Information asymmetry can be reduced through voluntary disclosure and tighter regulation (Scott, 2012). However, regulation in the context of agency conflict works only if the regulator can require the disclosure of information that market participants are unwilling to disclose voluntarily (Beyer, Cohen, Lys, & Walther, 2010). According to Watts and Zimmerman (1986), the recognition, measurement, and disclosure of accounting data are not always guided by impartial decisions, but can be driven by economic incentives that maximize the expected utility of one of the interested parties. Managers overlook the fact that, in earnings management, accounting choices should be guided by the economic fundamentals of the company's business.

The guiding hypothesis of this study is that voluntary disclosure and earnings management are negatively related because this relationship is based on the relationship of each of these variables with information asymmetry. Healy and Palepu (2001), Lambert, Leuz, and Verrecchia (2007), and Verrecchia (1983) present voluntary disclosure as a factor that contributes to the reduction of information asymmetry. For Dye (1985, 1988) and Schipper (1989), among others, the information asymmetry between managers and investors is the necessary condition for earnings management. From this perspective, this study aims to investigate the relationship between voluntary disclosure of economic and financial information and earnings management in the Brazilian capital market.

Voluntary disclosure and earnings management are recurring themes in research on finance and accounting. However, there is little empirical evidence on the relationship between them that is specific to the Brazilian capital market. One example is the study by Murcia and Wuerges (2011), who explore this relationship from 2006 to 2008 using a sample of the 100 largest companies listed on the São Paulo Stock Exchange, Commodities and Futures (BM&FBOVESPA) and report a partially negative association between voluntary disclosure and earnings management.

To deepen this discussion, the time period of 2005-2012 is explored. Part of this period is marked by adjustments resulting from the process of alignment with international accounting standards starting in 2008. Consoni and Colauto (2016) present evidence that this process can be understood as an exogenous factor that had a significant positive effect on voluntary disclosure in Brazil. Therefore, the index proposed by Consoni and Colauto (2016) is adopted as a metric for voluntary disclosure and, different from that of Murcia and Wuerges (2011), the proxy for earnings management that is used is the discretionary accruals (DA) estimated using the model by Dechow et al. (1995).

The analysis performed in this study reveals that voluntary disclosure and earnings management are neither co-determined nor associated. That is, the absence of a relationship between the variables investigated suggests that disclosure decisions are not an important determinant for the practice of earnings management in Brazil. For the U.S.A. (Jo & Kim, 2007; Lobo & Zhou, 2001) and British (Iatridis & Kadorinis, 2009) markets, there is evidence of a negative association. Thus, it should be noted that different proxies for voluntary disclosure and earnings management make direct comparison difficult. Moreover, institutional differences between markets may influence both voluntary disclosure and earnings management.

Another crucial element is the understanding of voluntary disclosure as a response to information asymmetry. As observed by Francis, Nanda, and Olsson (2008), the assumption that voluntary disclosure is a determinant of the quality of earnings reported by companies ignores the fact that the voluntary disclosure may itself be based on poor-quality information. This point must be discussed and other methodologies must be used to better understand the behavior of voluntary disclosure and earnings management in the Brazilian context.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Voluntary Disclosure of Information

The demand for additional resources always increases when new investment opportunities appear and new investment opportunities are themselves likely to be associated with a widening gap in the information asymmetry between "insiders" and "outsiders" (Healy & Palepu, 2001). Analytical models, such as those developed by Diamond and Verrecchia (1991), Glosten and Milgrom (1985), and Kim and Verrecchia (1994), show that information asymmetry decreases as the level of voluntary disclosure of information rises because and this can reduce the adverse selection component of the bid-ask spread (the mechanism for price protection when shares are bought and sold). As a result, the trade volume and stock market liquidity increase, possibly reducing the cost of capital.

According to Grossman (1981), Milgrom (1981), and Milgrom and Roberts (1986), without information disclosure, investors would be unable to distinguish between high-quality and low-quality stocks. A lack of information would lead investors to reexamine their beliefs about the company's value and, logically, offer an average price for the entire group of stocks evaluated. In this sense, managers have an incentive to disclose all of the data at their disposal to distinguish themselves from those with less favorable data. In turn, theory about voluntary corporate disclosure has concentrated on identifying the reasons that full disclosure does not in fact occur.

Some of the research conducted by Robert E. Verrecchia and Ronald A. Dye, or research to which these authors contributed, has aimed to formulate models to explain partial voluntary disclosure. Refuting Verrecchia's thesis (2001) that there is no unified theory of voluntary disclosure, Dye (2001) demonstrates that his arguments differ from those of Verrecchia in that they consider models of voluntary disclosure to be essentially endogenous, whereas Verrecchia (2001) attributes the same status to endogenous and exogenous models.

According to Dye (2001), the idea that voluntary disclosure is efficient and contributes to efficient resource allocation in the capital market is related to the credibility of the financial data disclosed. Although Verrecchia (2001) notes managers' propensity not to disclose data that are essentially true, Dye (2001) argues that Verrecchia omits what he considers the determining factor in the disclosure's credibility, earnings management.

In this sense, Core (2001) argues that unbiased disclosure is not a manager's ideal, given that it carries a high cost. This conclusion is based on Watts and Zimmerman's understanding (1986, p. 205) that not all accounting manipulation is eliminated and that only in capital markets with rational expectations will managers fail to benefit from manipulation. The notion that it is very expensive to eliminate manipulation entirely indicates that managers can introduce some disclosure bias at a low personal cost.

In Verrecchia's model (1983), the disclosure costs that hinder full disclosure do not vary based on the information that the manager possesses. In Verrecchia's view (1983), the discretionary disclosure policy of managers is influenced by the costs of disclosing data, but the managers' only motivation for divulging information is its effect on the company's value.

In contrast, Dye (1985, 1986) claims that disclosure costs vary with the nature of what is being disclosed. If investors are uncertain whether managers withhold private information, they cannot interpret a lack of information as a sign that the company in question is withholding bad news. In the eyes of investors, Dye argues, companies with bad news are therefore indistinguishable from companies that make no disclosures.

Uncertainty over how investors will interpret a disclosure causes managers to publish data based on how they believe investors will interpret it (Dye, 1985). To correctly interpret a manager's action, it is necessary to identify the manager's incentives to disclose good or bad news and the entire set of data that the manager could have disclosed, but chose not to. Discussion of this question has led Dye (2001) to state that voluntary disclosure is a special case of Game Theory because it is not always possible to conclude that managers disclose only information calculated to raise the company's stock price and hide information that will reduce it. The reason is that bad news may be released during labor negotiations or when options are being granted and good news may be released at the time these options are exercised.

It is interesting to note that the benefits of corporate disclosure typically result in voluntary information disclosure, but not of all the information to which company management is privy. As noted by Dye (2001), the best information for the purpose of negotiating contracts is not necessarily the best information on which an investor should base a decision. Therefore, managers can strategically choose what to disclose and when to disclose it, provided that investors are uncertain as so what information the managers possess.

2.2 Earnings Management

Earnings management has been studied from many perspectives and methods. As a result, Mulford and Comiskey (2002) report that different characterizations have arisen, such as income smoothing, the reduction of current profits for the sake of future profits (big bath), creative accounting, and cosmetic financial statements (window-dressing), among others.

Healy and Wahlen (1999, p. 368) and Schipper (1989, p. 92) explain that earnings management can aim to modify both profit measures and economic and financial ratios, thereby modifying the form and content of accounting information. It is thus supposed that the practice of earnings management can interfere with the credibility of accounting data and its utility for decision-making by market actors. Thus, if earnings management is viewed as an opportunistic act, it must be viewed as reducing the quality of the published disclosure.

For Arthur Levitt (1998), former president of the Securities and Exchange Commission (SEC), earnings management stems from a decline in the quality of financial information disclosure, and measures requiring greater transparency and oversight of the financial statement disclosure process would be necessary to contain it. In Brazil, the Brazilian Securities Commission (CVM, by its Portuguese abbreviation) has also spoken on this subject. In Circular n. 480 (14 February 2007) (Comissão de Valores Mobiliários/Normas Contábeis e Auditoria/Superintendência de Relações com Empresas, 2007), the CVM declared that it considers earnings management to be an arbitrary form of discretion intended to influence or manipulate accounting numbers, though it falls within the limits of the law.

Despite the reduction in data reliability that often accompanies the practice of earnings management, there are arguments that this practice can be useful if kept within certain limits. Fields, Lys, and Vincent (2001) and Schipper (1989) argue that earnings management may reveal information about the company's value. In this sense, Subramanyam (1996) and Burgstahler, Hail, and Leuz (2006) refer to the practice of earnings management as an opportunistic behavior, but not when management's discretion is used to better communicate the company's underlying economic and financial performance. Thus, if earnings management is used responsibly, then this practice can transmit private information to the market about expectations for future corporate earnings.

According to Dechow and Skinner (2000), the different interpretations of earnings management agree that the practice requires intentional management, but it is not clear whether that intention is merely opportunistic or designed to convey private information to investors. As a result, this aspect makes it difficult to achieve a comprehensive understanding of the motivations for this practice and leads to widely differing empirical results.

According to Schipper (1989, p. 95), it is the persistence of information asymmetry that makes earnings management possible. This condition arises from a contractually established form of communication that cannot be eliminated without changing the contract. Along this same line of reasoning, Dye (1988) argues that earnings management occurs when one or more hypotheses of the Revelation Principle are violated, given that monitoring mechanisms would force managers to reveal the truth about the information that they possess.

The Revelation Principle is present in the literature on the design of mechanisms. In this context, mechanisms refer to a set of incentives that causes the agent to act in a manner that maximizes utility for the principal (Myerson, 1979). According to Lambert (2001), the premises of the Revelation Principle are related to communication, the form of the contract, and the commitment taken on. Thus, the author explains that, according to the logic of mechanisms, when agents receive private information, they have the ability to transmit the information in its fullest dimension, i.e., when there are two signals, they will be transmitted as two separate messages rather than being aggregated into a single message.

Arya, Glover, and Sunder (1998) emphasize that individuals do not blindly follow the provisions established in contracts; as a result, problems in the mechanism's design arise from the difficulty of ensuring that the contracting parties fully disclose the information in their possession. In Dye's view (1988), when the mechanism is inefficient, managers hold an informational advantage over shareholders, which leads them to exercise their discretionary power to apply accounting standards in a manner that serves their own interest, given that shareholders cannot perfectly monitor the company's performance and observe the prospects of the business environment. Dye (2001) addresses this issue, noting that Verrecchia (2001) neglects what he considers to be the determining factor in the information's credibility, earnings management.

According to Watts and Zimmerman (1986), managers sometimes have the power to determine when an event will be shown in the accounts and which transactions will affect the results reported, such as the appropriation of a certain expense, revenue, and the disposal of assets. In this sense, Bushman, Engel, and Smith (2006) explain that profit may not be a good indicator for monitoring managers' efforts. One reason is that managers may choose accounting policies to maximize their own expected utility, managing the earnings opportunistically, and/or by reducing voluntary disclosure.

As suggested by LaFond and Watts (2008, p. 450), the private benefits of control give managers incentives to use private information to transfer wealth to themselves, "even in the absence of financial-reporting-based debt and compensation contracts". Furthermore, the institutional environment can interfere and provide various incentives for the practice of earnings management. The level of protection for the investor can guide corporate choices on issues such as governance, the dividend policy, the financial structure, and the shareholder control of companies.

The literature on earnings management suggests many explanations and/or motivations for this practice, with each of the explanations being applied to particular circumstances. Healy (1996, p. 108-109) suggests that the motivations for earnings management are ambiguous, making it difficult to establish appropriate methods for analyzing a certain behavior. In any given group of companies, some may act to reduce profit to reduce their tax burden or discourage potential competition, whereas others may inflate profits to maximize bonuses, meet analysts' projections, or obtain loans. Furthermore, all of these behaviors may be present in the same company over a given period.

Due to the variety of environments in which businesses operate, it is difficult for a single explanation to cover all environments. In summary, it appears that earnings management occurs because there is no precise measure of net income and because the generally accepted accounting principles (GAAP) cannot completely constrain the subjectivity inherent in accounting policy choices and in certain practices. Many decisions about accounting choices are complex and defy a simple answer about which best informs the investor.

Therefore, the issue of information asymmetry presents itself as a link between voluntary disclosure and earnings management and supports the research hypothesis. To inform stakeholders, managers can voluntarily disclose qualitative and quantitative information that goes beyond that which is required by law.

Through voluntary disclosure, managers can show current and prospective earnings to those interested in the financial position of the company or they can clarify and explain the criteria adopted for the company's formulation of its accounting policies and estimates (Lundholm, 2003). According to Lambert et al. (2007), this effort aims to reduce information asymmetry and thereby increase investors' ability to make decisions and accurately monitor their investments.

Dye (1985, 1988) and Schipper (1989) consider the information asymmetry between managers and shareholders to be a necessary condition for earnings management. Schipper (1989) states that high levels of information asymmetry between managers and shareholders indicate a lack of sufficient resources, incentives, or access to relevant information for managers' actions to be monitored.

Trueman and Titman (1988) base their work on the assumption that voluntary disclosure increases transparency and that earnings management would therefore be more easily detected by shareholders of companies with a more consistent voluntary disclosure policy. Under these circumstances, managers would be less likely to practice earnings management because its purpose and effectiveness depend on the level of information asymmetry between managers and other market participants. Thus, managers would limit the level of voluntary disclosure if they wanted to maintain the flexibility to engage in earnings management.

Richardson (2000) explores these arguments, suggesting that the level of earnings management increases as the level of information asymmetry increases; testing this relationship, he finds a positive correlation. Richardson believes that this evidence indicates that, when information asymmetry is high, parties interested in the accounting data cannot obtain access to the information necessary to prevent accounting manipulation. Therefore, as information asymmetry increases, managers can use their discretion to manage reported earnings. Along the same lines, Iatridis and Kadorinis (2009), Jo and Kim (2007), and Lobo and Zhou (2001) find voluntary disclosure to be inversely correlated with earnings management. Based on the theoretical predictions and empirical results discussed, the research hypothesis is as follows:

H_1: as the index of voluntary disclosure of economic and financial information increases, the level of earnings management decreases.

3. METHODOLOGY

3.1 Measurement of Voluntary Disclosure

To explore what underlies the objective of this study and the specifics of the context being analyzed, as Botosan (2004) refers to it, this study employs the metric proposed by Consoni and Colauto (2016) for measuring the content of voluntary disclosures (Table 1). These researchers conceive the metric grounded in Brazilian studies and define its content based on the elements that continue to be voluntary over the time period of the study. This aspect of the methodology is relevant in the context of this analysis because, starting in 2008, Brazil began the process of aligning with the international accounting standards. In addition, in 2009, the CVM began to require companies to file a Reference Form, which replaced the Annual Information Form (IAN, by its Portuguese abbreviation), and contributed to changing the nature of disclosure and increasing the volume and detail of the disclosed information.

Table 1 *Voluntary disclosure index*

	Market view
1	Competitive analysis
2	Market share
3	Assessment of major economic trends market
4	Government influence on the company activities
	Corporate strategy
5	Plans and corporate objectives
6	Alignment of company activities with the stated objectives
7	Prospect of new investments
8	Sales forecasts
9	Earnings forecasts
10	Cash flow forecasts
	Economic and financial performance
11	Variation in the inventories of goods for sale, inputs or finished products
12	Variation in the level of receivables
13	Variation in the volume of sales
14	Variation in the level of administrative and commercial expenses
15	Variation in the level of operational earnings
16	Variation in the cost of goods sold, the products manufactured or services provided
17	Financial effect from the raising of short and long-term third-party resources
18	Financial effect from the application of own resources
19	Performance of common and preferred shares
20	Global indicators (EVA, EBITDA, MVA)
21	Cost of equity
	Operational aspects
22	Current production compared to the installed capacity
23	Operational efficiency measures
24	Dependence of technology, suppliers, customers and labor
25	Investments and divestments
26	Resources invested in human capital management
27	Resources invested in education projects, culture and social development

Source: *Adapted from Consoni and Colauto (2016).*

This metric favors economic-financial information, although voluntary disclosure is not restricted to this content. It is understood that this limitation guides the analysis and is primarily due to the difficulty of evaluating the disclosure of socio-environmental information in heterogeneous samples. Occasionally, this type of information is linked to details of corporate activities in certain segments of the market and may even be disclosed to meet regulatory requirements for that sector of the market.

The procedures for data collection are the same as those adopted by Consoni and Colauto (2016), aligning the scope of each item of the metric with the content of statements in the Management Report and, where applicable, in some sections of the IAN and Reference Form. To take advantage of the fact that some companies disclose more detailed information, these researchers define coding criteria that consider how detailed the information is, in both qualitative and quantitative terms. Therefore, when no information is available for a certain item, a score of 0 is assigned; when only qualitative information is available, presented in descriptive terms, 1 point is assigned; and when both qualitative and quantitative information is available (in monetary or non-monetary terms), 2 points are assigned.

The absolute individual score ranges from 0 to 54 points (27 items measured, each worth a maximum of 2 points). The index, which is a proxy for voluntary disclosure, is obtained by dividing of the absolute score of each company for each year by the maximum possible score. The closer the ratio is to 1, the better the company's voluntary disclosure is.

Along the same line presented by Francis et al. (2008), it is understood that a voluntary disclosure policy comprises a stable set of disclosure practices. Although voluntary disclosure also occurs in conference calls, websites, and newspapers, the documents cited are consulted because they are subject to a fairly uniform presentation framework, making it possible to compare companies and monitor the regularity of their disclosures.

3.2 Measuring Earnings Management

According to Dechow and Dichev (2002, p. 39-40), accruals are temporary adjustments that delay or anticipate the recognition of cash flows. Because not all financial decisions are directed at earnings management, researchers have separated total accruals into discretionary (opportunistic behavior) and non-discretionary (related to the level of business activity) accruals. The literature offers a variety of models for estimating DA, many of which are attempts to improve on previous models. For this study, we use the model by Dechow et al. (1995), known as the Modified Jones model. This model uses aggregate accruals to try to estimate a "normal" level of accruals and deviations from this level are considered evidence of earnings management. The advantages and disadvantages of this model have been discussed by Dechow, Ge, and Schrand (2010), DeFond (2010), Fields et al. (2001), Guay, Kothari, and Watts (1996), Lo (2008), Thomas and Zhang (2000), and Young (1999), among others, but no alternative approach offers a superior solution. According to Subramanyam (1996), the DA estimated by this model are priced by the market.

To estimate the DA, it is first necessary to calculate the total accruals obtained using the balance sheet approach. The total accruals of company i at time t is defined as follows:

$$TA_{i,t} = (\Delta CA_{i,t} - \Delta Cash_{i,t}) - (\Delta CL_{i,t} - \Delta CFL_{i,t}) - Depr_{i,t} / A_{i,t-1} \quad \boxed{1}$$

where $TA_{i,t}$ is the total accruals of company i at time t, $\Delta CA_{i,t}$ is the variation in the current assets of company i at the end of time t-1 to the end of time t, $\Delta Cash_{i,t}$ is the variation in the available cash of company i from the end of time t-1 to the end of time t, $\Delta CL_{i,t}$ is the variation in the current liabilities of company i from the end of time t-1 to the end of time t, $\Delta CLF_{i,t}$ is the variation in the short-term loans and financing of company i from the end of time t-1 to the end of time t, $Depr_{i,t}$ is the amount of depreciation, amortization, and depletion of company i during time t, and $A_{i,t-1}$ is the total assets of the company at the end of time t-1.

DA are estimated using pooled ordinary least squares (OLS) with the following equation:

$$TA_{i,t} = \alpha_1\left(\frac{1}{A_{i,t-1}}\right) + \alpha_2\left(\Delta REV_{i,t} - \Delta REC_{i,t}\right) + \alpha_3\left(PPE_{i,t}\right) + \varepsilon_{i,t} \quad \boxed{2}$$

where $\Delta REV_{i,t}$ is the variation in the net revenue of company i from time t-1 to time t, weighted by the total assets at the end of time t-1, $\Delta REC_{i,t}$ is the variation in the accounts receivable (net) of company i from time t-1 to time t, weighted by the total assets at the end of time t-1, $PPE_{i,t}$ is the balance of the fixed asset accounts (gross) of company i from time t-1 to time t, weighted by the total assets at the end of time t-1, and $\varepsilon_{i,t}$ is the error term of company i for time t.

All model variables are deflated by the total assets of the previous time period ($A_{i,t-1}$) to minimize the effect of company size and the problem of heteroscedasticity. Regarding the parameters of the modified Jones model, the fixed assets and the difference in variation between net revenue and accounts receivable are the main drivers of the process of recognizing accruals. Using the estimated coefficients α_1 and α_2 of each company-year (equation 2), the non-DA ($NDA_{i,t}$) are calculated as follows:

$$NDA_{i,t} = \hat{a}_1\left(\frac{1}{A_{i,t-1}}\right) + \hat{a}_2\left(\Delta REV_{i,t} - \Delta REC_{i,t}\right) + \hat{a}_3\left(PPE_{i,t}\right) \quad \boxed{3}$$

The absolute DA ($DA_{i,t}$) represent the difference between total accruals ($TA_{i,t}$) and non-DA ($NDA_{i,t}$) as follows:

$$DA_{i,t} = TA_{i,t} - NDA_{i,t} \quad \boxed{4}$$

In this sense, DA are the residuals of the regression. The farther the residual is from 0 (whether positive or negative), the greater the level of earnings management is. Table 2 shows the estimates of the parameters obtained by the Modified Jones model.

Table 2 *Coefficients estimated by the Modified Jones model (2005-2012)*

	Expected sign	Coefficient	Standard Error	t	p-value	VIF
Constant		0.0595	0.0261	2.2788	0.0231**	-
α_1		2330.4	1109.42	2.1006	0.0362**	1.001
α_2	+/-	-0.2219	0.0454	-4.8874	0.0000***	1.002
α_3	-	-0.0872	0.0452	-1.9283	0.0544*	1.003
R^2						0.0565
R^2- adjusted						0.0511
F (3.524)						10.46***
Durbin-Watson statistic						2.000
White's test						39.11***
Normality of residuals						125.55***
Observations						528

Note: *the dependent variable is total accruals (TA).*
coefficient $\alpha_1 = 1/A_{i,t-1}$; *coefficient* α_2 = *variation in the net revenue of company i from time t-1 to time t, weighted by the total assets at the end of time t-1, minus the variation in accounts receivable of company i from time t-1 to time t, weighted by the total assets at the end of time t-1; coefficient* α_3 = *balances of fixed assets accounts (gross) of company i at the end of time t, weighted by total assets at end of time t-1; VIF = variance inflation factor.*
***,** ***, ***: significant at the 10, 5, and 1 levels, respectively.*
Source: *Prepared by the authors.*

The variance inflation factor shows that the model does not have multicollinearity problems in the specification. The Durbin-Watson statistic shows that there is no serial autocorrelation. In turn, the model's residuals do not follow a normal distribution. Nevertheless, according to Wooldridge (2002, p. 167), the OLS estimators satisfy asymptotic normality; that is, they have an approximately normal distribution in sufficiently large sample sizes. White's test detects heteroscedasticity, which makes the OLS estimators inefficient.

The α_2 coefficient is negative and related to the difference in variation between net revenue and accounts receivable. Theoretically, the sign expected for this coefficient is difficult to predict because it is related to the increase in accruals, both for increasing and decreasing reported earnings. The α_3 coefficient represents fixed assets, which is responsible for expenses associated with depreciation, amortization, and depletion and, as expected, is positively correlated with these expenses.

3.3 Statistical Model

The research strategy is designed based on a simultaneous equations model. From the theoretical arguments outlined in the literature, it is assumed that corporate disclosure policy and the management of accounting data result from endogenous decisions. Therefore, the following two structural equations are defined to compose the system of simultaneous equations:

$$DA_{i,t} = \alpha_0 + \alpha_1 VDI_{i,t} + \alpha_2 ROA_{i,t-1} + \alpha_3 LEV_{i,t} + \alpha_4 IFRS_{i,t} + \alpha_5 SIZE_{i,t} + \varepsilon_{i,t} \quad (5)$$

$$VDI_{i,t} = \alpha_0 + \alpha_1 DA_{i,t} + \alpha_2 CON_{i,t} + \alpha_3 LIQ_{i,t} + \alpha_4 IFRS_{i,t} + \alpha_5 SIZE_{i,t} + \varepsilon_{i,t} \quad (6)$$

where $DA_{i,t}$ is the discretionary accruals of company *i* at time *t*, $VDI_{i,t}$ is the index of voluntary disclosure of company *i* at time *t*, $ROA_{i,t-1}$ is the ln of the profitability of corporate assets for company *i* from the end of time *t-1* to the end of time *t*, $LEV_{i,t}$ is the ln of the book leverage of company *i* at the end of time *t*, $LIQ_{i,t}$ is a dummy for the liquidity of the shares of company *i* at the end of time *t*, $IFRS_{i,t}$ is a dummy for the period of alignment with international financial reporting standards of company *i* at time *t*, taking the value of 1 for the 2009-2012 period and 0 otherwise, $SIZE_{i,t}$ is the size of the company, as measured by the ln of the total assets of company *i* at time *t*, $CON_{i,t}$ is the control rights, as measured by the percentage of common shares held by the main controlling shareholder or the sum of the percentages of common shares held by those who participate in the shareholders' agreement for company *i* at time *t*, and $\varepsilon_{i,t}$ is the error term for company *i* at time *t*.

The two-stage least squares (2SLS) method is used to estimate the system of simultaneous equations. The OLS method produces inconsistent estimators for models with endogenous explanatory variables. In turn, if no endogenous explanatory variables exist, or in the case of weak instruments, then the 2SLS method produces inefficient estimators, i.e., they lack the minimum variance.

3.4 Sample

This study employs the same sample of companies that is used in Consoni and Colauto (2016). The sampling procedure favors the random selection of companies that have maintained an active registration in the BM&FBOVESPA during the 2005-2012 period, excluding financial companies. By calculating the minimum size for finite populations, with a significance level of 5% and a 10% margin of error, Consoni and Colauto obtain a sample of 66 companies, representing 32% of the population considered.

These criteria lead to the formation of a balanced panel containing 568 observation-years. Companies in the electric power and the steel and metallurgy sectors predominate in the sample, totaling 30%. Over 55% of the sample companies belong to the traditional market and, on average, the concentration of control rights is 73%, as measured by the percentage of common shares held by the controlling shareholder or, in some specific cases, the sum of common shares held by participants in the shareholders' agreement.

In considering whether the sample is appropriate for the aims of this study and, consequently, the analysis of its results, the following factors are taken into consideration: (i) The sample has survival bias; that is, companies that closed or went public after 2005 are not included in the sample. Including only companies with active registrations makes it possible to indirectly control for the potential effects of economic and regulatory changes on the main variables of the study, particularly on voluntary disclosure. In addition, this study seeks to monitor the consistency of companies' voluntary disclosure policies. However, the survival bias makes it more difficult to generalize the results; (ii) To avoid impairing the measurement of some variables, such as the proxy for earnings management, companies in the finance and insurance sector are excluded from the sample because they have their own rules, chart of accounts, and specific property that are not comparable to other sectors; (iii) A sample of 66 company-years makes it possible to construct a disclosure index, given that, according to Core (2001), disclosure indices require intensive manual labor and are viable only for small samples.

4. RESULTS

4.1 Regression Analysis Using 2SLS

The results obtained by the 2SLS and the diagnostic statistics for the estimates are presented in Table 3.

Table 3 *Summary of results for the two-stage least squares regression*

Independent variables	Equation 5	Equation 6
VDI instrumented	-0.7102*** (0.2470)	-
DA instrumented		-0.0224* (0.0120)
	Auxiliary regression	
Instruments	**Endogenous VDI**	**Endogenous DA**
VDI_{t-1}	0.8495*** (0.0473)	
VDI_{t-2}	0.0464 (0.0464)	
DA_{t-1}		0.4313*** (0.0428)
DA_{t-2}		0.5273*** (0.0425)
Shea partial R^2	0.7909	0.9079
Sargan	0.473	0.160

Cont.

Table 3 *Cont.*

p-value	0.4916	0.6893
Hansen J	9.86	6.60
p-value	0.079	0.252
Wu-Hausman	0.165	0.846
p-value	0.685	0.358
Observations	396	396

Equation 5: $DA_{i,t} = \alpha_0 + \alpha_1 VDI_{i,t} + \alpha_2 ROA_{i,t-1} + \alpha_3 LEV_{i,t} + \alpha_4 IFRS_{i,t} + \alpha_5 SIZE_{i,t} + \varepsilon_{i,t}$
Equation 6: $VDI_{i,t} = \alpha_0 + \alpha_1 DA_{i,t} + \alpha_2 CON_{i,t} + \alpha_3 LIQ_{i,t} + \alpha_4 IFRS_{i,t} + \alpha_5 SIZE_{i,t} + \varepsilon_{i,t}$
Note: *standard error in parentheses. Regressions with exogenous variables not reported in table.*
DA = discretionary accruals; VDI = voluntary disclosure index.
, **, *: significant at the 10%, 5%, and 1% levels, respectively.*
Source: *Prepared by the authors.*

The Shea R^2 statistic from the first-stage regression indicates that the instruments are relevant in explaining the endogenous regressors. To ensure over identification, the lagged endogenous variables are used as instruments. The Sargan test of over identifying restrictions is used to assess the fit of the instruments. This test evaluates the statistical plausibility of the assumption that the instruments are exogenous. The result shows that the instruments are statistically relevant. To perform analyses with appropriate estimators, it is necessary to test simultaneity between DA and VDI, adopting the Wu-Hausman specification test. The test indicates that the residuals are not significant, as reported in Table 3; thus, it is impossible to reject the null hypothesis of exogeneity. In other words, DA and VDI show no simultaneous relationship in this model.

The estimation of models with endogenous explanatory variables by the OLS method produces inconsistent estimators. However, the 2SLS method for estimating models produces inefficient estimators that lack the minimum variance when no endogenous explanatory variables exist or in the case of weak instruments. Because there are no indications of simultaneity, it is more efficient to use the OLS method.

4.2 Regression Analysis of Panel Data

Panel data, specifically the fixed effects model, may be used to identify the sequential interrelationship between the DA and VDI variables. However, if only one of the relationships is significant, a unidirectional relationship will be observed between these variables. Therefore, the equations are estimated individually. First, the functional relationship between the dependent and independent variables is tested to observe the behavior of the VDI variable and of the control variables in relation to the DA and *vice versa*.

The Hausman test for the null hypothesis of the consistency of random effects estimators indicates that the fixed effects estimators are less efficient; thus, the random effects model is deemed more suitable. The results of the panel diagnostic tests and other results are shown in Table 4.

Table 4 *Random effects model with panel data*

Independent variables	Expected sign	Equation 5		Expected sign	Equation 6	
VDI	+	0.0253	(0.0956)			
DA				-	-0.0127	(0.0165)
LEV	+	0.1272***	(0.0376)			
ROA_{t-1}	+	0.3318	(0.2115)			
CON				-	0.0001	(0.0003)
LIQ				+	0.0355**	(0.0138)
SIZE	-	0.0391	(0.0256)	+	0.0544***	(0.0074)
IFRS	+/-	-0.0012	(0.0182)	+/-	0.0566***	(0.0074)
Coefficient	+/-	-0.7832*	(0.4068)	+/-	-0.4103***	(0.1066)
R^2-within		0.04			0.25	
R^2-between		0.03			0.41	
R^2-overall		0.03			0.38	
Observations		528			528	
Panel diagnosis		**Coefficient**	**p-value**		**Coefficient**	**p-value**
Chow test		125.3300	0.0000		20.8789	0.0000
Breusch-Pagan test		1611.6700	0.0000		912.7820	0.0000
Wu-Hausman test		1.9844	0.8513		3.7747	0.5823

Equation 5: $DA_{i,t} = \alpha_0 + \alpha_1 VDI_{i,t} + \alpha_2 ROA_{i,t-1} + \alpha_3 LEV_{i,t} + \alpha_4 IFRS_{i,t} + \alpha_5 SIZE_{i,t} + \varepsilon_{i,t}$
Equation 6: $VDI_{i,t} = \alpha_0 + \alpha_1 DA_{i,t} + \alpha_2 CON_{i,t} + \alpha_3 LIQ_{i,t} + \alpha_4 IFRS_{i,t} + \alpha_5 SIZE_{i,t} + \varepsilon_{i,t}$
Note: *standard error in parentheses.*
DA = discretionary accruals; CON = stock concentration; IFRS = dummy for the period of alignment with international accounting standards; LEV = ln of the book leverage; LIQ = dummy for stock liquidity; ROA_{t-1} *= ln of the first asset profitability lag; SIZE = ln of total assets; VDI = voluntary disclosure index.*
, **, *: significant at the 10, 5, and 1% levels, respectively.*
Source: *Prepared by the authors.*

For the regression in which DA are the dependent variable, the only significant variable is LEV. This positive and significant relationship suggests that companies with high debt ratios tend to manage their earnings to show higher profit. Because it is a log-level function, all things being equal, a 10% increase in leverage has, on average, practically no effect on earnings management. This result shows that, although significant, the economic effect is very small. The other variables are not significant, nor do they show significant coefficients. These results contradict the theoretical assumption that these variables should be included in the model and, therefore, it is inferred that voluntary disclosure has no influence on variations in DA in the same time period. The analysis of the results for the regression in which voluntary disclosure (VDI) is the dependent variable shows that, with the exception of the ownership concentration variable (CON), the other control variables are significant at the 1% or 5% level. The relationship of these variables is consistent with that which was expected.

Based on the results presented, a relationship between earnings management and voluntary disclosure in the 2005-2012 period is not found by the simultaneity test; even the regression analysis with panel data finds no association between them. If a unidirectional relationship was found in the current period, then it may be inferred that a dependent relationship existed between the variables of interest; that is, the decision about whether to make voluntary disclosure would depend on the prior choice of accounting policy and *vice versa*.

To allow the analysis of the influence of the independent variables on the dependent variables over time, dummy variables are included to control this dimension. In this study, the dummies are presented for 2006 to 2012, given that 2005 is taken as the reference year. Only the year 2008 was found to be significant in both models, it was demonstrated that there is a difference between the periods before and after 2008. This difference may have occurred because many current accounting regulations went into effect that year as Brazil aligned with international accounting standards; 2008 was also the year of the subprime lending crisis.

Although it is found that the DA and VDI variables do not appear to be associated in the current period, this study seeks to determine whether the level of voluntary disclosure at *t-1* affects earnings management and whether earnings management at *t-1* affects voluntary disclosure. New tests are conducted to test the relationship between voluntary disclosure in the prior period and earnings management and *vice versa*. Tests to identify the most appropriate panel data approach are again performed. The first two tests reject the null hypothesis that the pooled OLS model is appropriate, validating the alternative hypothesis that fixed or random effects models are appropriate. The result of the Hausman test indicates the random effects model is the most appropriate. Overall, the results do not differ from those found when the variables were analyzed for the current period alone (Table 4).

This finding shows that the relationship between earnings management and voluntary disclosure is not significant. Thus, there is no evidence that greater voluntary disclosure is reflected in a lesser propensity to manage earnings in the methodological context of this study. This finding contradicts the underlying theoretical assumptions and differs from the empirical results presented by Iatridis and Kadorinis (2009), Jo and Kim (2007), and Lobo and Zhou (2001) in addition to the study of Brazil by Murcia and Wuerges (2011). These studies conclude that voluntary disclosure is one of the factors inhibiting the practice of earnings management. It is important to note that the different methods and analyses used in each of these studies make it difficult to draw direct comparisons with the results found in this study.

5. CONCLUSION

The theoretical assumptions of this study were that, when managers decide the level of voluntary disclosure, they may be inclined to practice earnings management to shape market actors' perceptions to suit their plans, perhaps even acting in their own self-interest.

This study is based on the idea that voluntary disclosure contributes to the reduction or elimination of information asymmetry and that lower information asymmetry makes it more difficult to engage in earnings management. Therefore, companies with a higher index of voluntary disclosure tend not to practice earnings management. It was hypothesized that there is a negative relationship between these variables.

In the inferential analysis performed, it is found that voluntary disclosure and earnings management do not appear to be simultaneously determined. Based on the procedures employed in this study, it is not possible to infer a significant relationship between the measures used. Accordingly, the results are inconclusive with regard to the ability of the voluntary disclosure variable to explain whether companies are likely to manage earnings. The lack of a relationship between earnings management and voluntary disclosure suggests that disclosure decisions are not a determining factor in companies' involvement in earnings management in Brazil.

Although it may seem that this result contrasts with the assumption that voluntary disclosure reduces information asymmetry and hence limits the opportunistic practice of earnings management, this study does not consider under which conditions and at what time full disclosure is likely to occur. A market that values additional information may help raise the level of voluntary disclosure and improve the quality of information disclosed. Therefore, it is conceivable that the influence of voluntary disclosure on the extent of earnings management depends on the complex mix of companies' characteristics and factors related to the institutional environment.

One possible explanation for the results obtained is the perception that, in Brazil, many companies may have no intention of making high-quality voluntary disclosures because their controlling shareholders are in a comfortable position, taking advantage of private benefits that flow from their preferential access to information. This situation reduces the importance of the potential market demand for information, stratifies information asymmetry, and does not prevent opportunistic earnings management.

The companies listed on the BM&FBOVESPA have gradually improved some aspects of corporate governance, but change has been very uneven. Brazilian companies are still marked by highly concentrated ownership and fragile corporate governance, with the concentration of control being made possible by the large number of non-voting (preferred) shares issued and the use of pyramidal structures (Silveira, Leal, Barros, & Carvalhal-da-Silva, 2009).

Due to the survival bias that guided the sampling process and measurement of the earnings management variable and the voluntary disclosure variable, it is noted that the reported results should be interpreted with caution. With regard to the estimation of DA, there are still doubts concerning the models' ability to measure earnings management, that is, to accurately distinguish between discretionary and non-discretionary components. The choice of model used reflects only the researcher's choice because the study was not intended to prove its effectiveness.

Research into aspects of companies' voluntary disclosure has difficulty obtaining an appropriate measure of disclosure. For various reasons, many researchers choose to develop their own measures. Although the metric's construction is grounded in previous studies and care is taken to identify the items whose disclosure has over time ceased to be voluntary, the process is not without subjectivity. Subjectivity can be present both in the selection of items and in the process by which they are coded.

It appears that several issues still need to be discussed in future studies. One should bear in mind that the literature on voluntary disclosure and earnings management is very dispersed, at times resembling a puzzle. This situation may be due to the differences in the conceptual understanding of each researcher, as well as their motivations. It is crucial to understand voluntary disclosure as a response to information asymmetry. As noted by Francis et al. (2008), the idea that voluntary disclosure is a determinant of earnings management ignores the fact that voluntary disclosure may also be based on poor information. This aspect makes it particularly difficult to identify the interaction between earnings management and voluntary disclosure.

Moreover, one of the great challenges of empirical research into earnings management and voluntary disclosure is the question of causality. Due to the hypothesis of the endogenous nature of causality, it is difficult to establish and identify the exact effect that one mechanism may have on the other. In this sense, the present study is only an attempt to investigate the relationship between them. The development or application of other methods can also make substantial contributions to this endeavor.

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Correspondence address:

Silvia Consoni
Universidade Federal do Paraná, Departamento de Ciências Contábeis
Avenida Prefeito Lothário Meissner, 632 – Campus III – CEP: 80210-070 Jardim Botânico – Curitiba – PR – Brasil
Email: silviaconsoni@ufpr.br

Insider trading and the post-earnings announcement drift

By

Christina Dargenidou, Ian Tonks, and Fanis Tsoligkas*

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Abstract:

We show that trades by corporate insiders after an earnings announcement determine in part the extent of the post-earnings announcement drift anomaly. Contrarian trades mitigate the under-reaction to earnings announcements, and confirmatory trades allow for price discovery with price movements continuing in the same direction of the earnings surprise. These results are consistent with insider trading being a mechanism that provides relevant information on transitory or permanent changes to the earnings process allowing the market to make appropriate inferences about the nature of the earnings surprise.

Keywords: Insider trading, earnings announcements, market under-reaction, market efficiency

JEL classification:
G14, M41

Christina Dargenidou, Xfi Centre for Finance and Investment, University of Exeter, Rennes Drive, Exeter, EX4 4ST. Email: C.Dargenidou@exeter.ac.uk.

Ian Tonks, School of Management, University of Bath, Claverton Down, Bath, BA2 7AY, UK. Email: I.Tonks@bath.ac.uk.

Fanis Tsoligkas, School of Management, University of Bath, Claverton Down, Bath, BA2 7AY, UK
Email: F.Tsoligkas@bath.ac.uk.

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Universities of Bath, Exeter, King's College London, Auckland University of Technology, National University of Singapore, Hong Kong, HKUST, and WHU – Otto Beisheim School of Management.

1 Introduction

This paper examines the consequences of trading by corporate insiders on the well-documented post-earnings announcement drift (PEAD) anomaly, whereby large positive unexpected earnings (UE) announcements are followed by an upwards drift in security returns, and large negative UE are followed by a downwards drift. The PEAD represents an under-reaction to earnings surprises, predominantly in those stocks with the largest surprises, for both positive (good news) and negative (bad news) announcements. Using a sample of 7,980 annual earnings announcements in the U.K. over the period 1995-2013, we first report evidence of the PEAD phenomenon: the spread in returns between the top and bottom quintiles formed on the basis of UE is a significant 3.4% six months after the earnings announcement. We go on to argue that corporate insider trading in the period after the earnings announcement affects the market's learning process of whether a structural change in the earnings series has occurred by providing additional information to the market about the interpretation of the earnings surprise. We show that information in contrarian directors' trades after an earnings announcement - director sales after good news or director buys after bad news - mitigate the PEAD. The market observes the trading behaviour of directors and infers that the earnings surprise reflects only a transitory change in earnings. Conditioning on these contrarian directors' trades, we find that the top to bottom quintile spread is reduced to an insignificant -1.4% six months later. In contrast, those companies with confirmatory director trades (in the same direction as the earnings surprise: director sales after bad news or director buys after good news) are deemed by the market to signal that there has been a permanent shift in earnings but the magnitude is difficult to determine. The post-earnings quintile spread in these companies that display confirmatory directors' trades increases to a highly significant 7.3%. This exacerbated PEAD represents price discovery as the market learns about the values of the new parameters in the earnings process. In the absence of any directors' trades, the market remains uncertain about the structural break. Our evidence on the market response to the joint signals of an earnings surprise and subsequent directors' trades suggests that the PEAD represents a learning response to the identification of permanent and transitory changes in the earnings process.

Seeking to explain the PEAD anomaly, Bernard and Thomas (1990) attribute it to the failure of stock prices to fully reflect the implications of time series properties of earnings for future earnings.[1] Taking further the hypothesis that PEAD is caused by investors' inefficient use of information to predict future earnings, subsequent research ascribe the anomaly to: unsophisticated

[1] A comprehensive literature review of the PEAD can be found in Richardson, Tuna and Wysocki (2010) and Kothari (2001). The PEAD is illustrated in Figure 1 by the upward drift in returns represented by the unconditional good news PEAD box following a positive earnings surprise. The downward drift in returns following a negative earnings surprise is illustrated by the position of the unconditional bad news PEAD box.

investors’ trades (Bartov, Radhakrishnan and Krinsky, 2000), the underestimation of the implications of inflation (Chordia and Shivakumar, 2005), accounting conservatism (Narayanamoorthy, 2006) as well as poor disclosure readability (Lee, 2012). Recent research by Milian (2015) documents that the PEAD anomaly persists, albeit concentrated over a shorter period of time. A possible explanation for the pervasiveness of PEAD may arise from cognitive biases preventing investors from fully reacting to the new information in the earnings surprise, including limited attention (Hirshleifer, Lim and Teoh, 2009), investors’ overconfidence in their private beliefs (Liang, 2003) and limits to arbitrage (Ng, Rusticus and Verdi, 2008). Alternatively, what appears to be a delayed reaction to the implications of current earnings for future earnings could be an implication of investors’ learning or ‘‘rational structural uncertainty’’ (e.g. Francis, Lafond, Olsson and Schipper, 2007). Learning models predict that investors’ under-react to information signals after a structural shift has occurred, because there is uncertainty as to whether a structural shift has in fact happened. Brav and Heaton (2002) note significant similarities in the underpinnings of behavioural and rational learning theories, and caution that it may be difficult to distinguish between them.

In a similar vein, we argue that trading by corporate insiders provides information that investors use to address the inference problem as to whether a structural shift in the earnings process has occurred. Investors who observe the direction of corporate insider trading are able to infer directors’ private information about the earnings surprise. We follow Seyhun (1998) and identify a set of contrarian insider trades, taking place after the earnings announcement but in the opposite direction to the sign of the earnings surprise. These trades provide a signal to the market that the earnings surprise denotes a transitory realization, and the market’s response reverses the initial reaction to the earnings announcements. The remaining set of insider trades occur in the same direction as the earnings surprise which we classify as confirmatory trades. These trades signal that informed insiders believe that the earnings surprise represents information about a permanent change in the earnings process. The market updates its beliefs about the permanent-transitory nature of earnings on the basis of this additional information and in the case of confirmatory directors’ trades, the initial under-reaction to the earnings surprise adjusts as prices continue to move in the same direction as the surprise, representing price discovery.[2]

Francis et al. (2007) predict that the under-reaction to earnings announcements is negatively associated with the level of the precision of the earnings signal, because investors’ learning is delayed when the earnings signal is less precise. We extend this argument and examine the effect of interacting the precision of the earnings signals with corporate insider trading. We demonstrate that in the presence of contrarian insider trading after the earnings announcement, there is no under-reaction to earnings announcements in firms with low earnings precision. The implication is that in these hard-to-value cases, contrarian directors’ trades allows the market to interpret the earnings surprise as a temporary event. In contrast, we find that in the presence of confirmatory trading the under-reaction is still significant. This suggests that confirmatory trades initiate a learning process to establish the extent of the permanent shift in the earning process even under circumstances where this is not likely to occur, i.e., under high earnings precision.

[2] Veenman (2012) also distinguishes between insider confirmatory buys after good news, and contrarian buys after bad news.

Our research contributes to the literature examining the implications of insider trading disclosure for the valuation of corporate earnings. To date, this research has indicated that the information contained in directors' trading allows the market to develop inferences about future earnings. For instance, Udpa (1996) shows that insider trading prior to an earnings announcement mitigates the market reaction to the subsequent earnings announcement. In a similar vein, Roulstone (2008) reports that insider purchases and sales result in lower market reaction during the earnings announcement. Beneish and Vargus (2002) find that the discretionary component of accruals in earnings is more persistent when accompanied by directors' purchases and less persistent when accompanied by sales. More recently, Choi, Faurel and Hillegeist (2017) show that the market uses pre-announcement insider trading information to anticipate and interpret the current earnings news leading to improved stock price efficiency during the post-earnings announcement period. In contrast to this stream of research, we are interested to find out how the market employs the information in directors' trading that occurs *after* the earnings announcement.

Kolasinski and Li (2010) examine insider trading after the earnings announcement. However, they focus on whether insiders exploit the initial under-reaction to an earnings announcement. Our study is mostly related to Veenman (2012) who investigates the short-term market reaction to the post-earnings announcement disclosure of insider purchases. Veenman (2012) finds that insiders' purchases enable the market to resolve the uncertainty associated with the valuation of past reported earnings. We differ from Veenman (2012) by investigating the implications of insider trading for the post-earnings announcement drift. This allows us to demonstrate that insider trading does not simply trigger a short-term market reaction but instead, initiates a learning process of uncertainty resolution with respect to whether a structural change in the earnings series has occurred.

The remainder of the paper is structured as follows: in Section 2 we discuss the regulation and practices with respect to insider trading around earning announcements in the UK. In Section 3 we develop our hypotheses concerning the impact of insider trading on the post-earnings announcement drift. In Section 4, we discuss the methodology that we employ to test our hypotheses, and in Section 5, we describe the data and the construction of our variables. In section 6 we report our findings, and finally in Section 7, we present the conclusions to the study.

2 Insider trading around earnings announcements: Regulation and practices in the UK

The regulatory framework and common practices in the UK allow us to determine the timing of transactions which are most likely to convey insiders' private information about the interpretation of the earnings surprise. The UK provides a unique setting for our investigation since the institutional arrangements allow first, directors to trade immediately after the earnings announcement and associated trading ban, and second, a speedy disclosure of transactions.

Insider trading on price sensitive information and in particular the trades by directors in the UK are regulated by The Companies Act 1985, The Criminal Justice Act (CJA) 1993, The Financial Services and Markets Act (FSMA) 2000, Listing Rules and Disclosure Rules administered by the

Financial Conduct Authority, who may impose penalties such as fines or imprisonment to insiders found guilty of trading on inside information. The London Stock Exchange Model Code (1977) (part of the Listing Rules), requires directors who trade in their own company's shares first, to seek clearance to trade from the Board ahead of the transaction and second, to report their trades to the company no later than the fourth day after the transaction occurred.[3] In turn, the company must notify the Stock Exchange no later than the following day, when the information about the trade is disseminated to the market. Although the duration of this process appears to be lengthy, in practice, the disclosure of insider trades in the UK is very timely. Fidrmuc, Goergen and Renneboog (2006) report that 85% of the directors' trades in the UK are announced to the market either on the same day they occur or on the following day. This is confirmed in our data, with 82.11% of the shares traded within the first 10 trading days after and including the earnings announcement day, being disclosed on the same or following day.

In addition, the Model Code prescribes a clearly-defined and well observed trading ban,[4] forbidding insiders from trading for two months prior to the earnings announcement. The purpose of this trading ban is to prevent insiders from exploiting any private information with respect to the forthcoming earnings announcement. However, an insider may trade after the end of the trading ban, with the trading restriction ending immediately after the earnings announcement has been made public. Our analysis will focus on these directors' transactions taking place shortly after the earning announcement.

3 Hypothesis development

In this section we develop our hypotheses concerning the impact of corporate insider trading on the post-earnings announcement drift – the market's under-reaction to earnings announcements. We argue that trading by corporate insiders allows the market to make improved inferences about changes in the underlying earning process and that such revisions can partly explain the PEAD. Bulkley and Tonks (1989), Timmermann (1996), and Veronesi (1999) have shown that since standard valuation models rely on estimates of the growth process for dividends and earnings as inputs, small revisions to these growth estimates can generate large changes in equity values which can explain the observed excess volatility of stock prices. Investors form expectations of future fundamentals such as earnings or dividends based in part on the time series properties of previous fundamentals. They update their beliefs about these estimates as new data on dividends and earnings become available. When a large surprise in earnings is announced, whether positive or negative, investors must decide whether this change represents a transitory or permanent variation in earnings. If the nature of the change in earnings is transitory, then the value of the company will only change by the contemporaneous change in the most recent earnings level. For instance, Freeman and Tse (1992) show that transitory earnings have small or no impact on prices. On the other hand, if a structural change has occurred in the earnings process, then the announced earnings represent the first

[3] Insiders in the UK are normally interpreted to be executive and non-executive directors of the company. Thus, we use the terms "insiders" and "directors" interchangeably to refer to corporate insiders.
[4] These listing rules apply to firms on the Main Market and on AIM. The trading ban in the UK has been shown to be well observed (e.g. Korczak, Korczak and Lasfer, 2010) with directors either abstaining from trading during this period, or trading with the permission of the company chairperson.

realisation from a new earnings process, and the value of the firm should change to reflect the new earnings process. From the perspective of a learnings model, investors face an identification problem from the most recent earnings figure, as to whether the unexpected value is an outlier from the previous earnings process, or is the first observation in a new earnings series. As well as explaining excess volatility puzzles, learning models in finance have been applied to explain asymmetric time-varying volatilities (David, 1997), the equity risk premium (Brennan and Xia, 2001), the value premium (Pástor and Veronesi, 2003), and term structure puzzles (Bulkley and Giordani, 2011). Lewellen and Shanken (2002) develop an equilibrium rational learning model where Bayesian-investors under-react to information signals after a structural shift has occurred, because there may be some uncertainty as to whether a structural shift has in fact happened. If there has been a structural shift, then investors face the difficult problem of valuing a new income stream with new parameters. Lewellen and Shanken (2002) suggest that many stock market anomalies can be explained by rational learning about parameter uncertainty but argue that this does not mean that there are exploitable arbitrage opportunities because "the strategy earns abnormal profits in a frequentist sense, but not from the Bayesian perspective of investors" (p. 1125). Brav and Heaton (2002) also note that it may be difficult to distinguish between rational learning and behavioural explanations for stock market anomalies.[5]

In an environment with parameter uncertainty investors will look around for further information that will allow them to make a better inference on the transitory or permanent shock to earnings. One such source of information is the trading behaviour of corporate insiders, who are allowed to trade after the earnings announcement in the UK following the relaxation of the two-month prior trading ban. Insider trading is a mechanism that enables private information held by corporate insiders to be incorporated into stock market prices (Manne, 1966). We argue that after an earnings announcement, large earnings surprises may reflect either an extreme value from existing distribution, representing a transitory component to earnings, or a value from new distribution, representing a structural change in the earnings process. Investors must assess whether a structural change has occurred.[6] Bayesian investors update beliefs from sample information generated by the relevant distribution, and directors' trades after the earnings announcement represent that sample information. We assume that directors with private information about the fundamental value of their firm, trade to maximise their wealth.[7] They will buy (sell) shares when the

[5] These learning models do not distinguish between learning and imitating. Acemoglu, Dahleh, Lobel and Ozdaglar (2011) incorporate social networks into a sequential learning model, and demonstrate even when there are an influential group of agents whom other agents copy, there will still be an asymptotic convergence to the efficient outcome (no herding) provided that the information signals received by individuals are unbounded.

[6] In Appendix 1 we provide a simple example of a shock to an earnings process generated by a uniform distribution, which reveals a structural change with an unknown upper support. Conjugate prior beliefs on this unknown parameter are represented by a Pareto distribution, meaning that investors who update from the likelihood function according to Bayesian rules will have posterior beliefs that are also Pareto. We show that such a learning mechanism generates a price process that replicates a PEAD.

[7] Bagnoli and Watts (2007) model managers' disclosure strategy around earnings announcements, and show that the optimal strategies are asymmetric around good and bad news, reflecting transitory and permanent components. However, an underlying assumption in Bagnoli and Watts (2007) is that the manager selects a voluntary disclosure strategy to maximize the market price of the firm. In our setting, we assume that managers trade to exploit their information advantage for their own benefit.

market price undervalues (overvalues) their estimate of the firm's fundamental value. This behaviour is consistent with the empirical evidence which demonstrates that information in directors' trading is associated with significant market reactions in both the short run (Fidrmuc et al., 2006) and long run (Lakonishok and Lee, 2001). Further, work by Seyhun (1998), and Hillier and Marshall (2002) has established trading patterns around the earnings announcement that illustrate insiders' informational advantages. Contrarian directors' trades in the post-earnings announcement period imply that corporate insiders know the earnings surprise is a transitory event, and that current prices are driven by an over-reaction to the earnings surprise. The market infers that earnings surprise reflects a transitory change in earnings, and there will be no PEAD. On the other hand, confirmatory directors' trades, in the post-announcement period reveal that insiders know the earnings surprise represents a permanent structural change. The market will correctly infer that there has been a permanent change in the earnings process, although the parameters of this new distribution will need to be estimated.

Seyhun (1998) notes that an insider who wants to purchase shares and anticipates a negative earnings surprise will hold back from trading until after the bad news has been announced in order to buy shares at a lower price. Conversely, an insider who wishes to sell and anticipates a positive earnings surprise will again postpone trading until after the public announcement, in order to sell at a higher price. These contrarian trading patterns are motivated by insiders' information that the earnings surprise represents a transitory event. Specifically, Seyhun (1998) argues that "Following their sales, insiders do not necessarily expect negative future performance. They only know that past expectation of good performance is completed and the stock price fully reflects insiders' expectations." (p 51). Following Seyhun (1998), we argue that the contrarian direction of these insider trades reveals that prices have over-reacted to the information in the earnings surprise, with the implication that such earnings surprises represent only a transitory change in earnings. The contrarian nature of these trades provides a contradictory signal to the earnings surprise, and causes market participants to revise their expectations in the opposite direction to the sign of the earnings surprise. The joint signal of an earnings surprise and a contrarian directors' trade, allows investors to infer that the earnings surprise does not reflect a permanent change in earnings, and we would not expect any further price movement in the direction of the earnings surprise; in fact, PEAD will be dissipated. Following these discussions, we set out our first hypothesis:

Hypothesis 1 (H1): Informed contrarian directors' trading after an earnings announcement conveys a signal on the transitory nature of the earnings surprise that attenuates the PEAD.

Figure 1 illustrates the pattern in returns that we predict following either of two joint signals: (positive earnings surprise and directors' sells) or (negative earnings surprise and directors' buys). In both cases we expect the initial stock price reaction to the earnings surprise to represent an over-reaction which is then mitigated by the contrarian trades, represented by the attenuated PEAD boxes.

FIGURE 1 ABOUT HERE

We now turn to the other type of insider trading around the earnings announcement: confirmatory insider trades. Confirmatory insider trades are those directors' trades that occur after the earnings announcement and in the same direction as the sign of the earning surprise, and are also illustrated in Figure 1. From these trades investors infer that there has been a permanent shift in the earnings process, since with confirmatory trades informed insiders are either buying shares after the good earnings news, or selling shares after the announcement of a bad earnings surprise. In both cases confirmatory directors' trading reveals a mis-valuation of the underlying firm fundamentals, and that the initial price reaction was an under-reaction to the earnings surprise. The direction of these confirmatory trades indicate that prices have still to fully reflect the information in the earnings surprise. This behaviour is consistent with the latest earnings surprise figure representing a permanent change to the earnings process. However, there are two issues in relation to the inferences that the market makes from confirmatory directors' trades.

First, the absolute upper limit on the permanent change in earnings is undefined whether for good news or bad news. Although the market may infer from these trades that there has been a permanent change in earnings, the parameters of this new earnings process are not yet known, and there is still much uncertainty about the ultimate equilibrium share price.[8] Although the joint signal of confirmatory trades and the earnings surprise indicates that a structural break has occurred, it is well-known that analysts typically under-estimate the extent of earning changes (e.g. Abarbanell and Bernard, 1992). Further, Ali, Klein and Rosenfeld (1992) show this under-estimation is more severe when earnings are deemed permanent. It is therefore unlikely that with a joint signal of an earnings surprise and a confirmatory insider trade prices will immediately jump to a new equilibrium level. It is more likely that there will be subsequent drift to the new equilibrium given that even professional investors (e.g. analysts) under-estimate the permanence of the structural change.

Second, insiders have reduced incentives to engage in confirmatory trading after the earnings announcement, given that the earnings surprise reveals in part the insiders' information. Directors would have greater incentives to trade prior to the earnings announcement to fully exploit their private information about the forthcoming earnings surprise. In the context of the UK's two month trading ban, an insider would purchase (sell) shares before the announcement of a positive (negative) earnings surprise, just prior to the imposition of the trading ban. However, pre-earnings announcement insider trading is rare as it exposes insiders to both litigation and reputation costs. Hillier and Marshall (2002) report that although insiders with private information about the upcoming earnings announcement may trade prior to the start of the trading ban period, the transparency of the trading disclosures and the legal consequences means that such trades are uncommon. Piotroski and Roulstone (2007) show that insiders refrain from pre-earnings announcement trades when the magnitude of the surprise is extreme. Also, there is evidence of a substantially higher incidence of directors' trading in the period following the earnings announcement, and this is consistent with insiders' reluctance to trade before the announcement and preference to delay their trades (Hillier and Marshall, 2002).

In summary, although the patterns associated with confirmatory insider trading are consistent with insiders exploiting their informational advantage over the interpretation of the earnings surprise, we anticipate the asymmetric incentives (compared with contrarian trades) may

[8] A similar issue arises in the case of insider trading around earnings restatements. Badertscher, Hribar and Jenkins (2011) argue that it is only possible to identify directional hypotheses about how stock prices respond to insider trading and accounting restatements, but not the rank order of the magnitude of the effects.

render a delayed stock market response to the earnings surprise. This discussion leads us to our second hypothesis:

Hypothesis 2 (H2): Informed confirmatory directors' trading after an earnings announcement conveys a noisy signal that a structural change in the earnings distribution has occurred, resulting in an exacerbated PEAD.

Figure 1 illustrates the predicted pattern in returns following confirmatory directors' trades. For both good and bad earnings surprises, the initial stock price reaction under-estimates the long-run fundamental price, and the subsequent stock price reaction is represented by the exacerbated PEAD boxes. The underlying conjecture in the development of hypotheses H1 and H2 is that the disclosure of informed directors' trading provides relevant information to the market which accelerates investors' learning with regards to the transitory-permanent nature of the earnings surprise and thus, either attenuates or exacerbates the reaction to the earnings announcement. We may seek further support for these arguments by examining these conjectures in relation to the characteristics in the earnings surprise related to the difficulty investors have in interpreting these signals. Francis et al. (2007) argues that a testable consequence of a rational learning model explanation of the PEAD is that we would expect the PEAD anomaly to be most prevalent in high information uncertainty firms whereby uncertainty is captured by the precision of earnings. They show that in these hard-to-value firms the under-reaction to earning announcements is exacerbated by the low precision in earnings signals since the investors' inference problem becomes more complex for these cases, and the speed at which investors incorporate the information in the earnings surprise is delayed. Veenman (2012) and Bhattacharya, Desai and Venkataraman (2013) extend these arguments and show that a low precision earnings signal amplifies the information asymmetry between insiders and outsiders, and increases the importance of insiders' private information for investors' assessments.

Hypothesis 3 then seeks to expand the evidence of the impact of contrarian and confirmatory trades conditional upon the influence of earnings precision:

Hypothesis 3:

(H3a): Contrarian insider trading attenuates the PEAD for low earnings precision (high information uncertainty) firm-announcements.

(H3b): Confirmatory insider trading exacerbates the PEAD for high earnings precision (low information uncertainty) firm-announcements.

The two parts to H3 seek to corroborate the learning mechanism underlying the impact of contrarian and confirmatory insider trading outlined in H1 and H2. In the case of contrarian trades, evidence of a mitigated PEAD under circumstances when it is most likely to occur, validates the suggested mechanism through which learning occurs. H3a predicts that in low precision firms, contrarian directors' trades will be effective at weakening the PEAD. We might anticipate a corollary of H2 with respect to confirmatory trades in high precision firms. We expect that in high earnings precision firms the PEAD will not be present, in which case if we find evidence of a PEAD following confirmatory directors' trades in such firms, this again will validate directors' trades as a learning mechanism. H3b predicts that in high precision firms, the presence of confirmatory insider trading will lead to a PEAD effect.

To summarise, our main hypotheses H1 and H2 are concerned with the role of informed contrarian and confirmatory insider trading in explaining the PEAD. Hypothesis H3 complements the first two hypotheses, since it aims to corroborate the role of insider trading in the context of low and high earnings precision firms, and thus validate that this learning mechanism is distinct from the learning that relies on fundamentals.

4 Research design

To investigate the effect of informed insider trading on the under-reaction to earnings announcements, we follow the event-study methodology to first identify the post-earnings announcement drift (e.g. Bartov et al., 2000) and then include variables that examine the impact of contrarian and confirmatory directors' trading on stock market returns. The timing of these events ensures that causality flows from the joint signal of the earnings surprise and directors' trades through to abnormal returns. Evidence of the under-reaction to earnings announcements is documented by a significant association between the earnings surprise and subsequent returns, as follows:

$$BHAR_{i,t} = \alpha_0 + \alpha_1 RUE_{i,t} + \alpha_2 Controls_{i,t} + \varepsilon_{i,t} \qquad (1)$$

where, $BHAR_{i,t}$ denotes market adjusted buy-and-hold abnormal returns using the FTSE all share marked index measured from 11 days after the earnings announcement to six months later (day +126), where a month is defined in terms of 21 trading days, and RUE_{it} is the rescaled quintile rank of the earnings surprise. Our main results refer to the PEAD over an approximate 6-month trading horizon. We concentrate on this time period since Bernard and Thomas (1989) report "a disproportionately large fraction of post-announcement drift is concentrated in the few days preceding and including the next quarter's earnings announcement" (p. 30). In the US where most firms report on a quarterly basis the timing of the PEAD is often measured over a 3-month horizon to capture the next earnings announcement date. In the UK where semi-annual reporting is much more common, Liu, Strong and Xu (2003) report the existence of the PEAD over a range of time horizons, but concentrate their abnormal return tests on the 6-month horizon. In order to assess the robustness of our results to the timing effects, we undertake additional tests for PEAD returns measured at 2-month (+11 to +52), 3-month (+11 to +73), 4-month (+11 to +94) and 5-month (+11 to +115) time horizons.

We first calculate unexpected earnings defined as the quintile rank of the earnings surprise, where the cut-off points are determined by the distribution of the earnings surprise in the previous year. We define the earnings surprise based on the difference between actual earnings and the latest analysts' earnings forecast (e.g. Ayers, Li and Yeung, 2011). We follow Mendenhall (2004) and define $RUE_{i,t}$ as a variable taking the value "-0.5" when an observation belongs to the bottom quintile rank of earnings surprise and "0.5" when an observation belongs to the top quintile rank of earnings surprise. For the intermediate quintiles, we set $RUE_{i,t}$ to be equal to zero. In this case, the difference between the extreme earnings surprise quintiles is equal to unity and therefore, α_1 represents the spread in average abnormal returns between observations in the highest and lowest unexpected earnings surprise quintiles. Figure 1 shows how this spread is measured. In the case of a positive earnings surprise the unconditional PEAD is measured by the vertical distance represented by the GN_PEAD box. Similarly, an unconditional bad news PEAD is measured by the BN_PEAD box. The spread measures the difference between these two boxes: spread = [GN_PEAD – BN_PEAD].

We control for the risk factors and variables that have been shown to be relevant for the UK stock market (e.g. Jiang, Soares and Stark, 2016). These include (i) size measured as the market value of the company at the fiscal year end, (ii) book-to-market which is the ratio of common shareholder's equity to the market value of the company at the day of fiscal year end, (iii) momentum which is measured as the buy and hold market adjusted return over the six months prior to the earnings announcement, (iv) the effect of R&D, captured by the ratio of R&D expense to the market value of the company, (v) leverage, measured as total debt divided by the market value of the company at the fiscal year end, (vi) the cash flow effect, captured by the ratio of operating cash flows to the firm's total assets, (vii) the natural logarithm of the share price at the begging of the accumulation period, and (viii) capital expenditures divided by the market value at the fiscal year end. In each case we control for these risk factors by means of the quintile rank of the corresponding variables (e.g. Hirshleifer, Myers, Myers and Teoh, 2008). In Appendix 2 we provide details on how these variables have been estimated.

Building on the evidence for the PEAD reported for the UK (e.g. Liu et al., 2003) and the US (e.g. Ayers et al., 2011), we predict a positive and statistically significant coefficient α_1 denoting an abnormal returns continuation along the sign of the earnings surprise $RUE_{i,t}$. In order to test Hypotheses H1 and H2, we adjust (1) by partitioning the association between the earnings surprise and subsequent returns in the presence of informed contrarian (*Ctrar*) and confirmatory (*Cfirm*) insider trading. Specifically, we modify (1) as follows:

$$BHAR_{i,t} = \beta_0+\beta_1 Ctrar\_RUE_{i,t}+ \beta_2 Cfirm\_RUE_{i,t} + \beta_3 NT\_RUE_{i,t} + \beta_4 Ctrar_{i,t} + \beta_5 Cfirm_{i,t} + \beta_6 Controls_{i,t} +\varepsilon_{i,t} \quad (2)$$

where, $Ctrar\_RUE_{i,t}$ equals to $RUE_{i,t}$ when directors engage in contrarian trading after the earnings announcement, and zero otherwise; $Cfirm\_RUE_{i,t}$ equals to $RUE_{i,t}$ when directors engage in confirmatory trading after the earnings announcement, and zero otherwise; $NT\_RUE_{i,t}$ equals to $RUE_{i,t}$ when directors abstain from trading after the earnings announcement, and zero otherwise. We also include the main effects of $Ctrar_{i,t}$ and $Cfirm_{i,t}$ in order to control for the possible effect of contrarian and confirmatory trading on subsequent abnormal returns.

Hypothesis H1 postulates that contrarian insider trading conveys useful information on the transitory nature of the earnings surprise that attenuates the under-reaction to earnings announcements. Hence, we expect the coefficient β_1 to be insignificantly different from zero ($\beta_1 =0$) indicating that the earnings surprise is not associated with a subsequent drift. H2 predicts that the presence of confirmatory insider trades will convey information about the permanent nature of the earnings surprise, which nevertheless, involves significant uncertainty and thus, there will be a continuation of the PEAD. Therefore, we expect the coefficient β_2 to be positive and significant ($\beta_2>0$). Additionally, the absence of any insider trading implies that the additional information needed to allow the market to interpret the permanent-transitory nature of the earnings surprise is not available, and we might expect β_3 to be positive in line with the overall evidence on PEAD. The case of PEAD in the absence of insider trading will be further investigated when testing H3. Furthermore, we seek to corroborate the distinct role of directors' trading in promoting efficient stock prices as set out in H1 and H2 by comparing these coefficients, and we anticipate: $\beta_2 > \beta_3 > \beta_1$. Referring back to Figure 1, the conditional good news PEAD after contrarian insider trading is given by the GN_{ct}_PEAD box, and the conditional bad news contrarian PEAD is given by the BN_{ct}_PEAD box. So, the contrarian spread is the difference between these two boxes: Contr. Spread = [GN_{ct}_PEAD – BN_{ct}_PEAD]. Similarly, for the confirmatory spread: Conf. Spread = [GN_{cf}_PEAD – BN_{cf}_PEAD].

In order to test Hypothesis H3, we need to obtain an estimate of the earnings signal precision. Following Francis et al. (2007) we measure the earnings signal precision by means of the magnitude of discretionary accruals.[9] To construct our measure of earnings precision, we rank firms annually based on the magnitude of their discretionary accruals. We assign an earnings precision variable (PREC) which takes the value of 1 if a firm belongs to the bottom tercile of this ranking, and 0 otherwise. Observations ranked in the bottom tercile of the unsigned discretionary accruals' distribution are considered to exhibit high earnings signal precision (PREC=1) while the remaining observations are considered to exhibit low levels of precision (PREC=0).

Equation (3) then enables us to test H3 by examining the association between the earnings surprise and subsequent returns, as described in (2), conditioning on the earnings signal precision (PREC).

$$\begin{aligned} BHAR_{i,t} = {} & \gamma_0 + \gamma_1 Ctrar\_RUE_{i,t} + \gamma_2 Cfirm\_RUE_{i,t} + \gamma_3 NT\_RUE_{i,t} \\ & + \gamma_4 Ctrar\_RUE_{i,t} * PREC_{i,t} + \gamma_5 Cfirm\_RUE_{i,t} * PREC_{i,t} + \gamma_6 NT\_RUE_{i,t} * PREC_{i,t} \\ & + \gamma_7 Ctrar_{i,t} + \gamma_8 Cfirm_{i,t} + \gamma_9 PREC_{i,t} + \gamma_{10} Controls_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{3}$$

The coefficients of particular interest in (3) are the coefficients γ_1 and γ_5. These coefficients represent respectively: the influence of contrarian insider trading in low earnings precision firms (*PREC=0*) where the PEAD is most prevalent; and the role of confirmatory insider trading in high earnings precision firms (*PREC=1*), where it has been shown that the PEAD is largely absent. Consistent with the distinctive ability of contrarian insider trading to facilitate investors' learning under low earnings precision, H3a predicts that γ_1 would be insignificantly different from zero. H3b predicts that even for high precision firms investors will be sensitive to the confirmatory directors' trades, and therefore we anticipate $\gamma_5 > 0$. In the absence of insider trading, we anticipate a negative and significant coefficient γ_6. This is because in the absence of insider trading, the information acquisition process is largely based on the underlying fundamentals as suggested by Francis et al. (2007).

[9] The main tests in Francis et al. (2007) employ a model that relies on a long time series of data and is based on Dechow and Dichev (2002). However, they report similar results when using the proxy that we employ here (cf. page 427 of their paper).

5 Data and empirical proxies

5.1 Data

We collect data for all UK non-financial companies listed in both the MAIN and the AIM markets for the period between 1995 and 2013. This yields an initial sample of 19,804 observations. Requiring an intersection between Datastream and I/B/E/S Detail History files to collect the necessary data for estimating the earnings surprise variable, we lose 9,366 data points mainly due to missing earnings announcements.[10] We note that requiring this intersection between Datastream and I/B/E/S datasets introduces a selection bias against the inclusion of very small and illiquid companies without an analyst following. We define the earnings surprise as:

$$UE_{i,t}=(Actual\_EPS_{i,t}-Forecasted\_EPS_{i,t})/P_{i,t-1}$$

where, $Actual\_EPS_{i,t}$ is the actual earnings per share reported in I/B/E/S for year *t*; $Forecasted\_EPS_{i,t}$ is the single most recent forecast made by the timeliest analysts prior to the earnings announcement;[11] and $P_{i,t-1}$ is the stock price at the previous fiscal year end. We convert $UE_{i,t}$ into quintiles of earnings surprises based on the magnitude of the surprise. We acknowledge that not all companies announce earnings at the same time and the distribution of earnings surprises might not be known prior to the portfolio formation date. Therefore, we define the quintiles of the earnings surprises from the distribution of the preceding year's surprises. We further eliminate 2,044 observations due to missing market data from Datastream, and a further 7 observations are eliminated due to missing accounting data that are necessary for the calculation of discretionary accruals.[12] Trimming buy-and-hold abnormal returns as well as the variables involved in the estimation of the discretionary accruals at the 2st and 98th percentiles of their distributions reduces further the sample by 334 firm-year observations. These selection criteria yield a final sample of 7,980 firm-year observations from 1,373 different firms, of which 1,524 firm-year observations and 429 firms are AIM-listed. Table 1 summarises the sample selection procedure.

TABLE 1 ABOUT HERE

5.2 Abnormal returns

We measure the post earnings announcement returns as the buy-and-hold market adjusted returns beginning from the 11th day and ending six months later, relative to the earnings announcement. We calculate returns using daily prices and dividends from Datastream given the concerns in Ince and

[10] We require the annual final earnings announcements to be available in Datastream or I\B\E\S, and ignore any interim announcements. After eliminating earnings announcements announced more than 200 days after the fiscal year end, we supplement the earnings announcements in Datastream from I\B\E\S and choose the earliest given the concerns of I\B\E\S reliability (Hung, Li and Wang, 2014). Most UK companies also report interim earnings announcements after six months, but a small number report quarterly interim earnings announcements. We undertake a robustness check of our results and exclude the 75 firms that make quarterly announcements.

[11] Following Bartov, Givoly and Hayn (2002), we only consider the latest forecast preceding the earnings announcement by at least three days. Using the latest forecast is quite common (e.g. Bartov et al., 2002; Ayers et al., 2011) and is known to be more closely related to the market reaction at the earnings announcement (Brown and Kim, 1991). We further exclude forecasts preceding the earnings announcement by more than 200 days to prevent stale forecasts being included in the analysis.

[12] We eliminate firm year observations whose accounting reporting period is less than 340 and more than 380 days (similarly to García Lara, García Osma and Mora, 2005).

Porter (2006) with regard to returns estimated from the Return Index (RI) data-item. Following Lee (2011) we drop any day where more than 90% of the shares outstanding are not traded (i.e. have zero return on that day). Furthermore, in order to filter out suspicious stock returns, we follow Chui, Titman and Wei (2010) and set returns that are greater than 100% (-95%) equal to 100% (-95%). Finally, thin trading leading to missing returns may also compromise our statistical inferences, and therefore we calculate trade-to-trade returns (Maynes and Rumsey, 1993). Specifically, trade-to-trade returns are calculated from non-missing price days. For a stock with a missing price, the corresponding portfolio return is added to the next non-missing price day's portfolio return for a trade-to-trade abnormal return calculation.[13] In addition, to reduce the influence of our thin trading adjustment on abnormal returns, we follow Hung et al. (2014) and require firms to be traded for at least 70% of the trading days within our measurement period.

5.3 Insider trading

Information on directors' trading is from the Hemmington Scott Directors' Trading Dataset. In line with prior research in the UK (e.g. Fidrmuc et al., 2006), we define insider transactions as purchases or sales by both executive and non-executive directors, but we allow for a number of different definitions of the directors trading signal. A common definition is the net purchase ratio (e.g. Beneish and Vargus, 2002), and we employ this firm-specific measure of net insider trading, aggregating all directors' trading activity within a period, as follows:

$$NPR = [PURCHASES - SALES]/[PURCHASES+SALES] \qquad (4)$$

where *PURCHASES* is the value of shares purchased by directors and *SALES* is the value of shares sold in the period after the earnings announcement. A positive *NPR* could be the result of directors purchasing more shares or selling fewer shares and *vice versa* for a negative *NPR*. A positive *NPR* indicates net insider buying, whereas a negative *NPR* indicates net insider selling. *NPR* is estimated using only open market purchases and sales of common shares in line with Veenman (2012) . A possible criticism of the *NPR* in equation (4) is that it does not take into account the relative importance of directors' trades in terms of their personal wealth: a trade which represents only a small percentage of the shares already owned by the director is likely to be less informative than a trade with a substantial impact on the directors' wealth. We address this concern by estimating a "weighted-NPR", where the weights applied are estimated as the ratio of the respective trade-size to the shares owned by the director. In the case of a single director trading, this will have no effect on the definition of a buy or sell signal. However, when many directors trade, the weighted-NPR depends on weights attached to the respective trades. We also employ an alternative measure which identifies the direction of the insider trading signal based on the direction of the majority of directors' trading. We refer to this signal as "Net trades", and in this case a buy signal would be defined when more directors are buying shares than directors selling shares, and vice versa for a sell signal. Finally, we acknowledge that in the presence of conflicting transactions (e.g., some directors sell and some buy), the insider trading signal may be ambiguous. In contrast, when all directors trade in the same direction, the trading signal is likely to be strong and clear. Our

[13] An alternative approach is to calculate lumped returns which consist of trade-to-trade returns on non-missing price days and zero on missing price days with no adjustment to the portfolio return when returns are missing, given that this procedure does not allow for missing returns. Using lumped returns, instead of trade to trade, does not alter our conclusions.

final definition of a directors trading signal is based on "Consistent trades", when multiple directors in a given company all trade in the same direction.

We provide summary statistics on the sample of directors' trades both before and after the earnings announcement in Table 2. Each panel reports the value of directors' purchases and sales (which are fewer in number but larger in value), the daily net value of these trades across directors trading in the same firm, and the NPR calculated over the relevant period. We organise the presentation of this data across various windows of insider trading observation around the earnings announcement day (0): Panel A reports the insider trading statistics over the period of 72 days before the earnings announcement to 10 days after it (-72, +10); Panel B captures the period preceding the trading ban (-72, -42) and Panel C covers the trading ban period (-41, -1). In Panel D, we identify insider trading transactions that are disclosed within the first ten days after and including the earnings announcement, which also coincides with the end of the trading ban. Additionally, Panel D presents summary statistics for the four alternative proxies of the insider trading signal employed here: (NPR, weighted-NPR, Net trades and Consistent trades) corresponding to the top and bottom quintiles formed on the basis of the earnings surprise. Note that both NPR and weighted-NPR are scaled to lie between (-1, +1). Figure 2 summarises the information in Table 2 and shows the number of daily insider trading transactions across all firms in our data set around the time of an earnings announcement (day 0), from 72 days before the earnings announcement to 10 days after. The figure confirms the effectiveness of the trading ban starting from approximately 42 (trading) days before the earnings announcement.

TABLE 2 AND FIGURE 2 ABOUT HERE

Figure 2 indicates that the incidence of directors' trading in the period after the earnings announcement is dramatically higher than in the period before the earnings announcement, and motivates our choice of a 10-day post-announcement period to compute our directors trading measures. The figure confirms insiders' reluctance to trade before the announcement and preference to delay their trades as the former may expose them to litigation or reputation costs. In particular, the patterns of directors trading presented on Figure 2 demonstrate that they trade as early as the earnings announcement day and these trades are disclosed to the market in a timely fashion.

5.4 Discretionary accruals

We estimate discretionary accruals in a two-stage procedure. In the first stage we use the Modified Jones (1991) model to predict the level of "non-discretionary" accruals as a function of the growth in revenues and gross property, plant and equipment. Specifically, we run a regression of total accruals for firm *i*, year *t* and sector *j* (two- digit ICB industry classification[14]) on the change in revenues and gross property, plant and equipment where all variables are scaled by the beginning total assets for each year. The second stage predicts the non-discretionary component of accruals using the estimated coefficients from the first stage. Note that in second stage, the influence of the cash sales is also taken into account by introducing the change in receivables, similarly to Dechow, Sloan and

[14] The two digit ICB provides 15 industry classifications where the equivalent SIC leads to 66 industry classifications, excluding missing and financial observations. We require at least 6 observations for each industry-year sub-sample (similarly to García Lara et al., 2005).

Sweeney (1995).[15] The "non-discretionary" part of the accruals then represents an estimate of the expected level of accruals and the remaining component is presumed to include managements' discretion on accruals. Moreover, since performance might also be a determinant of the level of accruals, the estimated discretionary accruals here are also "performance adjusted" in the manner advocated by Kothari, Leone and Wasley (2005) by adding return on assets (ROA) as an additional explanatory variable in the estimation of "non-discretionary" accruals. Since firms do not announce their earnings on the same day or time of the year, the variables used to calculate discretionary accruals are not available for all firms in the same industry-year portfolio. Therefore, the entire distribution of discretionary accruals is typically unknown to the investors at the earnings announcement and, as a result, the hedge portfolio strategies that underlie our investigation cannot be implemented. Following Louis and Sun (2011), we address this issue by estimating the accrual model one year prior to the portfolio formation and then applying the estimated coefficients to the second stage of the estimation process and using the cut-off points from the year before (similar to the quintile ranks of the earnings surprise).

6 Analysis

6.1 Results

Table 3 presents the initial univariate evidence on the post earnings announcement buy-and-hold market adjusted abnormal returns over the six months period (+11, +125) after the earnings announcement. Panel A shows returns corresponding to the top and bottom quintiles of earnings surprises. The spread in returns between the top and bottom quintiles supports the presence of under-reaction to the earnings announcement. The average abnormal returns in the top quintile of earnings surprises are larger (+ 2.3%) than those in the bottom quintile (-1.1%), and this difference (+3.4%) is statistically significant, confirming the presence of the PEAD anomaly in the UK.

TABLE 3 ABOUT HERE

Panel B of Table 3 demonstrates the effect of conditioning these buy-and-hold abnormal returns on contrarian insider trading. In the presence of contrarian insider trading, the average buy and hold abnormal return over six months following the earnings announcement for the observations in the top quintile of the earnings surprise has a smaller magnitude than the corresponding figure for the observations in the bottom quintile. Moreover, the magnitude of the returns in both quintiles is low and not significantly different from zero. Confirming our first hypothesis H1, this finding suggests that in the presence of contrarian trades, the market interprets the earnings surprise as a transitory change in the earnings process and thus, does not capitalise its magnitude into share prices: there is no subsequent market reaction and the PEAD is mitigated. In contrast, the results in Panel C show that when there are confirmatory insider trades, the market infers that there has been a permanent change in the earnings process. Prices continue to move along the direction of the earnings surprise indicating that the market considers that the earnings surprise has information about a permanent change in the earnings process. The PEAD anomaly is particularly pronounced among this set of observations as the return spread between top and

[15] The change in receivables is included in order to control for managers' attempts to manipulate earnings through discretionary revenues

bottom earnings surprise quintiles is 7.3%. Further analysis indicates that this result is driven by the effect of insider purchases rather than sales. Being a costly and hence, credible signal of good prospects, confirmatory purchases represent a strong signal that insiders regard the earnings surprise as reflecting a permanent change in the earnings process. Panel D reports the univariate results for earnings announcements with no subsequent directors' trades. In this case the drift is similar to the pooled sample, but is smaller than in Panel C, highlighting the exacerbated response to confirmatory trades accelerates investor learning. Evidence of PEAD in the absence of directors' trading implies that directors' trading can only partly explain the PEAD.

Table 4 reports the multivariate implementation of model (1) and provides evidence of an under-reaction to earning announcements after controlling for risk factors relevant to the UK stock market. In addition, the regression employed here takes into account the panel structure of the data using firm- clustered standard errors and year fixed effects. Evidence on the PEAD anomaly is shown by the positive and significant coefficient of *RUE;* as explained in Section 4, the coefficient on *RUE* represents the spread in average abnormal returns between observations in the highest and lowest unexpected earnings surprise quintiles. The spread results reported in the first column of Table 4 provide significant evidence of PEAD (0.020; p-value<0.05) even after controlling for size, momentum, book to market and other risk effects.

TABLE 4 ABOUT HERE

The results from testing hypotheses H1 and H2 are reported in the last four columns of Table 4. Consistent with our univariate tests, we find no significant evidence of under-reaction to the earnings surprise in the presence of contrarian insider trading. Specifically, the coefficient on *Ctrar_RUE* denoting the spread in average abnormal returns in the presence of contrarian trading, is -0.039 and statistically insignificant when we define insider transactions based on the net purchase ratio. We report similar results when we use the alternative definitions of the directors' trading signal. These findings support our hypothesis H1 with respect to the role of contrarian trading in mitigating the PEAD. In contrast, confirmatory insider trading conveys information to the market that there has been a permanent change in the earnings process. This is denoted by the magnitude and significance of the *Cfirm_RUE* coefficient across all alterative definitions of the insider trading signal. (e.g. 0.087; p-value<0.01 when defining directors' trading signal based on NPR). In the absence of directors' trading there is still significant evidence of the PEAD as reflected by the value of the coefficient on *NT_RUE* across all definitions of directors' trading signal (e.g. 0.019; p-value<0.05 when defining directors' trading signal based on NPR). Share prices continue to move along the direction of the surprise, but the drift is less pronounced than in the case of confirmatory directors' trade. This would suggest that directors' trades cannot completely explain all of the PEAD, but there may well be other sources of information available to investors' post-earnings announcement enabling them to infer the permanent-transitory nature of the earnings surprise.

To further support our evidence with respect to the information conveyed by contrarian and confirmatory insider trading about the permanent-transitory nature of earnings surprise we test whether the coefficients are statistically significantly different from one another using Wald tests. Collectively, the results indicate that the coefficient of *Cfirm_RUE* is significantly higher than the coefficient of *NT_RUE* which in turn, is larger than the coefficient of *Ctrar_RUE.* This hierarchy highlights the distinctive effect of insider trading upon the PEAD and is in line with our predictions as illustrated in Figure 1. Overall, these findings confirm the important role for directors' contrarian trading in alleviating the PEAD anomaly while confirmatory insider trading explains, in part, the PEAD.

The proposition advanced in the development of hypotheses H1 and H2 is that the disclosure of informed insider trading provides relevant information to the market that accelerates investors' learning on the transitory-permanent nature of the earnings surprise. In Table 5, we provide further support to our hypotheses by examining the influence of earnings precision on the speed at which investors incorporate the news about the earnings surprise.

TABLE 5 ABOUT HERE

Francis et al. (2007) argue that low earnings precision delays investors' learning and hence, aggravates the under-reaction to earnings announcements. In line with this argument, we find that the PEAD is more pronounced and significant under circumstances of low earnings precision. In the first column of Table 5, we report that the coefficient of RUE_{it} is positive and significant (0.031; p-value <0.01), but the PEAD dissipates as earnings precision increases (denoted by the interaction between PREC and RUE: -0.035; p-value<0.10).

The remaining four columns in Table 5 present the results of testing the two parts of Hypothesis H3 for the four alternative proxies of insider trading signals. In H3 we predict that the insider trading signal initiates a learning process which is distinctive from the learning process underlying the earnings precision. That is, we expect that contrarian directors' trading has a distinct ability to unravel the earnings process even under circumstances where we expect that the PEAD should occur (H3a). The tests reported in Table 5 confirm this hypothesis by means of the small magnitude and insignificant coefficient of *Ctrar_RUE*, when the earnings precision is low. This result is in contrast to the coefficients of *Cfirm_RUE* and *NT_RUE* both of which are significant and large in magnitude. A comparison of the coefficients reported in the "*Low earnings precision*" panel supports this inference.

Analogous to H3a, hypothesis H3b predicts that confirmatory trades will initiate an exacerbated PEAD even under circumstances where the PEAD is not expected to occur. The results reported on Table 5 support this prediction. First, we find that the coefficient of *Cfirm_RUE* is large and significant. The coefficient of *Cfirm_RUE* captures the PEAD anomaly for those firms with low earnings precision (PREC=0) in the presence of confirmatory insider trading, and its estimated value is 0.065 with a p-value <0.10, in the case of the NPR signal. More importantly, the coefficient of the interaction between *Cfirm_RUE* and *PREC* is positive and insignificant denoting a persistent PEAD, even under circumstances of high earnings precision. Again, the results from a comparison of the coefficients reported in the "*High earnings precision*" panel re-affirm this inference: under high earnings precision, the PEAD is present only when directors trade in a confirmatory direction.

Finally, when directors are not trading, we find that the earnings precision effect dominates, with the absence of insider trading in low precision firms, denoted by *NT_RUE*, producing a coefficient that is positive and significant (0.036; p-value <0.05). High precision earnings mitigate the uncertainty as reflected by the significant negative coefficient of the interaction between *NT_RUE* and *PREC*. The contrast between the results in the absence of insider trading and the results discussed earlier serves to attest to the distinctive effect of insider trading on the PEAD.

6.2 Sensitivity tests

We conduct a series of sensitivity checks to confirm whether our findings are robust to alternative definitions of the key variables. These results are available in an On-line Appendix 3, but we summarise the main findings here. It might be argued that the apparent PEAD anomaly, identified in Table 3 and in the first column of Table 4, may be spurious if it is not economically important, even though it is statistically significant, since it might not be possible to design a trading strategy that implements the apparent anomaly.[16] We have therefore re-estimated the initial multivariate PEAD regressions (first column Table 4) on the significance of the spread between top and bottom quintile portfolios (formed from earnings surprises) using implementable returns following Soares and Stark (2009). We use a "June-strategy" and rank firms each year according to their unexpected earnings at the end of June. Subsequently, we measure returns from the beginning of July and for six months using daily returns as in our original tests. The spread on the RUE coefficient remains positive and significant, so the original PEAD is robust to implementable returns; and there is an anomaly to be explained.

In a second robustness test we assess the PEAD over alternative time horizons (2, 3, 4, and 5-months), and we find that the unconditional spread is always significantly positive, with values of 1.3% for the 2-month, 0.9% at the 3-month and 4-month horizons, 2.0% at the 5-month horizon, and increases to 3.4% (as reported in Table 3) at the 6-month horizon. In the presence of contrarian trades, at all horizons this spread is not significantly different from zero. In contrast, conditioned on confirmatory trades, the spread is significantly positive, and the median spread increases with the time horizon. The multivariate regression results for 2-month, 3-month 4-month and 5-month post-earnings announcement time horizons confirm that conditioning on contrarian trades, the PEAD spread evaporates, but is exacerbated in the presence of confirmatory trades. To further confirm that the effect of insider trading on the PEAD is distinct from the initial short term reaction to its disclosure (Veenman, 2012), we delay the starting date of return accumulation. Rather than starting on day (+11), we start the accumulation on day (+21) and we observe the PEAD over the subsequent 5-months period. The unconditional spread is now even wider (+2.4%) and our inference with respect to the effect of insider trading remains unchanged.

Third, we check the sensitivity of our results to the period over which we observe the insiders' signal. Instead of calculating the directors' trading signals over the 10-day period after the earnings announcement, in a third set of tests we calculate the four alternative signals over the period (0, +5) and (0, +17), starting the return accumulation over six months from day +6 and +18 respectively. We find that the unconditional PEAD spread, and the PEAD spread conditioned on confirmatory and contrarian trades are of the same order of magnitude as the reported results in Tables 3 and 4,

[16] As we discuss in the research design we determine the cut-off points of the quintile ranks of the earnings surprise and earnings precision by the distribution of the earnings surprise and discretionary accruals in the previous year in order to ensure that the portfolio strategies are implementable similar to Louis and Sun (2011).

although with the short (0, +5) directors' trading period, we lose some significance because the numbers of observations with directors' trading is smaller.

Fourth, we exclude 370 observations from 75 companies that report quarterly interim reports after the annual earnings announcements. Fifth, we exclude 439 firms that were listed on AIM, rather than the Main Market on the basis that trading in these firms is likely to be relatively illiquid. Finally, we partition our earning precision measures in terms of quintiles instead of terciles. In all cases the results are consistent with the main findings with respect to the effect of contrarian and confirmatory directors trading on the PEAD.

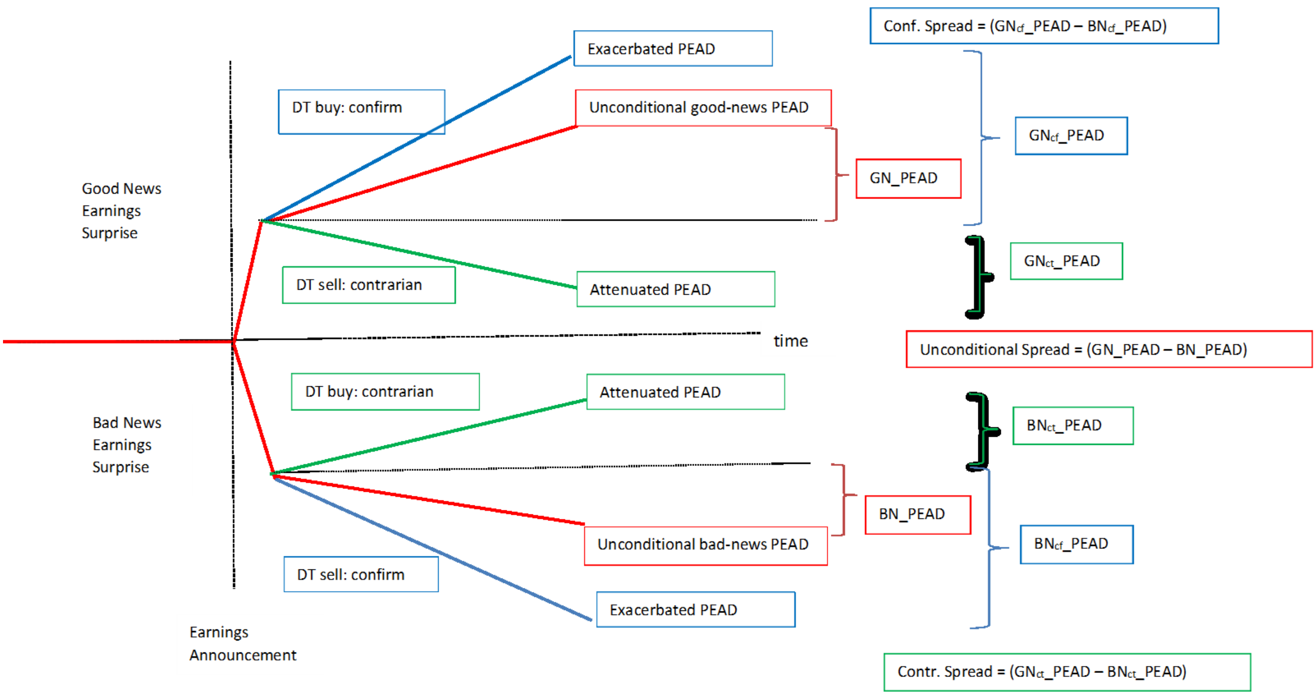
7 Conclusions

In this paper we have argued that the PEAD is a consequence of investors learning and updating their beliefs as to whether a structural change has occurred in the earnings process. When companies announce unexpectedly high or low earnings, investors must establish the implications of the earnings surprise for future earnings: does the earnings announcement represent a transitory change in profitability or a permanent change in earnings to a new average level? Directors trading immediately after the earnings announcement provide additional information on the transitory or permanent nature of the earnings surprise. Given directors' access to inside information we would expect them to be in an advantageous position to assess the valuation implications of an earnings surprise. If directors sell after good news, or buy after bad news – in other words trade in a contrarian direction to the earnings surprise - this suggests that the director believes that the earnings surprise reflects only a transitory change in the earnings process and therefore, it will not support a further change in the share price along the direction of the earnings surprise. We also examined directors buying after good news and selling after bad news, and such confirmatory trades suggest directors consider the earnings surprise to represent a permanent change in earnings. Nevertheless, we note that in the case of confirmatory trades, investors may have difficulty in assessing the new permanent levels of equilibrium share prices resulting in a stronger drift.

We find that conditioning stock price movements after an earnings announcement on contrarian and confirmatory directors' trades sheds light on the well-documented anomaly, the market under-reaction to earnings announcements, or PEAD. Recognising that the under-reaction represents a delayed response to the earnings surprise, we demonstrate that contrarian directors' trades mitigate the PEAD, and confirmatory trades allow for a continuation of the PEAD as prices to continue to move in the direction of the earnings surprise. Further analysis demonstrates that contrarian trades guide the market to establish that the earnings surprise does not consist a permanent shift in the earnings process even in hard-to-value firms with low earnings precision. On the contrary, confirmatory trades initiate a learning process to establish the shift in the earning process even under circumstances where this is not likely to occur, i.e., under high earnings precision. Taken together these results speak to the particular effect of insider trading on the long-term price discovery.

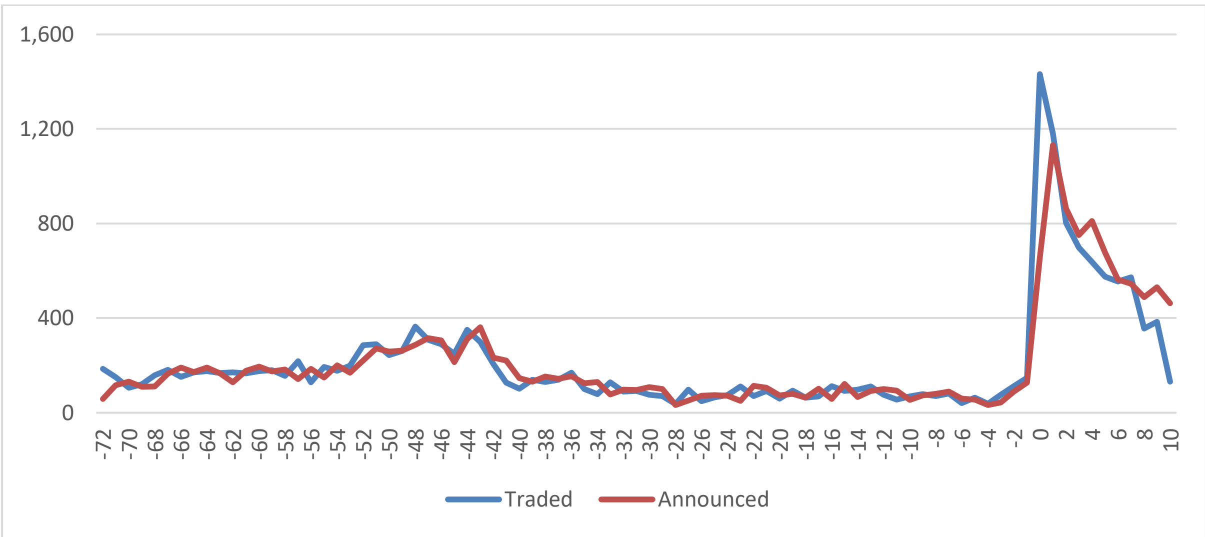
A caveat to these findings is that insider trading can only in part explain the PEAD. Although our study contributes to the understanding of the PEAD anomaly from a learning mechanism perspective, further research could identify other sources of information that investors use to update their beliefs on structural changes to the earnings process.

Figure 1: Predicted effects on stock prices of directors' trading after an earnings announcement



Notes: The figure shows predicted stock market responses after the earnings announcement and post-earnings announcement directors' trades, and the effect of conditioning on confirmatory and contrary directors' trades (DT).

Figure 2: Number of directors' trades per day around earnings announcements



Notes: The figure shows the total number of daily directors' trades up to 72 days before an earnings announcement and 10 days after. The trading ban is in place from day -42 to day 0. The blue line denotes days when the directors' trades occur, and the brown line denotes days when the directors' trades are reported to the market.

Table 1: Sample Selection process

19,804		**Initial sample of firm-year observations** The initial sample consists of all publicly listed companies in the UK between 1995 and 2013 with available accounting data. In identifying the firms that have been listed in the UK, we use Datastream's research lists of active (GRP1-6) and dead companies (DEADUK1-7). From these lists we eliminate duplicates, instruments which are not classified as equity, non-primary issues and financial firms (based on ICB industry classification).
(11,824)		Total firm-year observations excluded, of which:
	(9,366)	Missing earnings announcements. We require the earnings announcements to be available in Datastream or I\B\E\S. We use the earliest earnings announcement reported in Datastream or I\B\E\S after eliminating earnings announcements announced 200 days after the fiscal year end.
	(73)	Missing data needed to estimate unexpected earnings
	(2,044)	Missing returns data needed to estimate returns
	(7)	Missing accounting data needed to estimate earnings precision
	(334)	Outliers removed
7,980		**Final sample: [*firms =1,373*]**

Table 2: Descriptive Statistics Directors' Trading

	Number of trades	Mean	Min (000s)	Q1	Median	Q3	Max (000s)
Panel A: Full Sample period (-72,+10)							
Value shares bought (£)	12,772	44,708	0.001	126	2,750	16,880	69,200
Value shares sold (£)	2,718	743,654	0.031	25,253	117,699	491,643	130,000
Net value traded (£ firm-days)	6,850	-211,712	-130,0000	130	3,955	25,475	54,800
NPR (firm level)	3,501	0.44	-1.00	-0.58	1.00	1.00	1.00
Panel B: Pre-ban period (-72,-42)							
Value shares bought (£)	4,763	63,316	0.001	126	2,998	15,795	69,200
Value shares sold (£)	736	163,644	0.003	3,860	20,000	109,491	6,500
Net value traded (£ firm-days)	2,671	-60,737	-34,000	248	5,250	24,350	54,800
NPR (firm level)	1,839	0.61	-1.00	1.00	1.00	1.00	1.00
Panel C: Ban period (-41,-1)							
Value shares bought (£)	3,297	13,502	0.002	123	127	1,015	14,000
Value shares sold (£)	172	382,980	0.031	14,775	63,157	478,258	6,150,000
Net value traded (£ firm-days)	1,228	-17,388	-6,560	244	476	3,323	14,000
NPR (firm level)	711	0.78	-1.00	1.00	1.00	1.00	1.00
Panel D: Post-EA period (0, +10)							
Value shares bought (£)	4,712	47,734	0.003	1,740	10,000	30,700	20,100
Value shares sold (£)	1,810	824,074	0.10	31,338	137,587	502,400	130,000
Net value traded (£ firm-days)	2,963	-427,489	-130,000	-10,889	9,026	40,026	22,200
NPR (firm level): All	2,228	0.39	-1.00	-0.99	1.00	1.00	1.00
NPR: UE1 Quintile	415	0.60	-1.00	1.00	1.00	1.00	1.00
NPR: UE5 Quintile	422	0.42	-1.00	-0.96	1.00	1.00	1.00
Weighted NPR: UE1 Quintile	415	0.60	1.00	1.00	1.00	1.00	1.00
Weighted NPR: UE5 Quintile	422	0.42	1.00	1.00	1.00	1.00	1.00
Net trades: UE1 Quintile	240	2.66	-8.00	2.00	3.00	4.00	17.00
Net trades: UE5 Quintile	245	1.93	-14.00	2.00	2.00	4.00	14.00
Consistent trades: UE1 Quintile	204	2.85	-6.00	2.00	3.00	4.00	15.00
Consistent trades: UE5 Quintile	204	2.14	-6.00	2.00	2.00	4.00	10.00

Notes: The table provides descriptive statistics on the sample of directors' trades (by executive and non-executive board members) in their own company shares across 1,373 firms over the period 1995-2013 in the 92-day period (-72,+10) around the annual earnings announcement. Panel A documents directors' trading statistics for the full sample period; Panel B for the period (-72, -42) before the trading ban; Panel C for the period (-41, -1) during the trading ban; Panel D for the period (0, +10) after the earnings announcement which is made at the start of day 0. The first and second rows of each panel shows the distribution of the value of shares purchased and sold; the third row shows the distribution of the net daily shares traded across directors in the same firm (positive for buys, and negative for sales) by value of shares traded; and the fourth row shows the distribution of the NPR calculated at the firm level for the relevant sample period by value of transactions. NPR is defined as the net value of shares traded scaled by the value of shares traded, and hence lies between (-1, +1). The fifth and sixth rows of Panel D show the distribution of NPR for the bottom and top quintile portfolios formed by earnings surprise. The seventh and eighth rows of Panel D show the distribution of Weighted NPR for the UE5 and UE1 quintile portfolios, where weighted NPR accommodates the effect of directors' shareholding wealth. The ninth and tenth rows of Panel D show the distribution of Net trades for bottom and top quintile portfolios, where Net trades is defined as the (unscaled) difference between the number of buy and sell signals. The last two rows

Table 3: Spread returns

Panel A: Spread returns for the pooled sample			
	UE 1	UE 5	UE 5 - UE 1
N	1591	1679	
Mean	-0.011*	0.023***	0.034***
Median	-0.001	0.019***	0.021***
Panel B: Spread returns in the presence of contrarian insider trading			
	UE 1	UE 5	UE 5 - UE 1
N	329	122	
Mean	0.011	-0.004	-0.014
Median	0.033	-0.028	-0.061
Panel C: Spread returns in the presence of confirmatory insider trading			
	UE 1	UE 5	UE 5 - UE 1
N	82	299	
Mean	-0.030	0.043***	0.073**
Median	-0.023	0.048***	0.071***
Panel D: Spread returns in the absence of insider trading			
	UE 1	UE 5	UE 5 - UE 1
N	1180	1258	
Mean	-0.016**	0.020***	0.036***
Median	-0.004	0.010**	0.013**

*, ** and *** denote significance at the 10%, 5% and 1% respectively.

Notes: Table reports univariate six-month buy-and-hold portfolio returns after earnings announcement for quintiles of high earnings surprises (UE 5) and low earnings surprises (UE 1), and spread portfolio between these two portfolios (UE 5 – UE 1). Panel A reports buy-and-hold returns (BHARs) for the full sample. Panel B reports BHARs for sample of contrarian insider trades, and Panel C reports BHARs for sample of confirmatory insider trades. Panel D reports BHARs for a sample of firm announcements after which there are no directors' trades. In all cases the directors' trading signal is based on the net purchases ratio, NPR.

Table 4: PEAD and the presence of informed contrarian and confirmatory insider trading with alternative insider trading signals.

VARIABLES	Base model	NPR	Weighted NPR	Net trades	Consistent trades
Constant	-0.129***	-0.131***	-0.131***	-0.130***	-0.131***
	(-8.04)	(-8.14)	(-8.14)	(-7.99)	(-8.00)
RUE	0.020**				
	(2.03)				
Ctrar_RUE		-0.039	-0.038	-0.028	-0.014
		(-1.48)	(-1.43)	(-0.70)	(-0.30)
Cfirm_RUE		0.087***	0.086***	0.109**	0.108**
		(2.82)	(2.78)	(2.57)	(2.11)
NT_RUE		0.019*	0.019*	0.019*	0.019*
		(1.68)	(1.70)	(1.68)	(1.68)
Ctrar		-0.009	-0.007	0.015	0.026
		(-0.62)	(-0.51)	(0.72)	(1.11)
Cfirm		-0.005	-0.006	-0.021	-0.021
		(-0.32)	(-0.35)	(-0.99)	(-0.81)
Q5MM	0.088***	0.089***	0.089***	0.087***	0.086***
	(8.70)	(8.84)	(8.83)	(8.53)	(8.35)
Q5BM	0.024**	0.023**	0.023**	0.023**	0.025**
	(2.11)	(2.03)	(2.04)	(1.98)	(2.09)
Q5MV	0.053***	0.053***	0.053***	0.053***	0.054***
	(4.23)	(4.23)	(4.23)	(4.14)	(4.15)
Q5LEV	0.033***	0.032***	0.032***	0.035***	0.035***
	(3.09)	(2.99)	(2.99)	(3.14)	(3.15)
Q5RD	-0.009	-0.010	-0.010	-0.009	-0.010
	(-1.19)	(-1.29)	(-1.29)	(-1.19)	(-1.24)
Q5SP	-0.065***	-0.064***	-0.064***	-0.064***	-0.064***
	(-5.34)	(-5.25)	(-5.25)	(-5.17)	(-5.12)
Q5CFO	0.084***	0.084***	0.084***	0.085***	0.085***
	(8.38)	(8.41)	(8.41)	(8.49)	(8.51)
Q5CC	-0.007	-0.007	-0.007	-0.007	-0.008
	(-0.64)	(-0.63)	(-0.63)	(-0.64)	(-0.67)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
N	7,980	7,980	7,980	7,628	7,550
Adj R-squared	0.0726	0.0734	0.0733	0.0724	0.0710
F test	21.08	19.49	19.47	18.94	18.53
Wald tests testing the equality of coefficients					
		Diff	Diff	Diff	Diff
Cfirm_RUE -Ctrar_RUE		0.127***	0.124***	0.138**	0.121*
		(3.16)	(3.09)	(2.43)	(1.84)
Cfirm_RUE- NT_RUE		0.068**	0.067**	0.090**	0.088*
		(2.07)	(2.02)	(2.05)	(1.70)
NT_RUE-Ctrar_RUE		0.058**	0.057**	0.047	0.033
		(2.01)	(1.97)	(1.12)	(0.69)

Notes: The first column of the table reports the results from estimating equation (1) and the remaining four columns report the results from estimating (2) under alternative definitions of the directors' trading signal: the second column presents the results when directors trading signal is based on the net purchase ratio (NPR); the third column when directors trading signal based on the weighted net purchase ratio, where weights depend on directors' shareholding wealth (weighted NPR); the fourth column when directors trading signal defined by majority of the directors are trading in the same direction (Net trades); and last column when directors trading signal depends on multiple directors all trading in the same direction (Consistent trades). UE is quintile rank of earnings surprise where unexpected earnings is calculated as the difference between the I/B/E/S actual reported earnings and the single most recent forecast deflated by the stock price; RUE stands for rescaled unexpected earnings quintiles, and equals -0.5 if the firms belongs to the lowest quintile of UE, 0.5 if a firm belongs to top quintile of UE and zero otherwise; *Ctrar*_RUE equals to RUE in the presence of informed insider trading, and zero otherwise; *Cfirm*_RUE equals to RUE in the presence of non-informed insider trading, and zero otherwise; NT_RUE equals to RUE when directors abstain from trading. Risk controls included: Q5MM, quintile rank of momentum measured as the buy-and-hold market adjusted returns over the 6 months up to the earnings announcement; QBM, quintile rank of the book to market ratio; QMV, quintile rank of the market value of the company measured at the fiscal year end for each company; Q5LEV, quintile rank of leverage; Q5RD, quintile rank of the ratio of research and development to market value; Q5SP, quintile rank of the natural logarithm of the share price measured at start of the return accumulation period; Q5CFO, quintile rank of operating cash flows divided by total assets, and Q5CC, quintile rank of capital expenditures divided by market value. Dependent variable is buy-and-hold abnormal return in excess of market return. Terms in brackets are t-statistics, computed from standard errors clustered at the firm level, and where *, ** and *** denote significance at the 10%, 5% and 1% respectively.

Table 5: PEAD and the presence of informed contrarian and confirmatory insider trading: The impact of earnings signal precision.

VARIABLES	Base model	NPR	Weighted NPR	Net trades	Consistent trades
Constant	-0.130***	-0.131***	-0.131***	-0.130***	-0.131***
	(-8.00)	(-8.09)	(-8.09)	(-7.93)	(-7.96)
RUE	0.031***				
	(2.59)				
RUE*PREC	-0.035*				
	(-1.82)				
Ctrar_RUE		-0.030	-0.030	-0.030	-0.004
		(-0.92)	(-0.93)	(-0.62)	(-0.07)
Ctrar_RUE*PREC		-0.030	-0.024	0.005	-0.027
		(-0.59)	(-0.48)	(0.07)	(-0.39)
Cfirm_RUE		0.065*	0.066*	0.094*	0.071
		(1.70)	(1.72)	(1.77)	(1.11)
Cfirm_RUE*PREC		0.064	0.059	0.039	0.087
		(1.25)	(1.15)	(0.60)	(1.24)
NT_RUE		0.036***	0.036***	0.036***	0.036***
		(2.58)	(2.60)	(2.59)	(2.60)
NT_RUE*PREC		-0.054**	-0.054**	-0.055**	-0.055**
		(-2.28)	(-2.30)	(-2.31)	(-2.31)
PREC	-0.000	-0.002	-0.002	-0.001	-0.001
	(-0.08)	(-0.29)	(-0.27)	(-0.22)	(-0.10)
Ctrar		-0.009	-0.007	0.015	0.026
		(-0.64)	(-0.53)	(0.73)	(1.11)
Cfirm		-0.005	-0.006	-0.020	-0.019
		(-0.32)	(-0.36)	(-0.96)	(-0.72)
Risk controls	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
N	7,980	7,980	7,980	7,628	7,550
Adj R-squared	0.0728	0.0738	0.0737	0.0727	0.0714
F test	19.76	17.53	17.49	16.93	16.60
Wald tests testing the equality of coefficients					
		Diff	Diff	Diff	Diff
Low earnings precision					
Cfirm_RUE -Ctrar_RUE		0.095*	0.096*	0.123*	0.075
		(1.85)	(1.87)	(1.73)	(0.88)
Cfirm_RUE- NT_RUE		0.030	0.030	0.057	0.035
		(0.73)	(0.74)	(1.07)	(0.54)
NT_RUE- Ctrar_RUE		0.066*	0.066*	0.066	0.040
		(1.83)	(1.85)	(1.30)	(0.70)
High earnings precision					
Cfirm_RUE -Ctrar_RUE		0.189***	0.180***	0.158**	0.189**
		(3.32)	(3.13)	(2.12)	(2.36)
Cfirm_RUE- NT_RUE		0.148***	0.143***	0.151***	0.176***
		(3.23)	(3.10)	(2.65)	(2.86)
NT_RUE- Ctrar_RUE		0.041	0.036	0.006	0.013
		(0.91)	(0.80)	(0.11)	(0.20)

Notes The first column of the table reports the results from estimating equation (3) before taking into account directors' trades; the remaining four columns report the results from estimating (3) including directors' trading variables. PREC takes value of 1 if a firm belongs to the bottom tercile of the magnitude of discretionary accruals, and 0 otherwise. The remaining variables and risk controls are explained in the footnote to Table 4. Terms in brackets are t-statistics, computed from standard errors clustered at the firm level, and where *, ** and *** denote significance at the 10%, 5% and 1% respectively.

Appendix 1: Illustration of learning and a delayed response to earnings information

We consider a simple example to illustrate how investors updating their beliefs about a shock to the earnings process, can explain the documented PEAD. The purpose of this example is to show that with a structural change and parameter uncertainty there will be a delayed response to an earnings announcement, as Bayesian investors update on other relevant pieces of information associated with the structural change. There will be a pattern in stock prices following the structural change.

Suppose earnings (e_t) are generated by a uniform distribution $U(.)$, with support $(0, W_0)$. The present value model, with an earnings announcement imminent, would price this earnings stream as $p_{t-1} = 0.5W_0(1 + \delta)$, where δ is the appropriate discount factor. Realised earnings are then announced, and prices jump to $p_t=e_t+0.5\delta W_0$. At some point after the announcement the price will go ex-dividend, and the stock price will revert to its long-run expected value $(=0.5\delta W_0)$.

Suppose the announced realised earnings are above the upper support of the original uniform distribution: $e_t > W_0$. This event represents a structural change: the earnings process is still generated by a uniform distribution $U(0, W)$, but the distribution of the earnings process has changed, with parameter uncertainty about the new upper limit W. We assume that investors update their beliefs about the unknown parameter W according to Bayesian rules. Following De Groot (1970) Section 9.7 Theorem 1, a conjugate prior for the likelihood function being a uniform distribution is the Pareto distribution with parameters (w_0, α), meaning that the posterior distribution for W after observing a single piece of sample information x_1 from the uniform distribution, is also Pareto with parameters (w_0', α') where $w_0' = max\ (w_0, x_1)$ and $\alpha' = \alpha+1$. In the Pareto distribution w_0 is the minimum possible value of W and α is a positive parameter that reflects the shape of the distribution, and reflects the range of possible values of W above the scale parameter w_0. Over time, as more sample information is accumulated, the scale parameter is updated in the posterior distribution to mimic any higher realised values, and over time the shape parameter in the posterior distribution gets larger and the range of upside values above the scale parameter is reduced.

Figure 1 illustrates the initial uniform distribution $U(0, W_0)$, and the post-structural change uniform distribution $U(0, W)$, with the prior beliefs represented by a Pareto distribution of the unknown parameter W. The mean and variance of the Pareto distribution is given by

$$E(W) = \frac{\alpha w_0}{\alpha - 1}\ and\ Var(W) = \frac{\alpha w_0^2}{(\alpha - 1)^2(\alpha - 2)}$$

Which represent the prior beliefs about W. Given the sample information x_1, posterior mean and variance is:

$$E(W|x_1) = \frac{(\alpha + 1){w_0}'}{\alpha}\ and\ Var(W|x_1) = \frac{(\alpha + 1)w_0'^2}{\alpha^2(\alpha - 1)}$$

A reasonable candidate for the prior value of w_0 is the realised earnings announcement e_t, and so α represents the strength in the beliefs that e_t is the upper support of the new distribution, or whether the upper support is even higher.

<u>Prices at date *t* (the earnings announcement):</u> Following the unexpected earnings $e_t > W_0$, prices will jump to $p_t = w_0\left(1 + 0.5\delta\frac{\alpha}{\alpha-1}\right)$ which is based on the prior for the Pareto distribution, and is unambiguously higher than in the case of no structural change. Subsequent movements in prices after the earnings announcement depends on any additional sample information provided by whether there is trading by informed insiders or not. The piece of sample information that investors observe is whether a director trades on the day after the earnings announcement, or does not trade. Directors know the true value of *W*, and hence know the true fundamental price $p_t^f = (w_0 + 0.5\delta W)$, which differs from the market price depending on whether $W \geq \frac{\alpha w_0}{\alpha-1}$ investors believe that directors will buy shares if the stock price is $p_t < p_t^f$, and not trade if $p_t = p_t^f$.

So if directors buy shares, investors infer that $W>w_0$ (since $\frac{\alpha}{\alpha-1} > 1$), which constitutes the piece of sample information, and $w_0' = max\ (w_0, I{:}\ x_1 > w_0)$ and $\alpha' = \alpha+1$. A simple price adjustment rule is that if investors observe $x_1>w_0$ they set $w_0'=w_0+1$.[17]

<u>Prices at date *t+1*:</u> In which case prices become: $p_{t+1}|\ (I{:}\,x_1 > w_0) = w_0 + 0.5\delta\frac{(\alpha+1)(w_0+1)}{\alpha} > p_t$ if $\alpha>\surd(w_0+1)$. So that following the directors' trade, prices may rise or fall depending on parameter values. For example, prices would rise if $\alpha=w_0=2$, or $\alpha=4$, $w_0=8$. In these cases, prices will rise after the market observes directors' confirmatory trading, and there will be PEAD.

On the other hand if directors do not trade on the day after the earnings announcement, investors infer that $W<w_0$, and $w_0' = max\ (w_0, I{:}\ x_1<w_0)$, $\alpha' = \alpha+1$, and prices unambiguously decline: $p_{t+1}|\ (I{:}\,x_1 < w_0) = w_0\left(1 + 0.5\delta\frac{(\alpha+1)}{\alpha}\right)$.

For some parameter values prices will fall in both cases, irrespective of the sample information because the learning effect induces an increase in the posterior precision of the unknown parameter W, (Veronesi, 1999). The price fall is always greater in the case of directors not trading. That is, the price following a directors' trade is always higher than the price with no directors' trade: $p_{t+1}|(\,I{:}\,x_1 > w_0) > p_{t+1}|(I{:}\,x_1 < w_0)$.

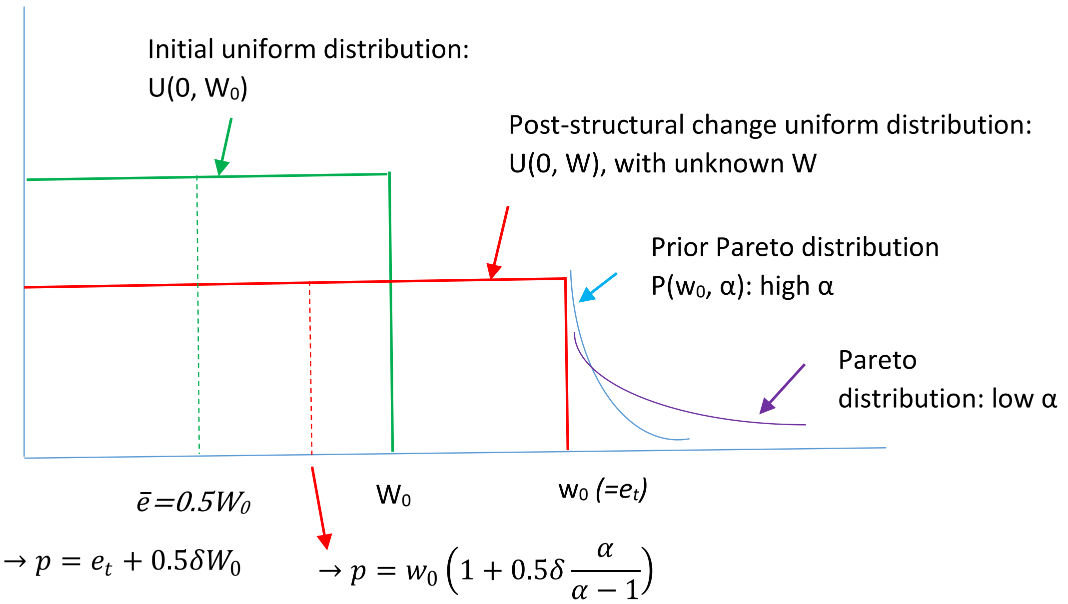
<u>Prices at date *t+2*:</u> Now we progress into the second day after the earnings announcement, and investors will again observe whether directors trade or not. Investors have new priors given by the posterior Pareto distribution from the previous time period with parameters (w_0', α'). Investors will again update their beliefs from the trading behaviour of directors in period t+2 (x_2). If there are no trades from directors, prices fall again to: $p_{t+2}|\ (I{:}\,x_2 < w_0) = w_0\left(1 + 0.5\delta\frac{(\alpha+2)}{(\alpha+1)}\right)$; but if directors trade, investors again infer that the fundamental price is above the current market price, and will update their beliefs accordingly, and prices become: $p_{t+2}|(I{:}\,x_2 > w_0) = w_0' + 0.5\delta\frac{(\alpha+2)(w_0+2)}{(\alpha+1)}$, with a sufficient condition for being greater than p_{t+1} is the same conditions as previously, so that

[17] There may be faster updating rules for prices depending upon the model that investors believe directors are following to trade strategically.

we observe a PEAD. This process will continue until market prices converge to fundamental prices, which is when directors cease trading.

This example illustrates how learning about a structural change in the context of a shock to earnings and subsequent directors' trading leads to a pattern of stock prices that with the benefit of hindsight may look predictable, but as Lewellen and Shanken (2002) observe, no Bayesian investor would be able to take advantage of this apparent predictable pattern in prices.

Figure A1: Initial and post-structural change uniform distributions for earnings process, along with prior Pareto distribution



The diagram illustrates the shift in the uniform distribution, and the Pareto prior for the unknown W. Note that the subsequent posterior distributions (which depend on the sample realisations) are not represented in this figure.

Appendix 2: Variable definitions

VARIABLE	DEFINITION	SOURCE
BHAR[a]	Buy-and-hold market adjusted abnormal return measured from +11 to +136 days relative to the earnings announcement calculated from trade to trade daily returns. For a stock not traded on a given day, the corresponding market return is added to the next non-missing price day's index return.	Datastream: Price (P), Dividend (DDE), Market return (FTALLSH)
UE	Quintile rank of unexpected earnings. Unexpected earnings are defined as the difference between actual EPS and forecasted EPS scaled by lag price. Quintilecut-off points of the earnings surprise are based on the distribution of the preceding year's surprises.	IBES: forecasted EPS IBES: actual EPS Datastream: Prices (P)
RUE	Rescaled quintile rank of unexpected earnings, which takes the value "-0.5" when an observation belongs to the bottom quintile rank of earnings surprise and "0.5" when an observation belongs to the top quintile rank of earnings surprise. RUE is equal to zero for the intermediate quintiles.	IBES: forecasted EPS IBES: actual EPS Datastream: Prices (P)
Q5MM	Quintile rank of momentum measured as the buy and hold market adjusted returns over the 6 months up to the earnings announcement.	Datastream: Price (P), Dividend (DDE), Market return (FTALLSH)
Q5BM	Quintile rank of firm book-to-market.	Worldscope: Common equity: (WC03501), Market Capitalisation (WC08001)
Q5MV	Quintile rank of firm size measured as the market value of the company measured at the fiscal year end.	Worldscope: Market Capitalisation (WC08001)
Q5LEV	Quintile rank of leverage measured as total debt divided by the market value of the company measured at the fiscal year end.	Worldscope: Total Debt: (WC03255), Market Capitalisation (WC08001)
Q5RD	Quintile rank of the ratio of research and development expenses to the market value of the company measured at the fiscal year end.	Worldscope: R&D expense: (WC01201), Market Capitalisation: (WC08001)
Q5SP	Quintile rank of the natural logarithm of the share price measured at the start of the return accumulation period	Datastream: Price (P),
Q5CFO	Quintile rank of operating cash flows divided by total assets.	Worldscoppe: Total Funds From Operations (WC04201), Other Funds From Operations (WC04831), Total assets (WC02999)
Q5CC	Quintile rank of capital expenditures divided by the market value	Worldscope: Capital Expenditure (WC04601), Market Capitalisation (WC08001)
Ctrar	Dummy variable which equals 1 if the directors' trading signal indicates trading in the opposite direction to the earnings surprise and zero otherwise	Hemscott: Directors trades:
Cfirm	Dummy variable which equals 1 if the directors' trading signal indicates trading in the same direction of the earnings surprise and zero otherwise.	Hemscott: Directors trades:
Ctrar_RUE	Equals to RUE when directors' trading signal indicates trading in the opposite direction of the earnings surprise (when Ctrar equals to 1) and zero otherwise.	IBES: forecasted EPS IBES: actual EPS Datastream: Prices (P)
Cfirm_RUE	Equals to RUE when directors' trading signal indicates trading in	IBES: forecasted EPS

	the same direction of the earnings surprise (when Cfirm equals to 1) and zero otherwise.	IBES: actual EPS Datastream: Prices (P)
NT_RUE	Equals to RUE when the directors' trading signal indicates no directors' trading, and zero otherwise.	IBES: forecasted EPS IBES: actual EPS Datastream: Prices (P)
PREC	Earnings precision variable equals to 1 if a firm's earnings are precise and zero otherwise. We define earnings precision based on the magnitude of total discretionary accruals. Firms belonging in the bottom tercile rank of the magnitude of total discretionary accruals have low levels of discretionary accruals and are deemed to report more precise earnings. The cut-off points of the tercile ranks are determined by the distribution of the magnitude of discretionary accruals at the year before. Discretionary accruals are estimated based on the modified Jones (1991) model adjusted for performance.	Worldscope: Income Before Extra Items: WC04001 Total Funds From Operations (WC04201), Other Funds From Operations (WC04831), Sales (WC01001), Total assets (WC02999), Receivables (WC02051), Gross Property, Plant and Equipment (WC02301)

[a] variable trimmed at 2% at the top and bottom of its distribution

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Article

Corporate Disclosure, Materiality, and Integrated Report: An Event Study Analysis

Maria Cleofe Giorgino [1,*], Enrico Supino [2] and Federico Barnabè [3]

[1] Department of Business and Law, University of Milano-Bicocca, 20126 Milano, Italy
[2] Department of Management, University of Bologna, 40126 Bologna, Italy; enrico.supino@unibo.it
[3] Department of Business Studies and Law, University of Siena, 53100 Siena, Italy; federico.barnabe@unisi.it
* Correspondence: maria.giorgino@unimib.it; Tel.: +39-02-6448-3161

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Abstract: Within the extensive literature investigating the impacts of corporate disclosure in supporting the sustainable growth of an organization, few studies have included in the analysis the materiality issue referred to the information being disclosed. This article aims to address this gap, exploring the effect produced on capital markets by the publication of a recent corporate reporting tool, Integrated Report (IR). The features of this tool are that it aims to represent the multidimensional impact of the organization's activity and assumes materiality as a guiding principle of the report drafting. Adopting the event study methodology associated with a statistical significance test for categorical data, our results verify that an organization's release of IR is able to produce a statistically significant impact on the related share prices. Moreover, the term "integrated" assigned to the reports plays a significant role in the impact on capital markets. Our findings have beneficial implications for both researchers and practitioners, adding new evidence for the IR usefulness as a corporate disclosure tool and the effect of an organization's decision to disclose material information.

Keywords: corporate disclosure; materiality; integrated report; event study; share price

1. Introduction

Over time, the importance of communicating the most relevant information about a business and the organization's activities to the market has led to the development of specific codes of corporate disclosure (within Company Laws, Accounting rules, or Securities Laws) aimed at regulating the level and content of the mandatory communication by each organization. The main aim of these regulations is to reduce the information asymmetry between managers and stakeholders to contain the related risk to trade (as investor, client, supplier, and so on) within the organization [1].

However, more and more organizations are deciding to go beyond these regulations, freely opting to disclose further (mostly non-financial) information on their business in the form of "voluntary disclosure" [2]. Such a decision is specifically included in the increasing attention to corporate social responsibility (CSR) spurred by the widespread conviction that CSR may "pay off" for organizations as well as for their stakeholders and society and supporting the organizations' achievement of strategic benefits oriented towards value creation [3].

Indeed, following the stakeholder approach to strategic management initially promoted by Freeman [4], corporate disclosure is certainly a CSR action as it may substantially support the legitimacy management necessary to build "sustainable growth for business in a responsible manner" [5] (p. 17), [6,7].

The two aforementioned typologies of corporate disclosure (mandatory and voluntary) are mutually complementary and influence each other. The reason for this is that the former may restrain or boost the latter depending on the quantity of compulsory information that organizations are already being asked, whereas quality or credibility of the latter may affect the former, thus encouraging greater or lesser market regulation [8–10]. Subsequently, the issue of corporate disclosure requires a consideration of not only (or not so much) the amount of (mandatory and voluntary) data disclosed, but also the materiality of the corporate communication, which is to be assessed while checking if the information provided is actually useful for the different stakeholders and their behaviors towards the organization.

To date, the considerable literature on the topic has mainly focused on the role of corporate disclosure for capital markets, assuming that managers have to take relevant disclosure decisions even in an efficient capital market due to their superior knowledge of the organization in comparison to outside investors, e.g., [11–17]. Indeed, previous studies have mainly investigated the following: on the one hand, the reasons underlying the organization's propensity for the (voluntary) communication of more information about its activities, and on the other, the impact of corporate disclosure on the organization's performance in the short, medium, and long term.

The literature on the topic is very extensive and is mostly focused on the impact of corporate disclosure on specific variables of the capital markets such as stock performance, cost of capital, or analyst coverage [18], mainly adopting the disclosure index or the event study approach [19]. Unfortunately, some of these studies include measurement errors that affect the interpretation of results, hence requiring further investigation on the topic [20]. Moreover, few studies have included in their analysis the concept of materiality and the necessity of relating the impact on the capital markets to the disclosure of material information [21,22].

To address this research gap in the literature, the aim of this article is to specifically analyze the impact produced on the capital markets by the publication of a recent tool of corporate disclosure, characterized by the essential purpose of providing a holistic representation of the organization's performance, and explicitly adopting materiality as its guiding principle. We refer to the "Integrated Report" and the framework released by the International Integrated Reporting Council (IIRC) [23]. Specifically, the article aims to:

- first, verify, through the event study methodology, if the publication of the Integrated Report, containing material information on the organization, is able to support the overall scope of corporate disclosure, thus definitely producing a statistically significant effect on the share price of that organization;
- second, investigate, by means of the adoption of a statistical significance test for categorical data, the association of the share price impact with the naming of the report; specifically, the aim is to verify if (and eventually to what extent) the name "integrated" (instead of "sustainability" or "annual") for a report and its specific association with the principle of materiality play a significant role in the impact registered on the share price of the organization.

The article is structured as follows. The next two sections introduce a brief literature review on corporate disclosure and its combination with the materiality principle as premises for the development of the research hypotheses of the study. The next section presents the method adopted for the analysis and the results achieved. The last section discusses the results referring to the research hypotheses, including some conclusive considerations.

2. Corporate Disclosure and Capital Markets: A Brief Literature Review

In recent years, organizations have increasingly improved their disclosure processes for two reasons. The first is due to the critical role played by corporate disclosure for the effectiveness of business exchanges and activities in a capital market, while the second focuses on the sustainable growth of an organization [5,7,24]. Corporate disclosure may include financial statements, management discussions, footnotes, as well as press releases, internet sites, and every other type of business report useful to provide data and information about the organization's activities to the market [20]. Over time, scholars have suggested a number of corporate reporting models, which is partly a consequence of changes in the international markets and the related requirement for continuous business innovation, including the disclosure processes implemented by the organizations [25].

To understand the reasons underlying the development of corporate disclosure, previous studies have analyzed a wide range of variables to identify which factors may influence the level of corporate communication to the market—e.g., [26,27]. A necessary premise of this research is the information asymmetry between managers and shareholders that was introduced by the separation of roles (decision-makers on one side, capital providers on the other) and relies on the traditional agency approach to the relationship between ownership and control [28]. Under agency theory, managers need to resort to corporate disclosure in order to affect the organization's access to capital as required by the capital market users, including both sophisticated subjects (such as brokers or investment funds) and non-sophisticated ones (i.e., capital providers without specialized knowledge) [24].

Specifically, previous studies have searched for the factors affecting the level of corporate disclosure, while underlining the relevance of variables such as the organization's size and typology, the information asymmetry risk of the market (influencing the potential assumption of opportunistic behaviors), the professional degree of the intermediary agencies (affecting the credibility of the information disclosed), the board composition (also in terms of the presence of women), or the traditional attitude of the management (whose hostility toward the costs of voluntary disclosure may be mainly reduced by strong economic incentives)—e.g., [29–34].

Moreover, focusing on the managers' decision on this issue, other studies have identified some forces which can intensify the corporate disclosure level for capital market reasons [20]. These forces entail the necessity of reducing the information asymmetry between managers and outside investors in order to improve the conditions for the following:

- capital market transactions, by reducing the cost of capital—e.g., [35–37];
- corporate control, by affecting the managers' turnover—e.g., [38,39];
- stock-based compensation plans, by correcting potential undervaluation—e.g., [40];
- development of litigation hypotheses, in turn impacting on the disclosure behaviors—e.g., [41,42];
- managers' recognition, spreading their talent—e.g., [43];
- competition in product markets, which is the only hypothesis assuming the absence of conflict of interest between management and ownership—see [13,44].

With respect to these motivations, other studies have associated the evidence of some positive effects with the development (especially in terms of voluntary decision) of corporate disclosure, essentially as a consequence of the mitigation of the cited investors' information asymmetry and the possibility of using private information in trading [11]. These effects essentially refer to three typologies of positive impact on capital markets: the stock liquidity, the cost of capital, and the information intermediation [20]. These studies have tested that voluntary disclosure can:

- increase the stock liquidity, thus improving investors' trust about the (affected) "fair price" of stock transactions—e.g., [45,46];
- reduce the cost of capital, limiting the information risk—e.g., [47–51];
- develop information intermediation, reducing the cost of attaining data for financial analysts—e.g., [52,53].

However, other studies have highlighted that corporate disclosure may also have negative impacts on the capital markets, primarily because revealing substantial data to competitors may harm the competitive position of the organization—e.g., [13,54–56]. This eventuality may induce managers to reduce the (voluntary) information disclosed, thus foregoing the advantages derived from corporate disclosure previously noted. This is in consideration of the perceived risk of losing the competitive position possessed against the organization's existing or potential competitors. The "nature" of the information to disclose (i.e., if there is good or bad news about the organization's performance) may certainly influence such a managers' decision, as tested by previous studies focused on their tendency to withhold bad news—e.g., [41,57,58].

In addition, it is worth remembering that corporate disclosure also entails supporting some specific costs, derived by the same disclosure process in terms of technological and human resources involved in the data collection, processing, and auditing, that might lead to the managerial decision to limit the flow of information to the market [24] (p. 1409). Assuming the costs related to the mandatory disclosure are unavoidable, the managerial decision on the degree of voluntary disclosure requires a specific cost-profit analysis (which is rather difficult to implement and is subjective) and is essentially aimed at checking that the marginal cost of additional information does not exceed the marginal profit resulting from the addition of information [59]. With this aim in mind, Holland [19] (p. 30) suggested that "management would publicly disclose up to (or towards) the point where the perceived reduction in the agency costs of equity capital equalled the increased costs of public disclosure to markets and the public domain".

Such an analysis is undeniably rather difficult to implement and is subjective, and requires the adoption of practical rules aimed at detecting and calculating the positive and negative effects of corporate disclosure. Some scholars have specifically explained the organizations' decision to extend the disclosure level beyond the mandatory requirements with considerations related to the concept of materiality [21,22], as better specified in the next section.

3. Disclosing Material Information: The Hypotheses Development

"Materiality is a vital concept, one of the cornerstones of accountancy" [60] (p. 116). From the 1960s and the development of capital markets, this axiom has been reiterated in the accounting and auditing literature, highlighting the relevance of what should be one of the main guides for accountants and auditors, despite the difficulty in understanding its actual meaning. Many scholars have tried to provide a definition of the concept of materiality but its meaning is still quite intuitive [22]. All of the definitions provided essentially point to the relationship between materiality and the decision-making processes in organizations, underlining the necessary "decision usefulness" of material data [61,62].

In these terms, an item is "material" if it is suitable to condition the behavior of an informed investor (or, generally, of a reasonable person), adding to his/her total information more than it detracts by complicating a report with the further detail provided. The materiality level of an item is measured by its potentiality to change the decision-maker's expectations, beyond its absolute dimension [22]. Moreover, according to Black et al. [63] (p. 144), the materiality principle arises as "a practical guide which helps the accountant decide to what extent to follow accounting principles" and it is related to the "relative importance" of data that can influence the decisions of the reader of a specific organization's report and only under particular circumstances. This implies the necessary involvement of the managers' judgment, essentially aimed at identifying what the report users need to know about the organization's activities in order to make reasonable decisions [64]. Many variables may influence this judgment, including both financial and non-financial issues, as well as both quantitative and qualitative factors, such as some characteristics (experience included) of the organization or its industry, the general economic context, the managers' ability and wishes, and so on [65–67].

Assuming the multi-dimensionality of corporate disclosure decisions, involving not only the amount but also the timing and nature of the information that is to be provided, an effective study on corporate disclosure consequently needs to consider the materiality principle as a key reference for the selection and the analysis of the data being disclosed. Unfortunately, few studies in the literature have included the impact of materiality in their analysis of corporate disclosure [21,22], justifying the development of further studies characterized by the inclusion of such a relevant variable.

Materiality is now a key reporting principle, not only for the financial impact of the organization's activities, but also for their social and environmental effects, in the interests of all of the organization's stakeholders [68]. Indeed, the materiality principle already appears in some corporate reporting models provided by scholars and/or professional accounting bodies to answer the aforementioned need of corporate disclosure beyond compulsory requirements. These models include the Global Reporting Initiative (GRI), according to which the materiality principle lies in the commitment of the report to "cover aspects that: Reflect the organization's significant economic, environmental and social impacts; or Substantively influence the assessments and decisions of stakeholders" [69] (p. 17), and the AA1000 standard, which defines as material any "issue that will influence the decisions, actions and performance of an organization or its stakeholders" [70] (p. 12).

Within this context, our study focuses on a more recent (and thus less analyzed) model of corporate disclosure, i.e., Integrated Report (hereafter IR), aimed at providing a holistic representation of the organization's activities and the related financial, social, and environmental performance achieved. Despite the wide variety of information provided and the interests involved, a crucial aim of this report is the organization's access to capital, since, according to its framework, "The primary purpose of an integrated report is to explain to providers of financial capital how an organization creates value over time" [23] (p. 8). The IR proposition builds on the explicit demand for a reporting approach integrating financial and sustainability information suggested by scholars and practitioners on the expectation of improving the decision-making processes for providers of financial capital [71–73]. Nevertheless, there is not enough evidence on whether integrated reports are concretely more useful than traditional annual reports in supporting investors' decisions [74–76].

In these terms, an analysis on the impact of IR on market valuation may certainly provide new evidence on the IR usefulness for investors [77] and, more broadly, on the effect of corporate disclosure on the organizations' access to capital, as required by the measurement errors affecting results of previous studies [20].

Specifically, the first research hypothesis of this study concerns the capacity of IR, as a corporate disclosure tool, to influence the organization's access to capital, producing, at the time of its publication, a significant impact on the share price of the organization. The analysis is coherent with the aforementioned necessity of integrating the disclosure issue with the materiality principle, as materiality represents one of the seven guiding principle suggested by the IIRC to prepare and present effectively an integrated report [23] (p. 17). Indeed, in line with the primary purpose of the IR framework, the report has to include all material information assuming that "a matter is material if it is of such relevance and importance that it could substantively influence the assessments of providers of financial capital with regard to the organization's ability to create value over the short, medium and long term" [78] (p. 2). We thus formulate the first research hypothesis of this study as follows.

Hypothesis 1 (H1). *The IR publication, disclosing material information of an organization, significantly affects the share price of that organization.*

The article also aims to further investigate the impact of IR on the capital markets focusing on its name, in order to check if (and eventually to what extent) it may be statistically associated with the effect produced by the report publication on the organizations' share prices. Such a research question may be connected with the literature debate developed in the last years on the comparison of IR with other corporate disclosure tools (mainly the "annual report" and the "sustainability report") in order to identify which one is the most effective model of corporate reporting. Specifically, this debate argues that sustainability reporting, even if aimed at mitigating the limitations of annual reporting (analyzing the organization's performance beyond its financial aspect), is usually presented as a distinct document and turns out to be incomplete in demonstrating the connection between sustainability and financial information [79–81]. According to its supporters, e.g., [82–84], IR on the other hand provides the specific benefit of highlighting any relationship among different organizational data as a consequence of the "integrated thinking" approach adopted and its overall aim of providing a holistic representation of the organization's performance [85,86].

Although related to distinct models of corporate reporting, the "annual report" and the "sustainability report" surprisingly represent the name of some integrated reports included in the database of the IR Pilot Program. This was probably due to two different reasons. First, some organizations participating in the program were probably interested in exploiting the greater notoriety that the other two models of corporate reporting certainly had in comparison with IR at the time of the report publication. Second, these reports, initially identified as "annual" or "sustainability" (reports) by the same organizations releasing them, could have been subsequently recognized by the IIRC as "integrated" as they were consistent with the content elements and the guiding principles of the IR framework.

Irrespective of the reason, it is the authors' opinion that this peculiarity about the IR name deserves further investigation aimed at testing its potential association with the impact produced in the capital markets by the report publication. Specifically, the second research hypothesis of the article builds on the assumption that the name "integrated" for the reports, drafted according to the IIRC framework, automatically stimulates providers of financial capital to recognize the existence and application of all of the guiding principles underlying those reports, with the principle of materiality being at the core of the entire process. In these terms, the adoption of the name "integrated" (instead of "sustainability" or "annual") for the report may contribute to producing some impact on the capital markets, as stated by our second research hypothesis:

Hypothesis 2 (H2). *The naming of the report as "integrated" and the related association with the principle of materiality play a statistically significant role in the impact produced by this disclosure tool on the organizations' share prices.*

4. Method and Results

4.1. Sample Selection

To identify which organizations to include in the analysis, we focused on the "Integrated Reporting Examples database" [87], which "contains examples of emerging practice in Integrated Reporting". The Examples database is structured in order to classify organizations not only by name, but also with reference to a variety of other features, such as their localization, or the fiscal year of the IR drafting. Moreover, the database allows the selection of reports according to the content elements and guiding principles applied to the report drafting, as identified by the IIRC Framework. Among these criteria of selection and according to the research hypotheses of this study, we adopted "materiality" as a filter to identify the integrated reports to be included in our analysis.

The criteria of selection returned 47 reports (drafted for the fiscal years from 2011 to 2015) that refer to organizations from any localization in the world.

We excluded six of the organizations that were not quoted on the capital markets, another one that was no longer active on the date of the analysis (since it had been acquired by a different company), and two others because it was not possible to identify the exact publication date of their IR.

The final sample therefore consisted of 38 reports.

According to the industry classification provided by the IIRC, the three industries most represented in our sample were: Financial services, Consumer goods, and Basic Materials. From a geographical point of view, almost 50% of the organizations involved in the analysis were from Europe.

Dates of publication were identified directly in the reports, or by searching the organizations' web sites, or by contacting the organizations and asking for this information.

To address our first research hypothesis, we decided to adopt the event study analysis, and we extracted all financial data relevant for the analysis from the Thomson Reuters DATASTREAM database.

To address our second research hypothesis, we adopted a statistical significance test for categorical data applied to the reports' names.

Below we provide more information on the event study analysis performed.

4.2. Event Study Analysis

Event study analysis [88–90] is a statistical technique aimed at determining if an event affects the returns of specific securities in a time period called an event window. Initially, event studies were very simple from a statistical perspective [91]. Later, the quality of event studies increasingly improved and their frequency of use increased in accounting, finance, management and other fields. From a practical viewpoint, event studies compare the returns that would have been expected if the analyzed event would not have taken place (normal returns) and the actual returns including one or more securities. The differences between actual returns and normal returns are called abnormal returns and represent the core element of event study analyses. If the distributional properties of abnormal returns are known (it depends on which techniques were used to estimate the normal returns), it is possible to assess if they are statistically significantly different from 0, which would mean that the event does affect the security price.

When performing an event study, the date of the event analyzed has to be accurately defined. The event window, which typically includes the event, consists of the day(s) on which the analysis is performed. Different test period lengths were used in event studies. For example, event windows from −4 to 4 trading days (where 0 is the publication date, −4 stands for the fourth day before the event and 4 is the fourth day after it) or from −5 to 5 trading days were used in some research articles focusing on the impact of corporate disclosure and other CSR actions—e.g., [92,93]. In this study, 33 event windows were considered. In particular, all the event windows from 1 to 9 days, containing the day of the event, the previous or the subsequent ones, were analyzed. Figure 1 shows all the event windows considered in this study.

EW(−1)				−1					
EW(0)					0				
EW(1)						1			
EW(−2;−1)			−2	−1					
EW(−1;0)				−1	0				
EW(0;1)					0	1			
EW(1;2)						1	2		
EW(−3,−1)		−3	−2	−1					
EW(−2;0)			−2	−1	0				
EW(−1;1)				−1	0	1			
EW(0;2)					0	1	2		
EW(1,3)						1	2	3	
EW(−4,−1)	−4	−3	−2	−1					
EW(−3;0)		−3	−2	−1	0				
EW(−2;1)			−2	−1	0	1			
EW(−1;2)				−1	0	1	2		
EW(0;3)					0	1	2	3	
EW(1,4)						1	2	3	4
EW(−4;0)	−4	−3	−2	−1	0				
EW(−3;1)		−3	−2	−1	0	1			
EW(−2;2)			−2	−1	0	1	2		
EW(−1;3)				−1	0	1	2	3	
EW(0;4)					0	1	2	3	4
EW(−4;1)	−4	−3	−2	−1	0	1			
EW(−3;2)		−3	−2	−1	0	1	2		
EW(−2;3)			−2	−1	0	1	2	3	
EW(−1;4)				−1	0	1	2	3	4
EW(−4;2)	−4	−3	−2	−1	0	1	2		
EW(−3;3)		−3	−2	−1	0	1	2	3	
EW(−2;4)			−2	−1	0	1	2	3	4
EW(−4;3)	−4	−3	−2	−1	0	1	2	3	
EW(−3;4)		−3	−2	−1	0	1	2	3	4
EW(−4;4)	−4	−3	−2	−1	0	1	2	3	4

Figure 1. Event windows analyzed.

Event windows may also include some days before the event analyzed in order to consider certain effects produced by previews or leaks (information leakage period). The maximum leakage period used in this study is 4 trading days. When considering a single organization, actual returns have to be compared with expected ones calculated using statistical or economic models. For organization i, event date τ and the conditioning information X_τ, the abnormal return, which is the difference between actual returns and estimated (normal) ones, is:

$$AR_{i\tau} = R_{i\tau} - E(R_{i\tau}|X_\tau) \quad (1)$$

With reference to the present study, daily expected returns were calculated using a simple linear regression model which assumes that the return on a generic *i*-th security at time t (R_{it}, explained variable) depends on the return on the market portfolio at the same time (R_{mt}, explanatory variable), i.e., the market model:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (2)$$

From the statistical model in Equation (2), the regression line can be written and the coefficients $\hat{\alpha}_i$ and $\hat{\beta}_i$ can be estimated, using historical data for R_{it} and R_{mt}:

$$\hat{R}_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt} \quad (3)$$

From which:

$$AR_{i\tau} = R_{i\tau} - E(R_{i\tau}|X_\tau) = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{mt} \quad (4)$$

The time series data used in the market model refer to the so-called estimation window. From an econometrical point of view, the number of trading days which the estimation window (L_1) consists of is fundamental. In fact, abnormal returns are forecast errors, presenting the following distributional parameters:

$$AR_{i\tau} \sim N\left(0, {\sigma_{\varepsilon_i}}^2 + \frac{1}{L_1}\left(1 + \frac{(R_{m\tau} - \hat{\mu}_m)^2}{{\hat{\sigma}_m}^2}\right)\right) \quad (5)$$

The variance of abnormal returns is higher than the variance of the market model regression errors (${\sigma_{\varepsilon_i}}^2$) because abnormal returns are technically forecast errors. However, this difference becomes shorter and shorter when the estimation period increases—indeed, $\frac{1}{L_1}\left(1 + \frac{(R_{m\tau} - \hat{\mu}_m)^2}{{\hat{\sigma}_m}^2}\right)$ decreases bit by bit—and can be ignored if the number of observations used in the market model (L_1) is large enough. In this study, we chose an estimation period of 200 trading days, starting 216 trading days before the date of the analyzed event and ending the seventeenth trading day before it.

Once having calculated the abnormal returns for all the organizations and the event windows analyzed, they can be aggregated through the time generating the Cumulative Abnormal Returns (CAR), which indicate the financial returns for all organizations in all the event windows selected. Since Cumulative Abnormal Returns are random variables consisting of the sum of as many abnormal returns as the days composing the event window analyzed, their distributional parameters (as L_1 is large enough) are the following:

$$CAR_i(\tau_1, \tau_2) \sim N\left(0, (\tau_2 - \tau_1 + 1){\sigma_{\varepsilon_i}}^2\right) \quad (6)$$

Finally, in order to generalize the results obtained for the single organization, the Average Cumulative Abnormal Return ($\overline{CAR}$) can be calculated.

$$\overline{CAR}(\tau_1, \tau_2) = \frac{1}{N}\sum_{i=1}^{N} CAR_i(\tau_1, \tau_2) \quad (7)$$

Its distributional parameters, asymptotic with respect to L_1 and N (the number of events analyzed), are the following:

$$\overline{CAR}(\tau_1, \tau_2) \sim N\left(0, \frac{1}{N^2}\sum_{i=1}^{N} {\sigma_i}^2(\tau_1, \tau_2)\right) \quad (8)$$

The distributional parameters for *ARs*, *CARs* and ($\overline{CAR}$) allow us to test the evidence in relation to the null hypothesis that the given event does not have an impact on the behaviour of the security returns.

4.3. Empirical Evidence

This study considered the publication dates of the 38 integrated reports included in our sample.

Cumulative Abnormal Returns and Average Cumulative Abnormal Returns were calculated for all the 33 event windows analyzed and were tested in contrast to the null hypothesis that the report disclosure does not affect the behavior of the security returns. A total of 13 out of the 33 event windows analyzed show, on average, a statistically significant impact of the report publication on the returns of disclosing organizations. Thus, it is possible to reject the null hypothesis that the average cumulative abnormal returns are zero. The results are shown in Table 1. ($|s\overline{CAR}|$ are the absolute values of the scaled Average Cumulative Abnormal Returns for all the event windows analyzed).

Table 1. Absolute values of the scaled Average Cumulative Abnormal Returns.

Event Window	$s\overline{CAR}$
EW(−1;0)	2.009261862 *
EW(−2;0)	2.091188742 *
EW(−3;0)	2.081430737 *
EW(−2;2)	1.746811573
EW(−1;3)	1.781481845
EW(−3;2)	1.815400844
EW(−2;3)	1.944908851
EW(−1;4)	1.797592212
EW(−3;3)	2.005045063 *
EW(−2;4)	1.959255745
EW(−4;3)	1.696990416
EW(−3;4)	2.023923379 *
EW(−4;4)	1.739827633

Significance codes: 0.05 ‘*’, 0.1 ‘.’

With reference to the cumulative abnormal returns, 16 out of 38 disclosures analyzed highlight a statistically significant impact (at both 5% and 10% level) of the report publication on the returns of the disclosing organization on—at least—one event window. Out of the 16 significant reports, 75% were published after 2013. Reports whose disclosure significantly affects the return were released by organizations listed in Europe (37.5%), Africa (37.5%), America (12.5%), and Asia (12.5%). With reference to the economic sectors, considering the industry classification provided by the IIRC, 50% of the reports are released by organizations producing services, whereas the remaining 50% is equally distributed among organizations producing consumer goods and industrials.

Notably, 69% of the documents included in this study are named as “integrated reports” (whereas the others are either “annual reports” or “sustainability reports”). In detail, the analysis of the name was useful to address our second research hypothesis, according to which the naming of the report as IR plays a statistically significant role in the impact produced by this disclosure tool on the organization’s share price.

To this end, we performed a statistical hypothesis test aimed at determining whether there was a significant difference between the expected frequencies and the observed frequencies in one or more categories of the qualitative variables: significance (with reference to the values of the average abnormal returns) and the name of the reports. The results are shown in Table 2.

Table 2. Association between the CAR significance and the name of the reports disclosed.

		Name			
		AR	**IR**	**SR**	**Total**
Significance	NO	10	8	4	22
	YES	5	11	0	16
	Total	15	19	4	38

Pearson’s Chi-squared test: $X^2 = 5.3258$, $df = 1$, $p\text{-}value = 0.06975$; Fisher’s Exact Test for Count Data: $p\text{-}value = 0.08253$.

Table 2 highlights that there is quite a strong association between the variables' *significance* (which can assume the modalities "yes" or "no", depending on the fact that the CAR of the specific firm analyzed is statistically significantly different from 0 or not) and *name* of the disclosed report (annual report "AR", integrated report "IR" and sustainability report "SR"). Eleven out of nineteen Integrated Reports (58%) refer to firms whose disclosure affected their share price in a statistically significant way. On the other hand, annual reports and sustainability reports seem to influence the assessment of financial capital providers less substantively; in fact, only 33% and 0%, of respectively annual reports and sustainability reports, presented a CAR statistically significantly different from 0. The results of the tests performed seem to confirm these considerations: both the Pearson's Chi-squared test and the Fisher's Exact Test are statistically significant at 10%.

5. Discussion and Conclusions

The results we obtained in our event study analysis show that IR publications produced, on average, significant effects on disclosing share prices. As previously highlighted, the event windows confirming a statistically significant effect in the average CAR are specifically those including the days from −1, −2 and −3 to 0 and from −3 to 3 and 4 (where 0 is the publication date).

Our results provide support for Hypothesis 1, indicating that the organizations' decision to publish IR has a statistically significant effect on share prices. Indeed, consistent with this hypothesis, a significant number of analyzed organizations experienced share price shocks when their IR was published. Therefore, it is possible to claim that shareholders responded to the organizations' decision to adopt this disclosure tool.

Beyond the general aim of any IR (i.e., the holistic representation of an organization and its performance), our findings are probably related to the specific informative usefulness of the reports analyzed. Indeed, according to the criteria adopted to select the documents to be included in the analysis, all these reports efficiently apply the materiality principle as defined by the IR framework [78]. As indirectly stated by the same IIRC (through the association of the reports analyzed with the database filter referring to the guiding principle of materiality), all these documents include data and information which can influence the stakeholders' actions, and they communicate all material information affecting the decisions of the organization's financial capital providers. The analysis of the average CAR confirms this IR potential, hence demonstrating that the organizations releasing the report tended to modify their perception as investment in the capital markets [23].

This result has beneficial implications for both researchers and practitioners.

For the former category, our findings add new evidence to previous research on corporate disclosure, confirming that an organization's decision to improve its level of communication and transparency towards the market (in this case, releasing an IR) affects the shareholders' expectations about that organization's performance—see [20]. Moreover, this study contributes to validating the "vital" function of materiality in the corporate disclosure process [60], since the impact registered on the organizations' share prices assumes that the IR analyzed includes all material information on the process of value creation implemented [21,22].

With reference to practitioners, our results suggest that managers should make their disclosure decisions by trying to anticipate how the corporate reporting might be able to influence shareholders' behaviors and hence share prices. Specifically, this study adds new evidence on IR usefulness in acting on the information asymmetry between managers and outside investors, in line with the agency approach [28,84]. In these terms, our findings may also support the managers' judgement in interpreting the materiality principle [64,65], in association with the studies investigating the managers' communication strategy in relationship with the nature (i.e., good or bad news) of the information to be disclosed [41,58].

In reference to our Hypothesis 2, this study verified that, among the reports included in the statistical significance test for categorical data, the ones named "integrated" (instead of "sustainability" or "annual") report, were associated with a greater impact on the share prices. This result is consistent with our assumption according to which the name adopted for the reports may influence the investors' perception and behavior. Indeed, all of the organizations relying on the IIRC framework for drafting their integrated reports should adopt materiality as one of the guiding principles of the entire reporting process. However, the choice of the name "integrated" for these reports favors their association with the disclosure of the organization's information that may influence the assessments and decisions of providers of financial capital [78].

Regarding the extent of the impact association with the naming of the report, it is noteworthy remembering that the *p*-value registered for our analysis was statistically significant at the 0.1 level, but not significant at the 0.05 level. This was likely due to the size of the sample, including the 38 reports corresponding to the selection criteria adopted. Nevertheless, our result certainly represents a first interesting finding about the potential of the name "integrated" to be associated with the materiality of the information disclosed in the report.

As discussed for Hypothesis 1, the aforementioned results may also be commented on in terms of helpful implications and contributions for both researchers and practitioners, mostly referred to the specific disclosure tool analyzed here (i.e., IR).

For researchers, our findings support the greater appreciation that IR has recently received in the literature as an example of an effective corporate disclosure tool [82,83]. For practitioners, our result might be useful to support managers' decisions about how to "present" IR to the capital markets, assuming that if it is quickly recognizable as an integrated report (adopting this name for the document), its publication may have greater effects on the organization's share price.

Regarding the limits and further developments of this study, it is worth remembering that the concept of performance disclosed in an integrated report has a multidimensional quality, because it includes a variety of information about the social and environmental impacts of the organization's activities, plus the more traditional financial data. Indeed, the investors' decisions go beyond expected profits, and include the requirement of broader analyses related to the organization's environmental and social goals. Unfortunately, at this stage our analysis is not able to reveal which specific aspect of the organization's performance was mostly responsible for the share price shock registered in association with the IR publication. This is certainly a limit of this study that might be addressed by collecting further data on the investors' behaviors and investigating more deeply the reasons underlying their allocation decisions, as already planned by the authors for the future development of the research.

Moreover, with reference to our second research hypothesis, we planned to develop a few qualitative case studies in order to explore and understand in more detail the motivations and decisions (including the report name) that informed those organizations in drafting their integrated report.

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Determinants of corporate financial performance relating to board characteristics of corporate governance in Indian manufacturing industry

An empirical study

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Palaniappan G.
Department of Management Studies,
Vinayaka Missions Kirupananda Variyar Engineering College, Salem, India

Abstract

Purpose – The purpose of this paper is to examine if certain board characteristics have an impact on the financial performance of manufacturing firms in India.

Design/methodology/approach – The study draws on data from 275 firms listed in NSE during from 2011 to 2015, using a multiple regression model. The present study examines the effect of board characteristics such as board size, CEO duality, independence and board activity devoted to the effectiveness of firms performance regarding market and accounting based financial performance measures.

Findings – The finding supports an inverse association between the extent of board characteristics and the firms' performance indicators. The study also finds a statistically significant negative relationship between board size and Tobins *Q*, ROA and ROE. The evidence also shows that the board independence and meeting frequency moderate the relationship between return on equity and return on assets by enhancing these measures among corporate governance mechanisms.

Research limitations/implications – The present study does not include all possible board characteristics, i.e., large shareholders dominance on the board and promoter's and institutional shareholding, to support firm's performance. Further research might include the ownership structure of the board to improve firm's performance.

Originality/value – The study focuses on the corporate governance issues such as size, duality, independence and activity of the boards and their influence on firm performance. The subject analyzes the possible impact of board characteristics and firm-related features that have received much attention from academic research, which has largely focused on studying the publications of corporate governance in India and Asian context.

Keywords Corporate governance, CEO duality, Board characteristics, Firms performance, Tobins *Q*

Paper type Research paper

Introduction

Corporate governance has become a popular discussion topic in developed and developing countries. Corporate governance comprises several elements of the structure of the government, which includes capital, labor, market and organization along with their regulatory mechanisms. The literature widely held view to contain the interests of shareholders has led to increasing worldwide attention. Today corporate governance has become a worldwide issue, and the

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development of corporate governance practices has become a prominent issue in all countries in the world. Corporate governance is a system of structures and processes to direct and control the functions of an organization by setting up rules, procedures and formats for managing decisions within an organization. It specifies the distribution of rights and responsibilities among company's stakeholders (including shareowners, directors and managers) and articulates the rules and procedures for making decisions on corporate affairs. It thus provides the structure for defining, implementing and monitoring a company's goals and objectives and ensuring accountability to appropriate stakeholders. Hence, the corporate governance issue widely debated in the developed market economies needs to be discussed in a different vein in the Indian context. India, for example, did not share the set of factors responsible for the Asian crisis, which were largely macroeconomic and related to bank failure due to unprecedented and unchecked growth (Jaiswal and Banerjee, 2010). Similarly, structural characteristics in the Indian corporate sector are quite different from that of USA and UK leading to a different set of corporate governance issues here.

Corporate governance norms in India have evolved well over the year's post-economic liberalization, with SEBI constituting a number of committees to suggest codes of conduct for good governance of corporate organizations. This was followed by the listing agreement under Clause 49 and by the voluntary guidelines of corporate governance in 2009 laid out by the Ministry of Corporate Affairs. These norms are inherently related to the legal and institutional environment in the country. The legal framework for corporate regulations by the Ministry of Corporate Affairs and vital formulation of the Companies Act 1956 and the new companies Act 2013, also with fairly functional stock exchanges and their detailed listing requirements and corporate must be ensured that globally accepted standards. India is one of the major emerging economies in the world, and the importance in the global economy has increased in recent years as the aspects of global commerce are expected to grow in the future. The Indian approach to corporate governance, accounting and auditing, however, differs in many ways from the US model (and the Chinese model). India, as well as many other developing countries, often has the form but not the substance of governance when it comes to matters of law. Strict enforcement of laws and speedy punishment of the violators are as much a part of the rule of law as the written law itself (Narayanasamy *et al.*, 2012). After Satyam scam, lot has been said and done in India related to board mechanisms. After Clause 49 implementation, it was mandatory to comply with its recommendations. The Clause 49 listing agreement of independent director for listed companies was deferred for nine months till December 31, 2005. Finally, it was implemented from January 1, 2006. In response, many companies have done shuffling at the board level. The question arises whether these changes pertaining to internal governance structures are related to firm performance measures. In the Indian context, the term corporate governance is defined more in terms of agency problem. Managers and researchers see a corporate governance problem as a conflict between management and shareholders. The limited data available so far has confirmed that among corporates, only those companies who are going global follow strict international accounting standards and policies. Presently, Indian business system is moving toward the Anglo-American model of corporate governance. The Anglo-American model gives importance to the shareholders over other stakeholders. Here, the usefulness of this model to current Indian system can always be questioned (Gugnani, 2013).

Literature review

The effect of corporate governance on firm performance is the focus of extensive analysis in majority of the previous studies (Choi *et al.*, 2007; Donaldson and Davis, 1991; Jensen, 1993). It is indispensable to realize the corporate governance in the Indian context, a detailed critique of relevant literature explained with deliberate corporate governance practices and firm performance.

Gompers *et al.* (2003) developed a governance index from a sample of 1,500 large firms using the governance rules and investment strategy. They also found that the firm with strong shareholder's rights has higher fund value and higher growth. Black (2001) found that the governance practices are strongly related to price-earnings ratio, and similar results were found by Klapper and Love (2004). Shleifer and Vishny (1997) view corporate governance as a set of mechanisms which ensure that potential providers of external capital receive a fair return on their investment, because the ownership of firms is separated from their control. It also increases the firms' responsiveness to the need of the society and results in improving long-term performance (Gregory and Simms, 1999).

CEO duality is an important issue in corporate governance because the status of the CEO and chairperson may have an influence on firm performance. There are arguments in favor of CEO duality, meaning CEO duality has a positive impact on firm performance, and the result is consistent in favor of the stewardship theory. Likewise, there are arguments against CEO duality, asserting that it has a negative impact on firm performance and these support the agency theory (Huining, 2014). The monitoring role of the board and its effectiveness on the behalf of shareholders depend upon its size and composition while carrying out the functional areas of the corporate governance (John and Senbet, 1998). The board characteristics like size, independence and meetings have an impact on current or prior performance, and a weak association was found between the two in the case of Indian firms (Arora and Sharma, 2015). Another study by Brick and Chidambaran (2010) also stated the intensity of board activity as an important dimension of oversight function performed by the board. Furthermore, it had used number of "director-days" to proxy for the level of board monitoring activity. Some studies were used the board composition and board size to represent the board's monitoring ability; it is the outside directors who have the ability to provide more effective than internal monitoring, more specifically, appointment of the independent directors leads to effective monitoring (Mak and Li, 2001; Choi *et al.*, 2007; Agarwal and Knoeber, 1996). The board index which consist of composition and meetings has been found to have a negative and significant association on firm performance of selected IT companies in India (Palaniappan and Rao, 2015). Kathuria and Dash (1999) observed that size of the board increased with the size of the corporation. Using a sample of top Indian Bombay Stock Exchange (BSE)-listed companies, Jackling and Johl (2009) had also showed significant positive correlation between firm size and size of the board (Kumar and Singh, 2013). The average board size was significantly different between small and large firms. However, in contrast, Lange and Sahu (2008) in their study on Nifty-listed Indian companies found an insignificant (but negative) effect of firm size (measure for scale) on board size. Substantiating the same, Linck *et al.* (2008) found that small firms had the smallest boards, with greatest proportion of insiders. In addition to the frequency, board meeting attendance also acts as a proxy for supervising quality of the board (Lin *et al.*, 2013). The measures of board attendance have been determined the participation of directors in meetings, also called board diligence that have been tested in supplement to the governance measures which was conducted on the firms listed on the NSE in India (Ghosh, 2007).

As far as the relationship between board characteristics and firm-specific characteristics is concerned, the past literature has established that large firms need more number of directors due to the complexity involved in their operations (Boone *et al.*, 2007; Chen and Al-Najjar, 2012; Coles *et al.*, 2008; Monem, 2013). However, in those studies, the percentage of non-executive directors (NEDs) on the board and firm performance was found to be statistically insignificant. Connell and Cramer (2010) also noticed a significant difference between the average board size of small and large firms listed on Irish stock markets.

Indeed, previous studies in several other countries also found a negative relationship between board size and firm performance. A positive relationship between the variables of corporate governance and firm's performance was found in Sri Lankan companies (Velnampy and Pratheepkanth, 2012). According to the studies of Black *et al.* (2006), Drobetz *et al.* (2004), Ong *et al.* (2003) and Gedajlovic and Shapiro (2002), there was a positive significant relationship between corporate governance practices and firm performance in various countries; in contrast, based on the studies of Gugler *et al.* (2001), Hovey *et al.* (2003) and Alba *et al.* (1998), there was no significant relationship between corporate governance and firm performance. The primary contribution of the study is that it examines the determinants of firm performance on board characteristics for which existing literature is limited, especially in the Indian context. This study further contributes to the literature by providing a comprehensive analysis of the relationship between board characteristics and firm performance. The empirical analysis focuses on a large number of companies (around 275 firms) covering 18 important industries from the manufacturing sector in India; moreover, instead of considering just a single measure of firm performance, the study considers three alternate measures of performance covering both accounting (ROA and ROE) and market-based (Tobin's *Q*) measures. Finally, this study also proposes another governance measure, board meeting, which is also related to firm performance (Table I).

Conceptual model and research hypothesis

Based on the previous section, extensive literature shows that corporate board characteristics affect firms' financial performance.

In this sense, the current research makes the contributions of empirically testing the effect of board characteristics on firm's performance. In line with the extant literature, the current study hypothesizes directional relationships between the measures of corporate governance on firm's performance. Figure 1 summarized the relational paths among

Sl. no.	Statement	Previous studies
1	The larger boards tend to have a negative influence on firm performance, judged in terms of either accounting- or market-based measures of performance. CEO duality has a significant effect on the firm performance	Ghosh (2006), Kathuria and Dash (1999), Lipton and Lorsch (1992)
2	Clause 49 along with other recommendations has emphasized the role of independent directors over executive directors for better governance structure. So board composition is a natural variable of interest in relation to firm's performance	Kumar and Singh (2012), Gugnani (2013)
3	A greater proportion of outside directors on boards was associated with improved firm performance	Jackling and Johl (2009), Fama (1980)
4	The study measure the independence of a board as percentage of independent directors on a board and is expected to have a positive relationship with firm performance	Hermalin and Weisbach (1991), Bhagat and Black (2002)
5	A positive relation between CEO duality and performance of a firm. Knowledge of the fact that the influence of CEO duality on firm performance can be a great benefit	Sanda *et al.* (2005), Huining (2014)
6	The board index, which consist of composition and meetings, has been found to have a negative and significant association on firm performance	Palaniappan and Rao (2015), Shivdasani (2004)
7	A positive significant relationship between corporate governance practices and firm performance was found in various countries	Ong *et al.* (2003), Gedajlovic and Shapiro (2002). Velnampy and Pratheepkanth (2012)

Table I.
Summary of literature review

governance-related board characteristics and the firm's performance regarding both accounting- and market-based measures. The following subsections discuss in depth the hypotheses related to each selected board characteristics.

Board size

The corporate governance literature is highly contradictory on board size being linked with corporate performance. The number of directors on board is an important variable, though literature does not have a consensus on the influence of board size toward increasing in firm's performance. Some studies describe a positive association between firm performance and board size due to lag in decision making owing to lack of harmony. Valenti *et al.* (2011) pointed out that when there is some dispute regarding the effect of board size on performance in general (Alexander *et al.*, 1993; Yermack, 1996), the evidence suggests that larger boards are preferable than smaller boards (Dalton *et al.*, 1999). This consistency results were in-line with a study by Coles *et al.* (2008) which states the board size should increase with the optimal board size to achieve higher financial performance. In the previous literature, both smaller boards and larger boards have been favored on different grounds. For instance, larger boards have been favored on the grounds of greater monitoring and effective decision making. According to Shivdasani (2004), board composition of a firm is affected by the fall in financial performance because companies react to performance downturns by adding outside directors to the board for corrective actions and effective decision making. Bradbury *et al.* (2006) report no association. Board size is known to be correlated with observable and unobservable firm characteristics that potentially correlated with firm financial performance (Bennedsen *et al.*, 2007). This endogenous effect is in-line with significant relationship of a firm's financial performance and board size (Black *et al.*, 2003). Therefore, the study hypothesizes the subsequent based on inconclusive evidence of the association without predicting its direction:

H1. There is no significant association between board size and firm's performance.

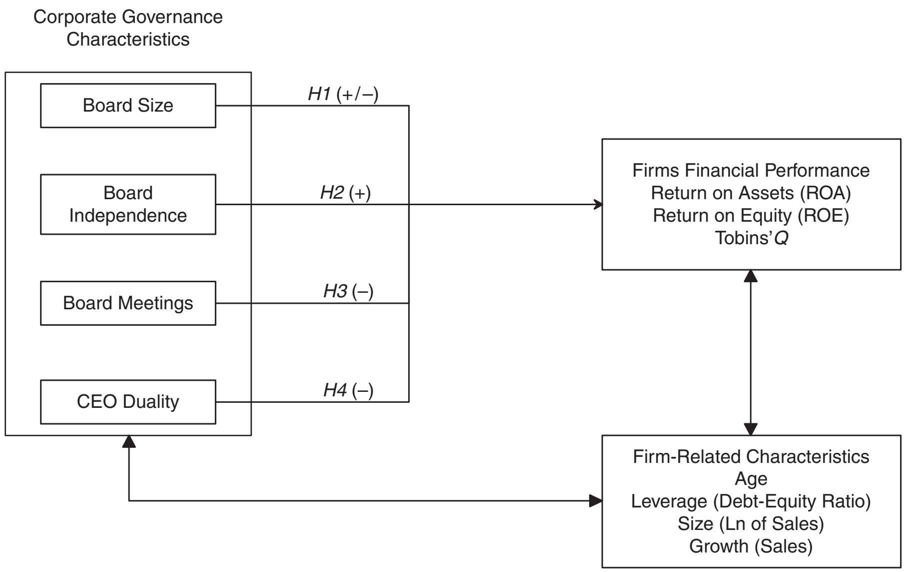

Figure 1.
Proposed conceptual model

Board independence

The number of independent director on the board is often used as proxy for good governance. The role of board of directors as effective monitoring mechanism for management is dependent upon them being non-executive and independent. Furthermore, the inclusion of independent directors on corporate boards is an effective mechanism to reduce the potential divergence between management and shareholders. Fama (1980) argued that more NEDs on the board act as professional referees and work for value maximization of shareholders. The independent directors are invited onto the board for oversight on behalf of shareholders (Baysinger and Butler, 1985). Rosenstein and Wyatt (1990) also suggested that higher proportion of independent directors is positively associated with excess returns. Similarly, Mak and Kusnadi (2005) revealed that a higher fraction of independent directors on the board is linked to greater firm value. Outsider-dominated on the boards in terms of percentage of independent directors which will enhance the reputation of the firm, as the firm is viewed as follows good corporate governance, improving the reliability of its financial disclosures. These shortcomings can be taken care of by choosing efficient board members. Bhagat and Black (2002) in their studies found that there is no significant relationship between number of independent directors and performance of a firm. These conflicting results on the association between board independence and firm's performance, with studies by Beasley (1996), Klein (2002) and Davidson *et al.* (2005), find significant negative association between the two. On the other hand, Park and Shin (2004), Peasnall *et al.* (2005) and Bradbury *et al.* (2006) fail to report any association between earnings management and independence of the board. Board independence is measured by the number of non-executive independent directors working on the board. The study measure the independence of a board as percentage of independent directors on a board and is expected to have a positive relationship with firm performance. Thus, the study examines the following hypothesis:

H2. There is a positive and significant association between firm's performance and board independence.

Board meetings

Next, the study estimated the impact of firm performance on board meetings, which is measured by the frequency of meetings annually. According to Vafeas (1999), board meeting is an important board attribute, but the relationship between firm performance and board meetings is not clearly established. There are several costs associated with board meetings such as managerial time, travel expenses and directors' remuneration. If a firm is not performing well, it might be possible that it may reduce the number of board meetings to avoid the costs associated with them. Jensen (1993) also pointed out that the meeting time might not be utilized for a significant dialogue among directors. Hence, the company might try to save upon the meeting costs by reducing the number of board meets. On the contrary, the firms have poor performance may try to conduct more meetings to discuss crucial issues like the reasons for their poor performance and setting strategies for improvement in performance. When directors meet frequently, they are more prone to discuss the concerned issues and monitor the management effectively, thereby performing their duties with better coordination (Lipton and Lorsch, 1992). If a firm is reasonably efficient in setting the frequency of its board meetings, it will also likely to attain high efficiency in agency costs. Thus, the impact of firm performance on board meetings is a valid research question, which should be examined empirically by following hypothesis:

H3. There is a significant negative association between attendance of directors in board meetings and firm's performance.

CEO duality

The literature argues that the status of CEO has direct impact on governance of firms. CEO position should be independent of the chairperson of the board to enable balance and check on misuse of power by the same. Agency theory supports the same to avoid conflict of interest for the board chairman to formulate the strategies and be responsible for implementing the same. This in turn would check firms' performance through better monitoring. Jensen (1993) argued that lack of independent leadership creates a difficulty for boards to respond to any failure. Fama and Jensen (1983) also argued that concentration of decision making makes it difficult for the board in independent decision making, and it affects the performance of a firm. Contrary to this view, Rechner and Dalton (1991) argued for role CEO duality as it would provide better incentives by linking CEO pay which will affect the firms' performance. Klein (2002) shows that role duality leads to unchecked powers and finds significant positive association with firm performance. Sanda *et al.* (2005) found a positive relation between CEO duality and performance of a firm, while Dalton *et al.* (1998) could found no significant relationship between CEO duality and firm performance. A number of studies report no significant relationship. Berg and Smith (1978) and Brickley *et al.* (1997) stated that it increases the conflict of interest, and the agency cost increases when CEO and the board chair is the same person. However, in another study, Rechner and Dalton (1991) argued that it is good if the board chair and the CEO is the same person as it reduces the bureaucracy in decision making. The study used CEO duality as a dummy variable and used a score of 1 when a person holds both position and 0 otherwise. This proposes that firms segregating the role of the chairperson of the CEO positively and significantly contributes to the firm's performance:

H4. There is a significant negative association between CEO duality and firms' performance.

Methodology

With the aim of analyzing the proposed model to explore the effect of board characteristics on firms performance and to empirically test the proposed hypothesis, the study conducted a content analysis among Indian manufacturing firms during 2011-2015 using firms' annual reports. Indian has become one of the most attractive destinations for investments in the manufacturing sector because of strong integrations of governance and control mechanism. The Government of India has taken several initiatives to promote a healthy environment for growth of manufacturing sector in the country (Media Reports, 2016). The data were collected with consist of detailed governance-related and financial performance information and indicators about the most actively traded and listed companies on the BSE of India during 2011-2015.

Sample selection and data collection

The data for empirical analysis are extracted from PROWESS (Release 4.0), a research database widely used in India, and from the corporate governance and annual reports of companies. The firms in our sample are chosen from important firms in the manufacturing sector. Banking and finance sector and government companies are completely excluded for the purpose of analysis because these firms have different type of structure and governance (Faccio and Lasfer, 2000). The firm classification of these 18 sectors is given in Table II. The total number of manufacturing firms listed under BSE in these sectors are 3,230 firms. The firms with missing data are excluded from the sample, which left with the final sample size of 275 firms. This study covers the time period of 2011-2015.

Table II.
Sample companies for various sectors

S. no.	Sectors	No. of samples
1	Apparels	9
2	Automobile and auto parts	5
3	Cement	11
4	Chemical and paint	36
5	Commercial trading	7
6	Consumer electronics	11
7	Diversified range of products	6
8	Engineering products	23
9	Fertilizers and agro-chemicals	15
10	Fibers and plastic products	9
11	Coal mining, and gas and oil exploration	13
12	Iron and steel	27
13	Packed foods and personal products	19
14	Sugar and paper	13
15	Pharmaceuticals	12
16	Power	16
17	Textiles	25
18	Miscellaneous industries	16
	Total	275

Variables construction
For the estimation purposes, the study use both accounting-based (ROA and ROE) and market-based (TQ) performance measures with respect to board characteristics such as size, independence, board meetings and CEO duality as the dependent variables in the analysis (Gompers *et al.*, 2003). The calculation of these variables has been shown in detail in Table III.

Empirical research results
In the analysis of the relationship between board characteristics and firm performance, the below regression equation will be used to test the main hypothesizes. To test the hypotheses, this study adopts the following empirical model:

$$\mathrm{ROA} = a + b_1\mathrm{BS} + b_2\mathrm{BI} + b_3\mathrm{BM} + b_4\mathrm{CEODUAL} + b_5\mathrm{AGE} + b_6\mathrm{LEV} + b_7\mathrm{SIZE} + b_8\mathrm{GROWTH} + e$$

$$\mathrm{ROE} = a + b_1\mathrm{BS} + b_2\mathrm{BI} + b_3\mathrm{BM} + b_4\mathrm{CEODUAL} + b_5\mathrm{AGE} + b_6\mathrm{LEV} + b_7\mathrm{SIZE} + b_8\mathrm{GROWTH} + e$$

$$\mathrm{TQ} = a + b_1\mathrm{BS} + b_2\mathrm{BI} + b_3\mathrm{BM} + b_4\mathrm{CEODUAL} + b_5\mathrm{AGE} + b_6\mathrm{LEV} + b_7\mathrm{SIZE} + b_8\mathrm{GROWTH} + e$$

where ROA, ROE and TQ are firm performance indicators of a company and b_1, b_2, b_3, b_4, b_5, b_6, b_7 and b_8 are the parameters for the explanatory variables. a is the constant number of the formula and e is the standard error.

This section presents the analysis and discussion of the empirical results.

Assumption of normality test
The normality assumption assumes that the errors of prediction are normally distributed. The Jarque-Berra statistics was used to check the null hypothesis that the sample is drawn

S. no.	Variables	Full form	Description	Expected outcome
Panel A: corporate governance measures				
1	BS	Board size	Number of directors serving on the board	Positive/Negative
2	BI	Board independence	Number of non-executive independent directors on the board	Positive
3	BM	Board meetings	Number of annual meetings	Negative
4	CEODUAL	Duality	A binary variable which equals 1 if a chairperson of the board is also the CEO of the firm and "zero" otherwise	Negative
Panel B: firm performance variables				
	ROA	Return on assets	PBDIT/Total assets	–
	ROE	Return on equity	PBDIT/Paid-up equity capital + reserves funds	–
	TQ	Adjusted Tobin's *Q*	Total assets + market capitalization – book value of equity – deferred tax liability)/total assets	–
Panel C: control variables				
	Age	Firm age	No. of years of a firm since its incorporation	Positive
	Lev	Leverage	Borrowings/Total assets	Negative
	Size	Natural log of sales	Sales is deflated using WPI, then natural log is taken and related to accounting performance of the firm	Negative
	Growth		Growth rate in net sales over that of the previous year	Positive

Table III. Constructs, items and description of variables

from a normally distributed population (Park, 2002). The Jarque-Bera statistics has an asymptotic χ^2 distribution with two degrees of freedom and was used to test the null hypothesis that the data follow a normal distribution. The Jarque-Bea statistic would not be significant, and *p*-value should be greater than 5 percent if the residuals are normally distributed (Brooks, 2008). The results in Table IV report a *p*-value of 0.4166, higher than 0.5, suggesting that normality assumption holds.

Assumption of homoscedasticity test

To test for homoscedasticity, the Breush-Pagan test and the White test were used, and the results reported in Table V indicate that the null hypothesis cannot be rejected since the *p*-values of both tests are considerably greater than 0.05. The results conclude that there is homoscedasticity, so no further corrections for the sample are required.

Assumption of autocorrelation test

Owing to the presence of auto correlation in the residuals, statistical inferences can be misleading. Since the Durbin-Watson test is only applicable to test autocorrelation in time

Test value	10.8771
(Prob. $> \chi^2$) *p*-value	0.4166

Table IV. Jarque-Berra test for normality

Breusch-Pagan test – H_0: *constant variance*		White test – H_0: *homoscedasticity*	
Test value	0.691	Test value	17.521
p-value	0.4016	*p*-value	0.3809

Table V. Breusch-pagan test for homoscedasticity series, this study also uses Wooldridge (2002) test appropriate in panel-data models where a significant test statistic indicates the presence of serial correlation. The p-value of the test is greater than 5 percent as shown in Table VI, suggesting the presence of no autocorrelation of errors. Drukker (2003) and Maladjian and Khoury (2014) used simulation results to show that the test has good size and power proprieties in reasonably sized samples.

Assumption for the multicollinearity test

Multicollinearity is the undesirable situation where the correlations among the independent variables are strong. Hence, if multicollinearity problem exists among the independent variables, then the regression results will not provide correct results. Lewis-Beck and Michael in their book *Applied Regression: An Introduction* have stated that if the correlation among the independent variables is greater than or equal to 0.80, then multicollinearity problem is assumed to exist. The same logic has been applied in this paper to define high correlation among the independent variables to give rise to multicollinearity problem. The multicollinearity problem is checked through correlation matrix. Correlation matrix is developed through SPSS between "firms' performance" and other independent variables. It is observed from Table VII (correlation matrix) that none of the independent variables have correlation greater than 0.8, hence we can safely deduce that multicollinearity does not exist among the independent variables.

From Table VII, Pearson correlation for selected explanatory variables shows that the Pearson correlation coefficient between board size and ROA is −0.733, ROE is −0.764 and Tobin Q is −0.752, which is found to be significant at 0.05 level. This indicates that board size and firm performance measures have a strong negative and significant association among the manufacturing firms in India. The results are consistent with Alexander *et al.* (1993) and Yermack (1996). The factor of board independence has been found to have a weak negative association among the firms' performance factors of ROA (−0.110), ROE (−0.101) and Tobins Q (−0.034), and the results are statistically insignificant and consistent with Lipton and Lorsch (1992). It is evident that board meeting has been found to have a moderate negative and significant relationship with firms' performance indicators such as ROA (−0.491), ROE (−0.551) and Tobins Q (−0.638), and the results are found to be significant at 0.05 level. The factor of CEO duality has been found to have a weak positive relationship among the firms' performance factors of ROA (0.061), ROE (0.086) and Tobins Q (0.183), and the results are statistically insignificant except for Tobins Q (at 0.05 level). This indicates that market-based performance (TQ) is increased if the positions of the CEO and chairperson are combined. The age of the firm and ROA have a positive and significant relationship at 0.481, and the result is significant at the 0.01 level. The size of the firm and Tobins Q has been found to be positively associated and significant at 0.01 level. The growth of the firm and ROE have a positive and significant association, and the results are statistically significant at 0.01 level. The remaining factors have insignificant association with the firms' performance factors.

Furthermore, the existence of multicollinearity is tested by calculating the variance inflation factor (VIF), where a VIF coefficient greater than ten indicates the presence of multicollinearity (Chetterjee and Price, 1977). Moreover, the mean of all VIFs is considerably larger than 1. The VIFs for individual variables were also very low, supporting the

Table VI.
Wooldridge test for autocorrelation

Wooldridge test for autocorrelation in panel data H_0: no first-order autocorrelation	
Test value	2.037
Prob. > F	0.2521

	BS	BI	BM	CEO duality	Age	Leverage	Size	Growth
Board size								
R	1							
Sig.								
Board independence								
R	0.801**	1						
Sig.	0.000							
Board meetings								
R	0.785**	0.590**	1					
Sig.	0.000	0.000						
CEO duality								
R	−0.028	−0.072	−0.030	1				
Sig.	0.652	0.238	0.625					
Age								
R	−0.088	−0.083	−0.016	0.124*	1			
Sig.	0.149	0.173	0.791	0.041				
Leverage								
R	0.097	0.106	0.023	−0.183**	−0.059	1		
Sig.	0.111	0.081	0.713	0.003	0.332			
Size								
R	0.079	0.033	0.074	0.045	0.011	0.093	1	
Sig.	0.194	0.593	0.225	0.459	0.858	0.127		
Growth								
R	−0.018	−0.010	−0.019	0.020	−0.004	−0.017	−0.065	1
Sig.	0.768	0.866	0.754	0.748	0.952	0.780	0.288	
Return on assets (ROA)								
R	−0.733*	−0.110	−0.491*	0.061	0.481**	−0.025	0.073	−0.021
Sig.	0.029	0.072	0.034	0.320	0.000	0.683	0.229	0.735
Return on equity (ROE)								
R	−0.764	−0.101	−0.551*	0.086	−0.035	−0.063	0.094	0.449**
Sig.	0.031*	0.098	0.047	0.161	0.569	0.300	0.123	0.000
Tobins Q								
R	−0.752	−0.025	−0.638*	0.183**	0.010	−0.080	0.568**	0.016
Sig.	0.019*	0.685	0.031	0.002	0.868	0.192	0.000	0.799

Note: *,**Significance at 5 and 1 percent levels, respectively

Table VII. Correlation matrix

previous conclusion that the explanatory variables included in the model are not substantially correlated with each other. The results of VIF among all the cases are shown in Table VIII.

Test to check whether the data are stationary or time series

Before going on with the subject, has to find out if the data have time series influence or are stationary. Durbin-Watson test has been conducted using SPSS to check the nature of the data. Computation of Durbin-Watson test was done taking the dependent variables (ROA, ROE and Tobins *Q*) and all the independent variables together. The result observed from Table IV reflects that Durbin-Watson test results are 1.946, 1.772 and 1.689 for ROA, ROE and Tobins *Q*, respectively, which fall within the acceptable range of 1.50-2.00 and satisfy the assumption of independence of errors. The Durbin-Watson test result is out of the range of −1.5 to +1.5, which proves that the data are time series one and are stationary. Moreover, by checking the Durbin-Watson table, it is observed that $d_u < d < 4-d_u$ (d_u is derived from the table and d is the Durbin-Watson test result). The results become closer to 2, which is in acceptable range, which proves that the data are not a time series one and are stationary. Thus, there is no autocorrelation between the dependent and independent variables. It is concluded from the above analysis that the data do not have time series influence and are stationary. Hence, we can utilize regression for the present study.

Regression results

The correlation analysis indicates that there exists a negative relationship between board characteristics such as board size, board independence and board meetings with firms' performance indicators of ROA, ROE and Tobins *Q*. So as to further analyze these relationships and to test the hypothesis, the OLS regression was run, and to be find out the predictors of firms' performance factors as dependent variables and board characteristics as independent variables, controlling for other variables was also done.

Tables IX and X sum up the results of regression analysis. It can be seen from Table IX that in model 1, board variables with ROA is fitted the regression equation and explains 44.6 percent variance in firms performance as shown by R square. The *F* ratio is 10.653 and is highly significant at less than 1 percent level. The R^2 value of model 2 is 0.438, which means that 43.8 percent of the dependent variable (ROE) is explained by independent variables. The R^2 value of model 3 is 0.570, which means that 57.0 percent of the dependent variable (ROE) is explained by independent variables. It can be observed from it that *F* statistics of the respective models are 10.653, 10.183 and 19.170, respectively, and the results are highly significant at 0.000. Hence, as the *p*-value is less 0.05, there can be a linear relationship between the dependent variables (ROA, ROE and Tobins *Q*) and selected independent variables.

The regression results as shown in Table X indicate that there is a statistically significant correlation between firms' performance and board effectiveness. It is also observed from the regression analysis (Model 1) in Table X that "leverage" has a *p*-value of 0.960 and the corresponding *t*-value of 0.150. It signifies that this particular variable is not important in

Table VIII.
Variance inflation factor (VIF) of the explanatory variables

Variable	ROA VIF	ROA Toler.	ROE VIF	ROE Toler.	ROA VIF	ROA Toler.
Board size	1.205	0.830	0.339	2.953	1.456	0.687
Board independence	1.651	0.606	0.580	1.725	1.995	0.501
Board meetings	0.374	2.674	0.618	1.618	0.452	2.213
CEO duality	2.942	0.340	1.556	0.643	3.555	0.281
Age	0.969	1.032	1.601	0.625	1.171	0.854
Leverage	1.941	0.515	1.553	0.644	2.345	0.426
Size	0.975	1.026	1.611	0.621	1.178	0.849
Growth	0.995	1.005	1.644	0.608	1.202	0.832
Mean VIF	1.382		1.188		1.669	

Table IX.
Regression model summary

Sl. no.	Dependent variables	Multiple *R*	R^2	Adjusted R^2	SE of the estimate	Durbin-Watson	*F*-value	*p*-value
1	ROA	0.696	0.446	0.493	1.685	1.946	10.653	0.000
2	ROE	0.588	0.438	0.495	3.172	1.772	10.183	0.000
3	Tobins *Q*	0.608	0.570	0.551	4.170	1.689	19.170	0.000

Model and dependent variable	Independent variables	Unstandardized coefficients *B*	SE	Standardized coefficients *β*	*t*	Sig.
1 – return on assets	(Constant)	−8.695	7.061		−4.241	0.000
	Board size	−1.371	0.055	−0.081	−2.082	0.046
	Board independence	0.176	0.546	0.010	3.115	0.021
	Board meetings	−1.245	0.372	−0.032	−2.369	0.047
	CEO duality	−4.346	1.311	−0.003	−2.058	0.049
	Age	4.856	0.559	0.474	8.680	0.000
	Leverage	1.191	23.943	0.003	0.150	0.960
	Size	3.683	2.805	0.076	1.389	0.166
	Growth	−1.157	1.727	−0.016	−0.295	0.768
2 – return on equity	(Constant)	−9.930	4.024		−2.468	0.014
	Board size	−2.474	0.099	−0.095	−2.791	0.010
	Board independence	−2.355	0.012	−0.053	−4.580	0.000
	Board meetings	1.047	0.075	0.056	0.631	0.529
	CEO duality	1.923	1.652	0.065	4.164	0.003
	Age	−0.013	0.012	−0.057	−1.041	0.299
	Leverage	−0.436	0.532	−0.046	−0.819	0.413
	Size	1.209	0.507	0.131	2.385	0.018
	Growth	13.363	1.594	0.454	8.383	0.000
3 – Tobins *Q*	(Constant)	−27.030	17.308		−7.322	0.000
	Board size	−1.071	0.765	−0.199	−2.833	0.045
	Board independence	−4.269	1.012	−0.063	−3.763	0.031
	Board meetings	−2.689	0.101	−0.121	−3.505	0.003
	CEO duality	4.413	1.496	0.145	2.859	0.025
	Age	−0.711	1.178	−0.030	−0.603	0.547
	Leverage	−7.545	4.423	−0.098	−1.935	0.054
	Size	5.485	3.027	0.579	11.629	0.000
	Growth	146.754	151.054	0.048	0.972	0.332

Note: $p < 0.05$

Table X. Regression result

the model. Similarly, "growth of the firm" (p-value of 0.768 and the corresponding t-value of −0.295) and "size of the firm" (p-value of 0.166 and the corresponding t-value of 1.389) have p-value more than 0.05 and t-values within the range of −2 to +2. These variables also seem not to be important enough in the model, so they need to be removed. While it is also observed that "board size," having a p-value of 0.046 and a t-value of −2.082; "board independence," having a p-value of 0.021 and a t-value of 3.115; "board meetings" having a p-value of 0.047 and a t-value of −2.369; "CEO duality," having a p-value of 0.049 and a t-value of −2.058; and "age," having a p-value of 0.000 and a t-value of 8.680, are highly significant variables in determining the firms performance (ROA) of manufacturing firms in India.

It is also observed from the regression analysis (Model 2) in Table X that "leverage" has a p-value of 0.413 and the corresponding t-value of −0.819. It signifies that this particular variable is not important in the model. Similarly, "board meetings" (p-value of 0.529 and the corresponding t-value of 0.631) and "age" (p-value of 0.299 and the corresponding t-value of −1.104) have p-values more than 0.05 and t-values within the range of −2 to +2. These variables also seem not to be important enough in the model, so they need to be removed. While it is also observed that "board size," having a p-value of 0.010 and a t-value of −2.791; "board independence," having a p-value of 0.000 and a t-value of −4.580; "CEO duality," having a p-value of 0.003 and a t-value of 4.164; "size," having a p-value of 0.018 and a t-value of 2.385; and "growth," having a p-value of 0.000 and a t-value of 8.383 are significant variables in determining the firms' performance (ROE) of manufacturing firms in India.

It is also observed from the regression analysis (Model 3) in Table X that "leverage" has a *p*-value of 0.054 and the corresponding *t*-value of –1.935. It signifies that this particular variable is not important in the model. Similarly, "age" (*p*-value of 0.547 and the corresponding *t*-value of −0.603) and "growth" (*p*-value of 0.332 and the corresponding *t*-value of 0.972) have *p*-values more than 0.05 and *t*-values within the range of −2 to +2. These variables also seem not to be important enough in the model, so they need to be removed. While it is also observed that "board size," having a *p*-value of 0.045 and a *t*-value of −2.833; "board independence," having a *p*-value of 0.031 and a *t*-value of −3.763; "board meetings," having a *p*-value of 0.003 and a *t*-value of −3.505; "CEO duality," having a *p*-value of 0.035 and a *t*-value of 2.859; and "size," having a *p*-value of 0.000 and a *t*-value of 11.629, are significant variables in determining firms' performance (Tobin's *Q*) of manufacturing firms in India. This positive sign is a consistent signal of stewardship theory which explain CEO duality positively influences firm performance (Huining, 2014) (Table XI).

Discussion, conclusion and implications

This study has investigated the influence the board characteristics of corporate governance measures has on the financial performance of Indian manufacturing industries. A sample of 275 industries across 18 different sectors was cross-sectionally analyzed with the help of OLS regression method. From the study, it can be said that "leverage," "age," "growth" and "board meetings" seem not to be statistically important and they do not influence the profitability of the manufacturing firms in India, whereas "board size, board independence, CEO duality and size of the firm" are important variables for determining the manufacturing firms' performance (ROA, ROE and Tobins *Q*) in India. It can be inferred from the results derived above that board characteristics and firms' performance of manufacturing firms in India. Theoretically, the effectiveness of board of directors, a central governance mechanism, is expected to be positively related to corporate governance quality. The study explored this relationship empirically with the use of board size, board independence and board meeting and found contradictory results regarding firms' performance parameters. These results were consistent and similar to previous studies (Arora and Sharma, 2015; Palaniappan and Rao, 2015; Sarpal and Singh, 2013). The study found that board size of a firm has emerged as an important determinant of firm's performance but the interesting part is that it is negatively related with firm performance (Gugnani, 2013). The results indicate that among the various factors affecting the corporate governance, board characteristics are strongly and negatively related to firms' performance

Table XI. Summary of hypothesis testing results

Sl. no.	Hypothesis	Proposed Sign	Hypothesis test result ROA	ROE	Tobins *Q*	Tools
H1	There is no significant association between board size and firm performance	±	Negative and significant	Negative and significant	Negative and significant	Regression
H2	There is a positive and significant association between firm's performance and board independence	+	Positive and significant	Negative and significant	Negative and significant	Regression
H3	There is a significant and negative association between attendance of directors in board meetings and firm performance	–	Negative and significant	Positive and insignificant	Negative and significant	Regression
H4	There is a significant negative association between CEO duality and firm performance	–	Negative and significant	Positive and significant	Positive and significant	Regression

measured with both accounting and market-based performance indicators. This result is as expected and supports the hypothesis that the optimum size of the board leads to the improvement of firm's performance. The use of ROA and ROE as proxies for financial performance has its own limitations. The results suggest that the marketing-based measures of financial performance (Tobin' *Q*, P/E and P/B) were not able to establish any relationship with corporate governance. It shows that the stock market performance of a firm is not related with it corporate governance measures and indicators (Gugnani, 2013).

The results of the study do indicate that the influence that board characteristics of corporate governance has on firm performance is significant. Hence, this study recommends that corporate entities should promote corporate governance measures effectively to send a positive signal to potential investors. In addition, the regulatory agencies including government should promote and socialize corporate governance regulatory measures and its relationships to firm performance across industries. So when policy makers of a nation within the Indian context decide that manufacturing firms should have the attention of board characteristics on the basis of an improvement in firm performance. The contribution of this study has been to find that board characteristic does have an influence on manufacturing firms' performance in India. The outcome of the study has been learned about the relevance and in line with regards to other developing countries, the board characteristics have strongly influenced in the performance of the firms. Despite these benefits, much can still be said about the ongoing debate between the agency theory and stewardship theory.

Limitations and further research

As with all empirical studies, the current research has several limitations, and overcoming these can be a guide for future research. First, the data are based on board characteristics; therefore, the research is exempt from the board composition, that is, the presence of women director on the board, board meeting attendance of especially by independent directors concern, Annual General Meeting and number of meetings conducted by the firms with beyond the required statutory level. Future research could combine measures of presence of women directors, meeting of independent directors and AGM attendance, which have some effect on firms' performance. Second, the current research explores the effect of some board elements such as audit committee and other committees on overall firm's performance. Further research could extend the model to include additional dimensions of the audit committee-based measures in order to better understand the firms' financial performance. Third, the current study does not include all possible board characteristics such as large shareholders' dominance on the board, promoter's shareholding and institutional shareholding to support their firm's performance. Further research might include the ownership structure on board to improve the firm's performance. Finally, this research is limited to Indian manufacturing firms. Future research should consider different countries, inter-differences with medium- and large-scale firms and private and public undertaking firms. There are certain limitations of this study because it focuses on internal governance mechanisms, ignoring external factors, which can have a more significant impact on corporate financial performance.

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Corresponding author
Palaniappan G. can be contacted at: palani.sunn@gmail.com

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Mapping Market-Based Accounting Research in Indonesia: Graphics and Guidelines for Future Research

Novrys Suhardianto*, Bambang Subroto**, Grahita Chandrarin***

*Universitas Airlangga, City University of Hong Kong, **Brawijaya University, ***Merdeka University of Malang

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Research Map

A B S T R A C T

The purpose of this study is to describe the development of market based accounting research (MBAR) published in Indonesia for 10 years. This study attempts to explain the topics of MBAR, research method used, the variables, between-variable relationship formed, and the units analysis used in MBAR. This research uses qualitative-descriptive method to create descriptive models of MBAR articles published in accounting journals that have been accredited with minimum grade of B. The analysis of 109 MBAR articles of five accounting journals shows that 10 MBAR themes are still potential. Among three methods in MBAR, the multivariate association study is dominant. Some papers use intervening and moderating model to explore the relationship between accounting data and capital market reaction. The results for each theme are described in a research map that shows the relationship between variables (constructs) of MBAR from three units of analysis. This paper finds some implications to MBAR research agenda in the future, especially for meta-analysis research and triangulation research, due to many inconsistencies of the MBAR findings in Indonesia. In addition, accounting standard research topic is still promising in the moment of accounting standards transition.

1. Introduction

Lev and Ohlson (1982) and Meek and Thomas (2004) express the notion of capital market based accounting research (MBAR) to find the relationship between published accounting information with the consequences of the use of such information that is reflected in the characteristics of securities traded in capital markets. MBAR is considered as a popular topic because various MBAR papers presented at the *Simposium Nasional Akuntansi* or SNA (Indonesian Accounting Symposium) as well as published in Accounting Review journal. Table 1 presents the number of MBAR articles presented in SNA and Accounting Review.

MBAR generally tests the decision of accounting information (see Scott, 2006, 122-148). In Indonesia, accounting research that aims to map the development MBAR is not too popular. Mapping research is descriptive research that transfers data into more meaningful format, indicates areas that need further study, provides a basis for discussions that produce a common understanding about a problem, and produce a model that represents a descriptive structure of MBAR development (Abdel-Khalik and Ajinkya,1979, 21-23; Kothari, 1990, 2-3; Meyer and Rigsby, 2001).

This study aims to describe the development of MBAR in Indonesia for a decade. To achieve these objectives, the study seeks to generate graphical models that represent (1) the description of the themes examined by MBAR; (2) the description of the variables involved in MBAR; (3) the description of the research methods used; and (4) the description of the relationship between variables formed. The study reviews the development of MBAR in Indonesia and identifies research topics that need further investigation.

This research contributes to the development of MBAR in Indonesia by providing pedagogically valuable document as defined by Kothari (2001) which helps MBAR researchers to avoid reinventing the wheel. Descriptive research is very important to evaluate the development of a particular topic, highlight the theory, and criticize the empirical findings (for example see Brown et al., 1987; Brown et al., 2007; Cho and Jung, 1991; Healy and Palepu, 2001; Heck and Bremser, 1986; Simon, 2007). These research is useful for meta-analysis study that synthesize the results of relevant research to produce a conclusion about a body of research (Cooper, 2010, 6-7).

Table 1. MBAR Paper in SNA (National Accounting Symposium) & Accounting Review (AR)

Year	SNA			AR		
	MBAR paper	Total paper	%	MBAR paper	Total paper	%
2000	15	41	37%	3	68%	16%
2001	18	52	35%	6	58%	21%
2002	10	53	19%	8	43%	17%
2003	18	91	20%	14	45%	34%
2004	18	76	24%	11	55%	24%
2005	9	69	13%	13	54%	28%
2 006	12	84	14%	12	46%	28%
2007	3	80	4%	9	25%	20%
2008	9	78	12%	10	41%	19%
2009	9	64	14%	14	39%	20%
Total	130	722	18%	100	46%	23%

2. Literature Review

The development of MBAR since the 1970s to the 1990s is well described by Lev and Ohlson (1982), Kothari (2001), Beaver (1982, 1996, 2002), and Dumontier and Raffournier (2002). There are 10 topics of MBAR found in previous studies. Accounting information content, discretionary behavior, market efficiency, and value relevance have been reviewed by more than one study. Table 2 presents the list of these themes.

Table 2. The Division of MBAR Theme by Previous Researchers

No	Theme	Researcher
1.	The consequences of Accounting Standards	Lev & Ohlson (1982)
2.	The consequences of Performance Measure Alternatives	Kothari (2001)
3.	The consequences of Accounting Disclosure	Dumontier & Raffournier (2002)
4.	Accounting Value Information Content	Lev & Ohlson (1982); Dumontier & Raffournier (2002); Kothari (2001)
5.	Analyst Behavior	Beaver (2002)
6.	Discretionary Behavior	Lev & Ohlson (1982); Kothari (2001); Beaver (2002)
7.	Valuation and Fundamental Analysis	Kothari (2001)
8.	Market Efficiency	Lev & Ohlson (1982); Kothari (2001); Beaver (2002)
9.	Value Relevance	Kothari (2001); Beaver (2002)
10.	Earning Response Coefficient/ ERC	Kothari (2001)

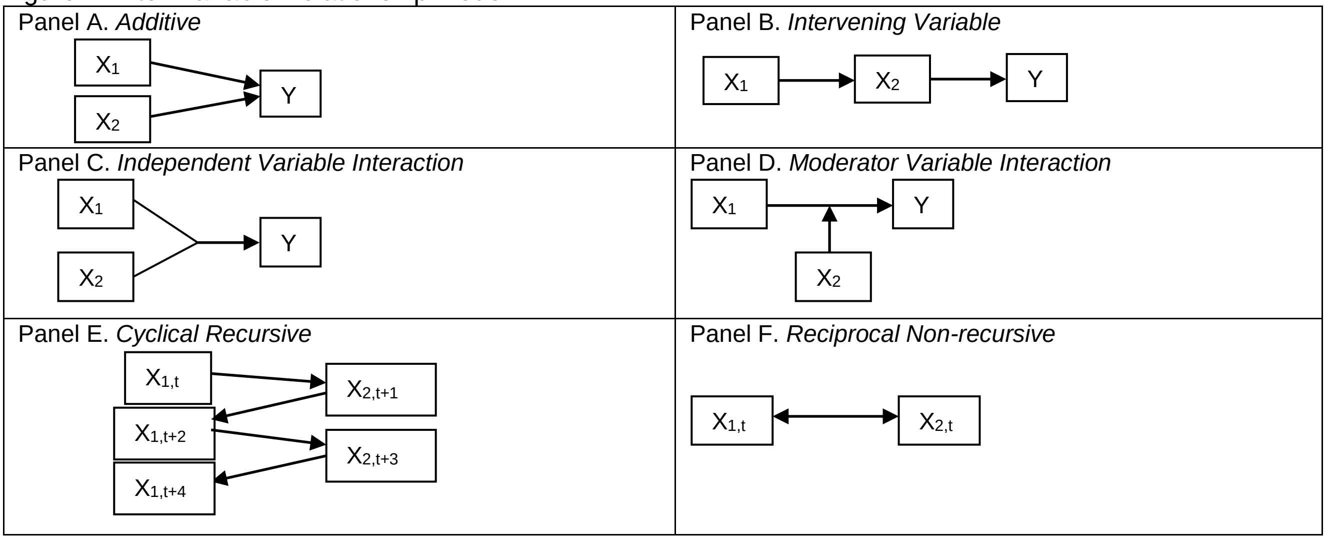
To test the 'relationship' between the accounting information published and the value of shares in the capital market, MBAR uses 2 methods i.e. event studies and association studies (Kothari, 2001). Through the event study, researchers will be able to conclude whether an event brings new information to market participants (Kothari, 2001) in timely basis. Specifically, if the returns before the event are different from the returns after or if the return in an event windows different with its average, the event has information content to investors (Tandelilin, 2010, 572-576). Event study is also used to test the efficiency of capital market (Hartono, 2008, 529-534).

On the other hand, association study provides evidence about the role of accounting data as a summary of events affecting the value of companies during the reporting period (Brown et al., 1999; Dumontier and Raffaournier, 2002). Association study does not conclude a causal relationship between accounting data and value stocks because accounting reports are not the only source of information (Kothari 2001). The strength of association between accounting information and price/return ordinary shares can be measured by R^2 (Brown et al., 1999; Dumontier and Raffaournier, 2002). Low association ($R^2 \approx 0$) means stock prices cannot be estimated using accounting data. High association ($R^2 \approx 1$) means that accounting data could be the estimator of stock price. These two methods will be used in descriptive modeling research framework (Figure 4) to describe the development of MBAR method in Indonesia.

According to definition of MBAR expressed by Lev and Ohlson (1982) and Meek and Thomas (2004), MBAR dependent variable should reflects investor reaction such as stock return and trading volume of shares (Deegan, 2000, 360; Beaver, 1968; Karpoff, 1986; Jang and Ro, 1989). Brown (1994, 27) states that the dependent variable of MBAR must reflect market behavior. In addition to returns and volume, there are some proxies of market behavior such as frequency of trading, bid-ask spread, or market depth. The independent variables of MBAR are any accounting information (events) that could change market expectations and reactions. MBAR does not search the relevance of any information other than accounting. The use of moderating and intervening variable in MBAR is not common. There were no published MBAR papers in JRAI (jurnal riset akuntansi Indonesia/ the Indonesian journal of accounting research) from 2000 to 2009 that stated using moderating and intervening variable in their title.

Luft and Shields (2003) have presented 6 models of inter-variable relationship that can be used by MBAR and represented descriptive structure of inter-variable relationship. These models are presented in figure 1.

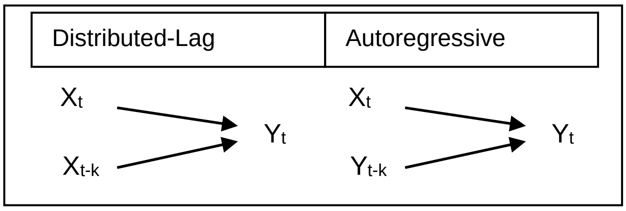
Figure 1. Inter-Variable Relationship Model



Source: Luft and Shields (2003)

There are 2 models that may be added since MBAR often use time series data i.e. distributed lag model and *autoregressive* model (Gujarati and Porter, 2009, 617). The two models are used because the independent variables have time lag in influencing the dependent variables.

Figure 2. Distributed-Lag and Autoregressive Model



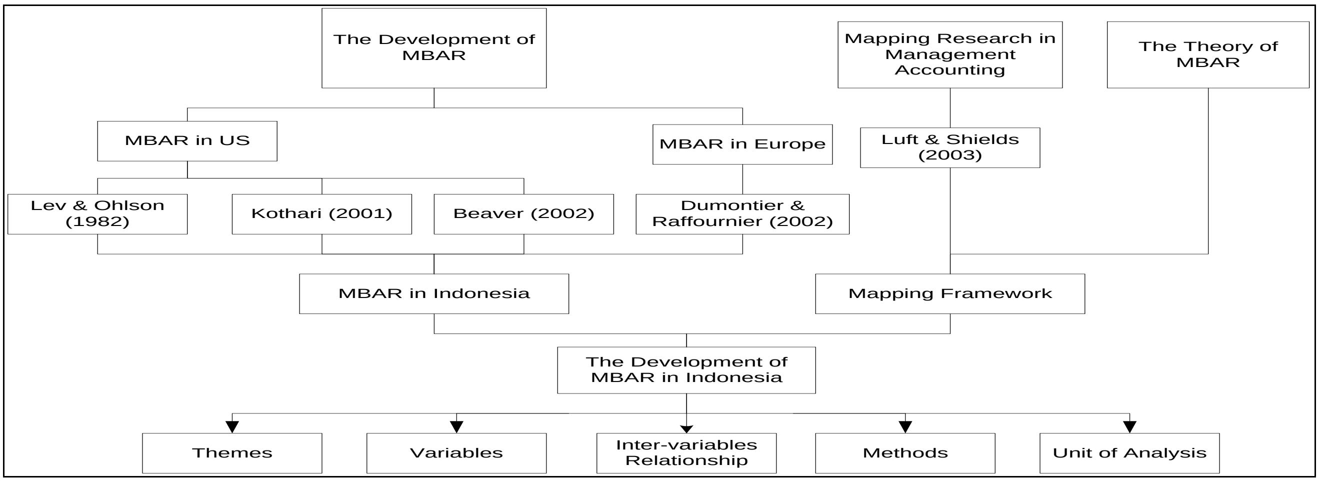
Source: Gujarati (2009: 617)

Luft and Shields (2003) divide the unit of analysis of accounting research into four categories. They are individual, organization subunit, organization, and beyond organization. MBAR usually uses organization as the unit of analysis. However, some of MBAR analyze market condition or macro-economic factors that is beyond organization.

One excellent review in accounting research is Luft and Shields (2003). Luft and Shields (2003) provide a guidance in reviewing the development of accounting research; include (1) identifying the themes and variables, (2) identifying the inter-variables relationship, (3) identifying the unit of analysis, and (4) establishing the mapping guidance. This paper borrows Luft and Shields' conceptual framework to mapping the development of MBAR in Indonesia. Moreover, this paper also develops its framework based on Lev and Ohlson (1982), Kothari (2001), Beaver (2002), and Dumontier and Raffournier (2002).

The framework of this research is shown in figure 3. This framework shows the gap of MBAR review in Indonesia. In mapping MBAR, this research uses Luft and Shields's framework that equipped with MBAR normative theory. The focuses of this research are to identify (i) MBAR themes, (ii) MBAR variables, (iii) relationship between variables, (iv) methods utilized, and (v) MBAR unit of analysis.

Figure 3. Research Framework



3. Research Methods

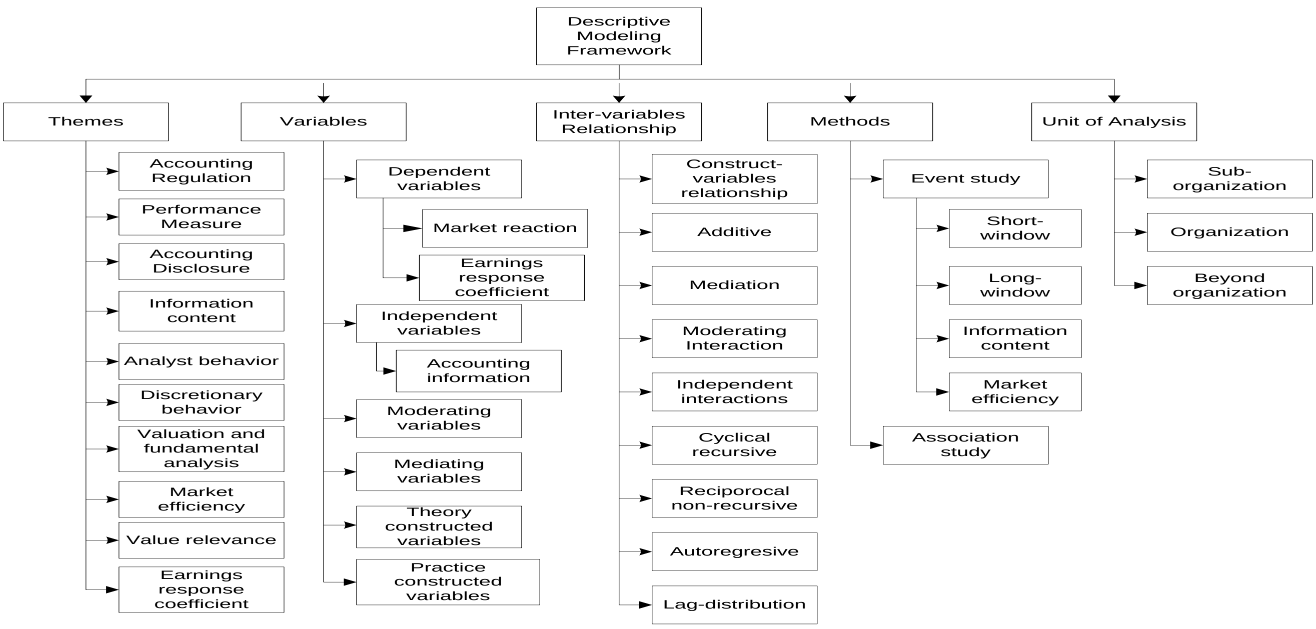
The framework developed in the literature review is used to describe the MBAR characteristics and offers ideas about future MBAR opportunities (the importance of research framework discussed in Sekaran, 2003, 122; Indriantoro and Supomo, 2002, 88). This study reviews MBAR articles published in Indonesia from 2000 until 2009. This research assumes that 10 years observations will be able to capture the development states of MBAR.

The subject of this research is MBAR papers that published in accredited accounting journals in Indonesia that satisfy two criteria. First, the journals should have B accreditation grade until 2010. This is important to control the quality of the MBAR articles. Second, the journals should publish accounting research articles only. A journal that publishes broad topics such as economics, management, and accounting might disproportionate the accounting topics.

This study uses Creswell's (2007, 150-155) recommendation to analyze qualitative data. The steps of analyzing the MBAR articles are (1) developing database; (2) sorting the data; (3) analyzing descriptive statistics, to find market share of MBAR, journal share, and the profile of research model; (4) analyzing the content of MBAR publications, to identify the themes of MBAR, the variables researched, the relationship between variables, the methods utilized, the unit analysis used, the summary, limitation, and future research chance; and (5) describing the data using text, table, or chart.

This research uses descriptive framework of Luft and Shields (2003) to describe the development of MBAR. This research will describe the development of MBAR in the sense of its topics, variables, inter-relationship of variables, methods, and the unit of analysis. This framework is used to discuss the findings of this paper (See figure 4.)

Figure 4. Descriptive Modeling Framework



4. Results and Discussion

This study finds 5 out of 22 accounting journals that satisfy the criteria. The journals are Jurnal Riset Akuntansi Indonesia (JRAI) published by Indonesian Institute of Accountant and the office in Universitas Gadjah Mada, Jogjakarta; Jurnal Akuntansi dan Keuangan Indonesia (JAKI) published by Universitas Indonesia, Jakarta; Jurnal Akuntansi (JA) published by Universitas Tarumanegara (UNTAR), Jakarta; Akuntabilitas (AK) published by Universitas Pancasila, Jakarta; and Jurnal Akuntansi dan Auditing Indonesia (JAAI) published by Universitas Islam Indonesia (UII), Jogjakarta. The list of these journals is shown in table 3.

Table 3. List of Accounting Journals

Panel A: Indonesia Accounting Journals

No	Name	ISSN	Description
1	Jurnal Akuntansi Dan Auditing Indonesia (JAAI)	1410-2420	Match the criteria
2	Jurnal Akuntansi (JA)	1410-3591	Match the criteria
3	Jurnal Riset Akuntansi Indonesia (JRAI)	1410-6817	Match the criteria
4	Akuntabilitas (AK)	1412-0240	Match the criteria
5	Jurnal Akuntansi Dan Keuangan Indonesia (JAKI)	1829-8494	Match the criteria
6	Media Riset Akuntansi, Auditing Informasi	1411-8831	Not match the criteria
7	Jurnal Akuntansi & Investasi	1411-6227	Not match the criteria
8	Jurnal Akuntansi & Bisnis: Journal of Accounting & Business	1412-0852	Not match the criteria
9	Jurnal Akuntansi Dan Keuangan	1411-0288	Not match the criteria
10	Jurnal Riset Akuntansi, Manajemen, Ekonomi	1411-8572	Not match the criteria
11	Jurnal Akuntansi & Manajemen	0853-1269	Not match the criteria
12	Kompak Jurnal Akuntansi, Manajemen Dan Sistem Informasi	0854-6142	Not match the criteria
13	Wahana: Jurnal Ekonomi, Manajemen Dan Akuntansi	1410-8224	Not match the criteria
14	Jurnal Bisnis Dan Akuntansi	1410-9875	Not match the criteria
15	Forum Ekonomi: Jurnal Ekonomi, Manajemen Dan Akuntansi	1411-1713	Not match the criteria
16	Akuntansi Dan Keuangan Sektor Publik	1411-5921	Not match the criteria
17	Jurnal Akuntansi Dan Keuangan	1411-6510	Not match the criteria
18	Tema: Telaah Ekonomi, Manajemen, Dan Akuntansi	1411-8149	Not match the criteria
19	Jurnal Widya Manajemen & Akuntansi	1411-8599	Not match the criteria
20	MAKSI: Jurnal Manajemen, Akuntansi & Sistem Informasi	1412-6680	Not match the criteria
21	Jurnal Manajemen, Akuntansi Dan Bisnis	1693-252x	Not match the criteria
22	JABM: Jurnal Akuntansi - Bisnis & Manajemen	0854-4190	Not match the criteria

Panel B: Publications of Five Selected Journals

Year	JRAI	JAKI	JA	AK	JAAI
2000	Vol. 3 No. 1-2	–	NA	–	Vol.4 No.1-2
2001	Vol. 4 No.1-3	–	NA	Vol.1 No.1-2	Vol.5 No.1-2
2002	Vol. 5 No.1-3	–	Vol.6 No.1-2	Vol.2 No.1-2	Vol.6 No.1-2
2003	Vol. 6 No.1-3	–	NA	Vol.3 No.1-2	Vol.7 No.1-2
2004	Vol. 7 No.1-3	Vol.1 No.1-2	Vol.8 No.1-2	Vol.4 No.1-2	Vol.8 No.1-2
2005	Vol. 8 No.1-3	Vol.2 No.1-2	Vol.9 No.1-3	Vol.5 No.1-2	Vol.9 No.1-2
2006	Vol. 9 No.1-3	Vol.3 No.1-2	Vol.10 No.1-3	Vol.6 No.1-2	Vol.10 No.1-2
2007	Vol. 10 No.1-3	Vol.4 No.1-2	Vol.11 No.1-3	Vol.7 No.1-2	Vol.11 No.1-2
2008	Vol. 11 No.1-3	Vol.5 No.1-2	Vol.12 No.1-3	Vol.8 No.1-2	Vol.12 No.1-2
2009	Vol. 12 No.1-3	Vol.6 No.1	Vol.13 No.1-3	Vol.9 No.1	Vol.13 No.1-2

JRAI and JAAI provide complete publication to be analyzed however; JA is missed for three years publication. The total article published in the five accounting journals is 653 articles and MBAR takes 16.48% from total articles.

Table 4. MBAR Articles Compare to Others

Category	JRAI	JAKI	JA	AK	JAAI	Total
MBAR	49	15	19	15	11	109
FACM*	59	22	34	36	36	187
Others	72	31	112	73	69	357
Total	180	68	165	124	116	653

*FACM: financial accounting and capital market, a broader topic than MBAR.

4.1. Descriptive statistics of MBAR publication

Market share of MBAR is the percentage of MBAR articles that are published in a particular accounting journal (Hesford et al., 2007). MBAR is published in JRAI for 27.3% and 21.8% in JAKI. These two journals are leading in MBAR publication. Table 5 shows the trend of market share and journal share of MBAR.

Table 5. Market Share and Journal Share of MBAR

Panel A Market Share of MBAR
Market Share = (∑MBAR articles in journal *i*) ÷ (Total article of journal *i*)

Year	JRAI	JAKI	JA	AK	JAAI
2000	35.7%	–	NA	–	10.0%
2001	15.0%	–	NA	0.0%	10.0%
2002	19.0%	–	6.3%	0.0%	0.0%
2003	42.1%	–	NA	16.7%	9.1%
2004	45.0%	0.0%	0.0%	25.0%	25.0%
2005	38.9%	30.8%	10.7%	18.2%	16.7%
2006	16.7%	25.0%	16.0%	15.8%	16.7%
2007	16.7%	25.0%	16.0%	15.0%	25.0%
2008	17.6%	33.3%	11.1%	12.5%	0.0%
2009	26.7%	16.7%	13.3%	0.0%	0.0%
Average	27.3%	21.8%	10.5%	11.5%	11.2%

Panel B Journal Share of MBAR
Journal Share = (∑MBAR articles in *i* journal) ÷ (Total MBAR article in all journal)

Year	JRAI	JAKI	JA	AK	JAAI
2000	83.3%	–	NA	–	16.7%
2001	75.0%	–	NA	0.0%	25.0%
2002	80.0%	–	20.0%	0.0%	0.0%
2003	72.7%	–	NA	18.2%	9.1%
2004	60.0%	0.0%	0.0%	20.0%	20.0%
2005	38.9%	22.2%	16.7%	11.1%	11.1%
2006	20.0%	20.0%	26.7%	20.0%	13.3%
2007	18.8%	18.8%	25.0%	18.8%	18.8%
2008	25.0%	33.3%	25.0%	16.7%	0.0%
2009	44.4%	11.1%	44.4%	0.0%	0.0%
Average	51.8%	17.6%	22.5%	11.6%	11.4%

Journal share describes the total MBAR articles that published in a certain journal compare to all MBAR articles in all journals (Hesford et al., 2007). On average, JRAI contributes 51,8% of published MBAR articles in a decade. Though first published in 2004, JAKI provides 17.6% of MBAR articles.

Value relevance study gets the biggest portion (43.12%) of MBAR topics. Information content study had 15.60% portion from 109 MBAR articles and all journals have publication in this theme.

Table 6. The Themes of MBAR in Indonesia

Themes	The Amount of Articles						
	JRAI	JAKI	JA	AK	JAAI	Total	Portion
Analyst Behavior	–	–	–	–	–	0	0.00%
Valuation and Fundamental Analysis	1	–	–	–	–	1	0.92%
The consequences of Accounting Standards	2	–	–	–	–	2	1.83%
Market Efficiency	2	–	–	–	1	3	2.75%
The consequences of Performance Measure Alternatives	–	1	2	1	–	4	3.67%
The consequences of Accounting Disclosure	–	5	3	–	–	8	7.34%
Discretionary Behavior	8	2	–	2	1	13	11.93%
Earnings Response Coefficient	10	–	1	2	1	14	12.84%
Accounting Value Information Content	6	2	2	4	3	17	15.60%
Value Relevance	20	5	11	6	5	47	43.12%
Total	49	15	19	15	11	109	

ERC and discretionary behavior take the third and fourth position. The less researched themes are accounting disclosure consequences, consequences of performance measure, market efficiency, and accounting regulation consequences. The theme that never been researched in Indonesia is the market reaction toward analyst's forecasts because analyst forecast reports are not publicly available in Indonesia capital market.

4.2. Method and Inter-variable relationship

The result indicates that an article may use more than one research model and method. According to table 7, additive model is the most frequently used by researcher (panel A) and therefore, unidirectional and linear model become the most popular model (panel B). Moreover, MBAR that employs additive model and unidirectional (whether linear or not) is classified as association research (panel C). The result also shows that nonlinear relationship between accounting data with market reaction is unpopular (4 from 109 papers). The second popular model is construct-variable (panel A) that is used by event study and difference study (panel C). The third and fourth popular models are moderator variable interaction (panel A) and intervening model.

Table 7. MBAR Model and Method

Description	Frequency					
	JRAI	JAKI	JA	AK	JAAI	Total
Panel A: Research Model						
Additive (Add)	25	12	15	10	5	67
Intervening Variable (IV)	–	–	1	–	–	1
Independent Variable Interaction (IVI)	1	–	–	–	–	1
Moderator Variable Interaction (MVI)	11	3	2	–	1	17
Cyclical Recursive	–	–	–	–	–	–
Reciprocal Non-recursive	–	–	–	–	–	–
Distributed-Lag	–	–	–	–	–	–
Autoregressive	–	–	–	–	–	–
Construct-Variable relationship	17	3	3	5	5	33
Panel B: Classification of Model						
Unidirectional	37	15	18	10	6	86
Bidirectional	–	–	–	–	–	–
Linear	35	15	18	10	4	82
Curvilinear (Nonlinear)	2	–	–	–	2	4
Ordinal (*monotonic*)	12	3	2	–	1	18
Dis-ordinal (*non-monotonic*)	–	–	–	–	–	–
Construct-Variable relationship	17	3	3	5	5	33
Panel C: Research Method						
Association Study	37	14	18	10	6	85
Event Study	12	3	3	5	4	27
Difference Study	5	1	1	2	1	10

The theme of MBAR used in various research models are ERC and the discretionary behavior. On the other hand, market efficiency testing and information content study use only event study or difference study and the use of association study by these themes generally for additional analysis only. The other themes use various research methods. An article in valuation and fundamental analysis uses additive model with associative method. Such model and method are also used by performance measure alternative research. Research in consequences of accounting disclosure generally employs additive model (associative method) or construct-variable relationship (difference study). The last theme, consequences of accounting regulation, generally uses additive model, moderator interaction, and construct-variable relationship.

Table 8. The Using of Research Model and MBAR Themes

Research Model / MBAR Themes	Additive	Intervening variable	Independent var. Interaction	Moderating var. interaction	Construct-vari. relationship	Unidirectional	Linear	Nonlinear	*Monotonic*	Construct-vari. relationship	Association study	Event study	Difference study
Analyst Behavior	–	–	–	–	–	–	–	–	–	–	–	–	–
Valuation and Fundamental Analysis	1	–	–	–	–	1	1	–	–	–	1	–	–
The consequences of Accounting Standards	2	–	–	3	1	2	2	–	–	1	2	1	–
Market Efficiency	–	–	–	–	3	–	–	–	–	3	–	3	–
The consequences of Performance Measure Alternatives	4	–	–	–	–	4	4	–	–	–	4	–	–
The consequences of Accounting Disclosure	5	–	–	–	2	8	8	–	3	2	8	2	–
Discretionary Behavior	6	–	–	2	6	8	8	–	2	6	7	3	4
Earnings Response Coefficient	6	–	1	6	2	13	13	–	7	2	13	1	1
Accounting Value Information Content	3	–	–	–	17	3	3	–	–	17	3	17	3
Value Relevance	40	1	–	6	2	47	43	4	6	2	47		2
Total	**67**	**1**	**1**	**17**	**33**	**86**	**82**	**4**	**18**	**33**	**85**	**27**	**10**

4.3. The development of MBAR

The next analysis emphasizes on qualitative aspect of MBAR development by drawing it into a research map. The map describes the variables researched, inter-variable relationship, and the unit of analysis. The map and its legend are presented in the appendix.

4.3.1. Analyst behavior

An analyst behavior research describes market consequences of analysts forecast publication. However, this research topic is not found because analyst forecast reports are not available for public. Therefore, regulatory body in Indonesia should consider that analyst forecast is to become one of the public information sources to make investment decision.

4.3.2. Valuation and fundamental analysis

Kothari (2001) describes that valuation and fundamental analysis aims to find out a company's valuation model that can reliably predict market value of shares. For a decade in Indonesia, only Wirama (2009) who studied the ability of Feltham and Ohlson (1995) valuation model in predicting market value of shares. However, many valuation models have not been researched yet such as dividend-discounting model or balance sheet model. *(See appendix 2)*

4.3.3. Accounting regulation consequences

Lev and Ohlson (1982) have described the development of research in consequences of accounting regulation in term of market reaction. There are 2 articles on this theme i.e. Alim and Hartini (2001) and Lestari and Baridwan (2008). They investigate the consequences of tax regulation changing and accounting policy difference, respectively. In Indonesia from 2000 to 2009, the global adoption IFRS has not been researched yet although it brings economic consequences (see for example Daske et al., 2008; Jeanjean and Stolowy, 2008). *(See appendix 3)*

4.3.4. Market efficiency

Three articles showed that Indonesia has a semi-strong capital market because it only reacts to existing information in capital market (Setiawan and Subekti, 2005; Marfuah, 2006). In term of decision-making, many investors react improperly to the growth of a company. Researchers conclude that Indonesian investors are more focus on potential cash information rather than financial statement indicators. However, the three researchers used the same model to test the efficiency market by using dividend announcement. Thus, many publications other than dividend have not been researched. *(See appendix 4)*

4.3.5. Performance measure alternative

Research in performance measure alternatives aims to identify the relationship between the uses of certain performance measured by the value of shares. The main conclusion of research in Indonesia is that EVA is still relevant to be used to predict the firm's value of shares although the result was not consistent. Other performance measures such as for banking, insurance, or mining that has special features remain to be potential research area. *(See appendix 5)*

4.3.6. Accounting disclosure consequences

Accounting disclosure consequences describes the relationship between accounting disclosure with the value of shares. Generally, the relationship between them in Indonesia was not conclusive. Besides accounting disclosure, many specific disclosures such as corporate governance or corporate social responsibility might influence investor decision making but have not been consistently proven. *(See appendix 6)*

4.3.7. Discretionary behavior

This theme focuses on the market reaction to discretionary behavior of management. In Indonesia, this research starts from the testing of differences in market reaction to financial statement containing earnings management. However, the results showed that earnings management inconsistently influenced market reaction. Researchers usually speculate on the reason of this inconsistency without giving more evidence. Therefore, motivation of earnings management, namely opportunistic and efficiency, needs to be elaborated in the future by using more sophisticated method.

The next step of discretionary research is to observe earnings management in the IPO session since there is a suspicion opportunistic behavior to get high initial price during the offering. Researchers found that listed companies did earnings management during the IPO although there was no consistent evidence of the ability of earnings management in influencing share price after IPO in the secondary market. *(See appendix 7)*

4.3.8. Earnings response coefficient (ERC)

ERC research in Indonesia is growing along the observation period. Kothari (2001) said that ERC researchers could only compare the significance of ERC with the response coefficient of other variables such as cash flow response coefficient. However, ERC in Indonesia runs more than Kothari (2001) expectation.

The explanatory variable of ERC is increasing such as foreign currency gain/loss, negative income, earnings surprise, auditor, and cash flow. Researchers usually use these variables as the moderator between unexpected earnings (UE) and cumulative abnormal return (CAR). In other words, these variables are used to test the responsiveness of CAR when there is an UE and other moderator variables. *(See appendix 8)*

4.3.9. Accounting information content

Accounting information content (AIC) can be called as announcement type research (Lev and Ohlson, 1982) because it seeks to find out the market reaction to the accounting publication/event using event study or difference study. The result shows that 17 articles of AIC use various publications such as earnings announcement, dividend, bonus share, bonds rating, right issue, and stock split. Earnings and dividend are still interesting for the market players although corporate action publication leads inconsistent reaction from market players.

AIC research remains interesting topic in the future because many questions have not been answered. Inter-industry information transfer could be potential topic to be further investigated since there was only one article discussed it about. Moreover, AIC research is facing a problem of the independency of price reaction with volume reaction although they come from the same market player. The date of earnings announcement in Indonesia still becomes classical problem because there is no such announcement in Indonesia unless for the companies that listed in cross-border stock exchange. Generally, researchers use the former of the date of financial statements submitting to the stock exchange, submitting it to SEC, or announcing it in mass media as the proxy of announcement date. Only some of MBAR researchers pay more attention to the direction of capital market reaction. Most of them focus on the existence of market reaction without considering the direction of the reaction. *(See appendix 9)*

4.3.10. Value relevance study

Value relevance study investigates the correlation of accounting data with stock price or its liquidity (Holthausen and Watts, 2001). Generally, the result of value relevance study indicates whether accounting value can predict stock price or not.

The consistency of prediction power of accounting value remains a questionable fact. Nonlinear model of relationship between accounting data and stock prices could not explain such inconsistency (Soepratikno and Hartono, 2005; Rahmawati, 2005, 2006; Sumarni and Rahmawati, 2007). Therefore, meta analysis is needed to indicate the best predictor of stock prices.

Although value relevance study is the most popular topic in MBAR, it has some weaknesses. Although the articles of value relevance study were published in accredited accounting journal, they used too small sample in utilizing parametric statistics. Other articles were not published in complete and standardized format. Moreover, an article was published twice in two different journals. This indicates the weaknesses of journal management and its review process. A common mistake of value relevance researchers is that they did not report the value relevance study, rather they found the best predictor of stock price and did not examine the causal relationship of accounting data and stock prices. *(See appendix 10)*

5. Conclusion

This research aims to describe the development of MBAR in Indonesia. The description is drawn on a research map that contains the theme of MBAR, variables, inter-variable relationship, methods, and unit of analysis MBAR. There are nine maps which represent the development of MBAR and contain 18 dependent variables, 154 independent variables, 19 moderating variables, 1 mediating variable, 34 constructs, 5 research models representing 3 research methods, and 3 unit of analysis. The analysis indicates that many MBAR areas are interesting to be investigated in the future. MBAR will be a more important research since the convergence process of international accounting standard is ongoing in 2012. Moreover, meta analysis is needed to synthesize the inconsistency results of MBAR.

However, this study contains some weaknesses. This paper only observes 10 years development while many previous researches make a review for at least 20 years. Due to the data limitation, this paper could review only a decade of Indonesia accounting research publication that historically starts in the late 90's. Since this study use descriptive approach for broad research area, the analysis is broad but not deep. Therefore, future research should deeply elaborate each theme mapped in this research.

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APPENDICES

Appendix 1

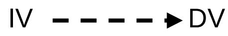
Map Notation

The map notation used in this research is adopted from Luft and Shields (2003).

I. Association study

1. Additive, linear, and unidirectional:

Positive: 

Negative: 

Not Specific: 

Not Related 

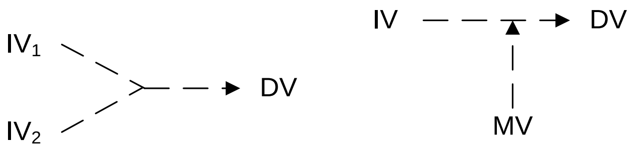
2. Intervening model, for example:

3. Interaction Model,

a. Ordinal (monotonic) model with general sign:

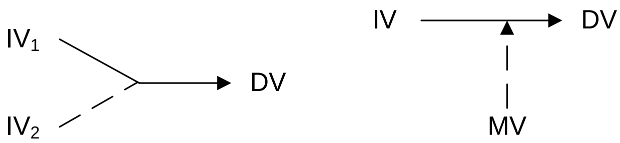
i. IV_2 or MV strengthen positive relationship of IV_1 – DV

ii. IV_2 or MV strengthen negative relationship of IV_1 – DV

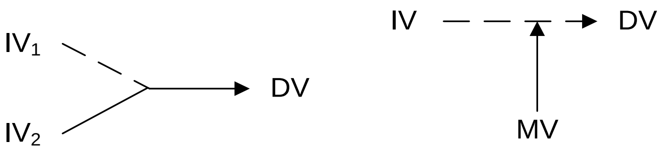


b. Ordinal Model with mixed-sign:

i. IV_2 or MV negatively influence the positive relationship of IV_1 – DV



ii. IV_2 or MV positively influence the negative relationship IV_1 – DV

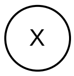


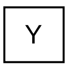
4. Nonlinear unidirectional relationship:

a. U relation: 

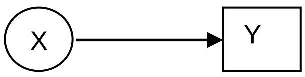
b. Inverted U relation: 

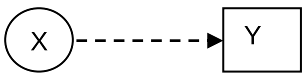
II. Construct-Variable relationship

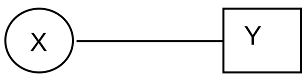
1. Construct: informative event, sample divider factor (immeasurable) 

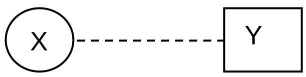
2. Variable (measurable) 

3. The relationship between construct and variable

Positive: 

Negative: 

Unspecific: 

Not related: 

Appendix 2 Fundamental Analysis and Valuation

Unit of analysis: Beyond organization
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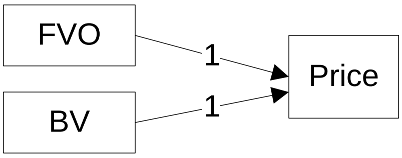
Unit of analysis: organization



Unit of analysis: Organization subunit
–

Dependent variable:
1. *Price*: Market capitalization

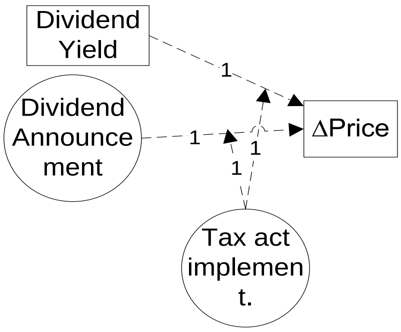
Independent variable:
1. BV: Companies book value
2. NMO: Ohlson (1995) model value

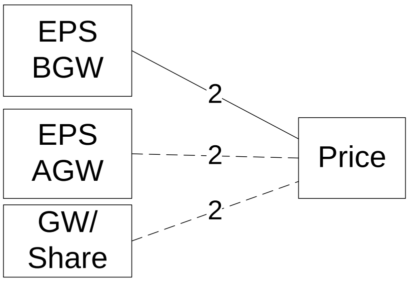
Source:
1. Wirama (2009)

Appendix 3 Accounting regulation consequences

Unit of analysis: Beyond organization
–

Unit of analysis: organization





Unit of analysis: Organization subunit
–

Constructs:
1. Tax act implementation: The category of difference test to divide sample into before-and-after tax act amendment
2. Dividend announcement: An event of announcing dividend

Dependent variables:
1. Price: Stock price
2. ΔPrice: Stock price changes

Independent variables:
1. EPSAGW: EPS after goodwill amortization
2. EPSBGW: EPS before goodwill amortization
3. GW/Share: Goodwill amortization per share

Sources:
1. Alim and Hartini (2001)
2. Lestari and Baridwan (2008)

Appendix 4 Market Efficiency

Unit of analysis: Beyond organization

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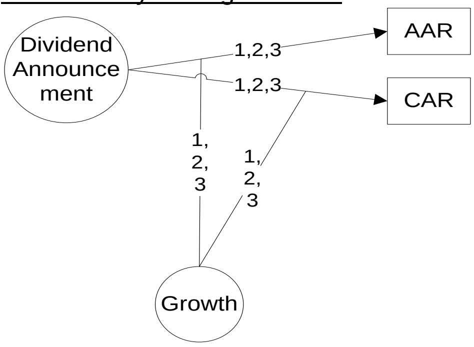
Unit of analysis: organization



Unit of analysis: Organization subunit

–

Constructs:

1. Dividend Announcement: An event of announcing dividend
2. Growth: A category to divide sample into two groups i.e. growing and not growing, measured by market value equity/book value equity or capital expenditure/book value of asset)

Dependent variables:

1. AAR: Average abnormal return (market model)
2. CAR: Cumulative abnormal return (market model)

Sources:

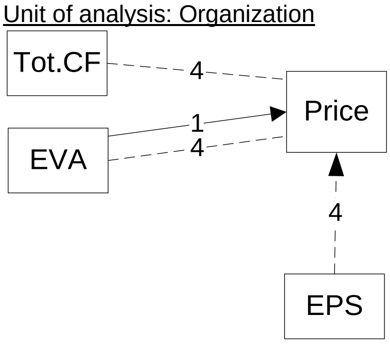
1. Setiawan and Hartono (2003)
2. Setiawan and Subekti (2005)
3. Marfuah (2006).

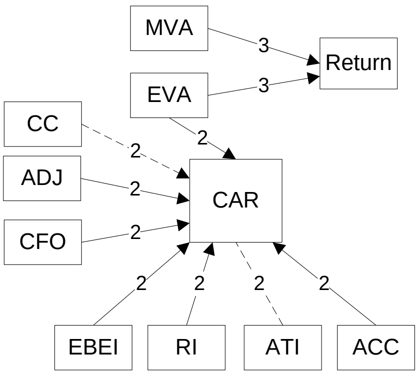
Appendix 5 Performance Measure Consequences

Unit of analysis: Beyond organization

–

Unit of analysis: Organization





Unit of analysis: Organization subunit

–

Dependent variables:

1. CAR: Cumulative abnormal return
2. Price: Stock price
3. Return: Stock return

Independent variables:

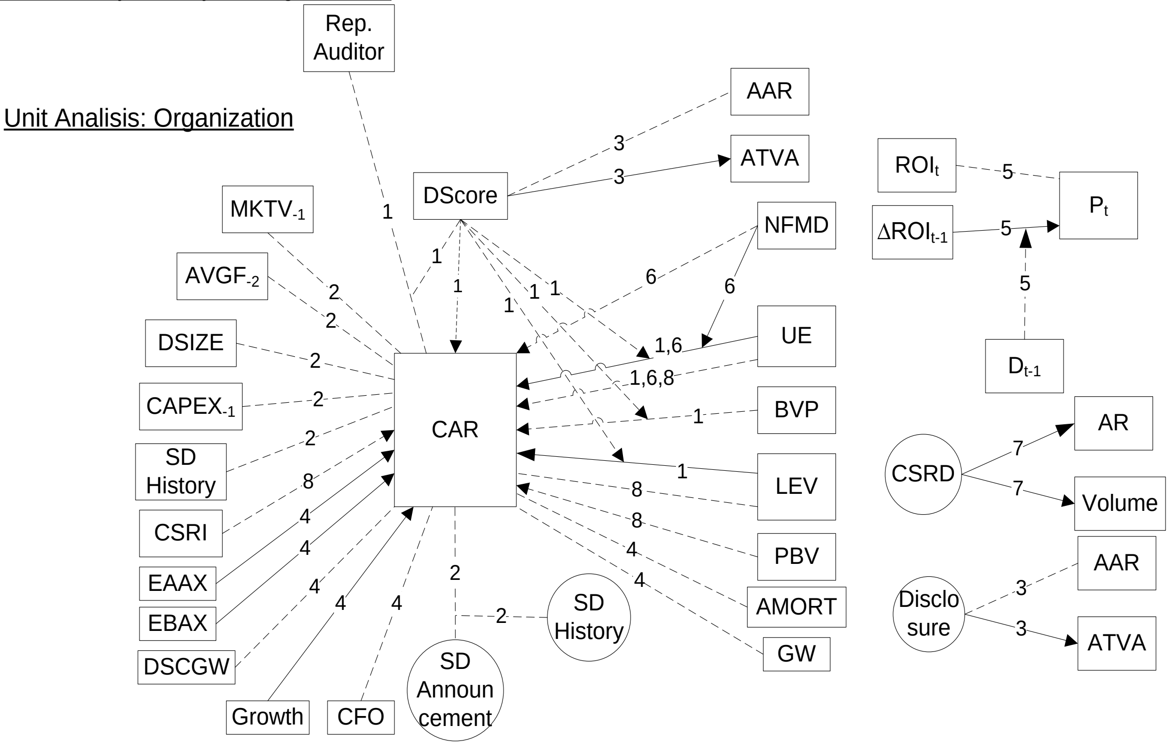
1. ACC: Accrual
2. ADJ: Accounting adjustment
3. ATI: After tax interest
4. CC: Capital charge
5. Tot.CF: Cash flow
6. CFO: Operating cash flow
7. EBEI: Earnings before extraordinary item
8. EPS: Earnings per share
9. EVA: Economic value added
10. MVA: Market value added
11. RI: Residual income

Sources:

1. Ekadjaja (2006)
2. Hidayat (2006)
3. Madiah, Sugiarto, and Siagian (2006)
4. Sriwahyuni (2007)

Appendix 6 Accounting Disclosure Consequences

Unit of analysis: Beyond organization



Unit of analysis: Organization subunit

–

Constructs:

1. CSRD: Corporate social responsibility disclosure index, sample divider
2. Disclosure: Announcement of financial statement
3. SD Announce: Stock dividend announcement
4. SD History Stock dividend history, sample divider

Dependent variables:

1. AAR: Average Abnormal return
2. AR: Abnormal return
3. ATVA: Average trading volume activity
4. CAR: Cumulative abnormal return (size adjusted model)
5. Price: Stock price
6. TVA: Stock trading volume

Independent variables:

1. ΔROI_{t-1} : ROI Changes
2. AMORT: The ratio of goodwill amortization expense and income after amortization
3. $AVGF_{-2}$: Two years operating cash flow average
4. BVP: Book value per share
5. $CAPEX_{-1}$: Capital expenditure
6. CFO: Operating cash flow
7. CSRD: Corporate social responsibility disclosure
8. CSRI: Corporate social responsibility index
9. DSCGW: Goodwill disclosure rate
10. DSIZE: Dummy for firm size

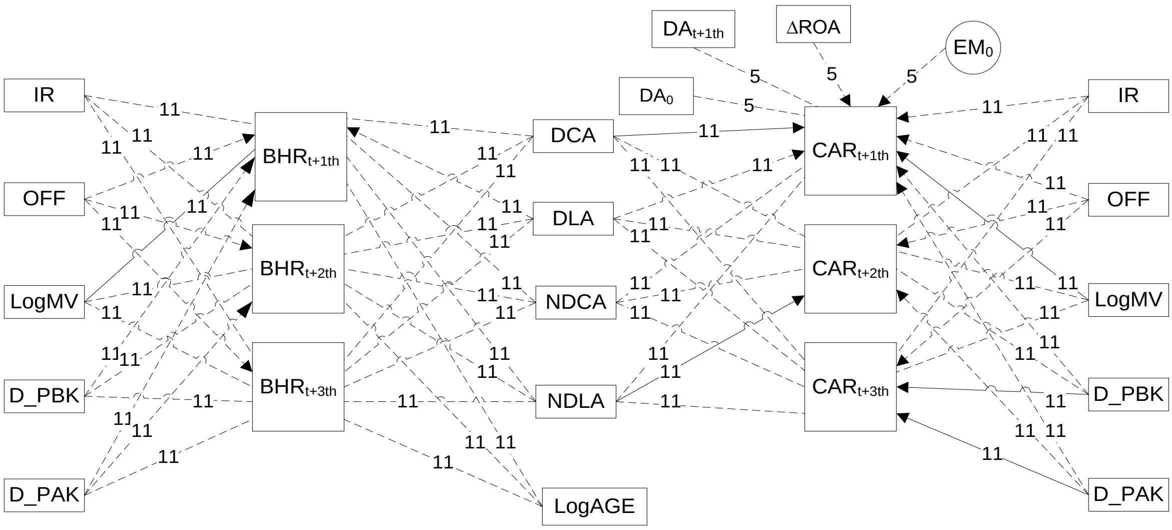
11. EAAX: Earning after goodwill amortization and extraordinary item
12. EBAX: Earning before goodwill amortization and extraordinary item
13. Growth: Company growth
14. GW: Goodwill portion of asset
15. LEV: Leverage
16. $MKTV_{-1}$: Market value of equity
17. NFMD: Nonfinancial measure disclosure
18. PBV: Price-to-equity book value
19. Rep. Auditor: Auditor reputation
20. ROI_t : Return on investment
21. SD History: Stock dividend history
22. UE: Unexpected earning

Moderating variables:
1. D_{t-1} : Disclosure index for period t-1
2. Dscore: Disclosure index

Sources:
1. Adhariani (2005)
2. Aloysius (2005)
3. Junaedi (2005)
4. Anindhita and Martani (2006)
5. Ardiansyah (2007)
6. Wondabio (2007)
7. Yuliana *et al.* (2008)
8. Celia and Bangun (2009)

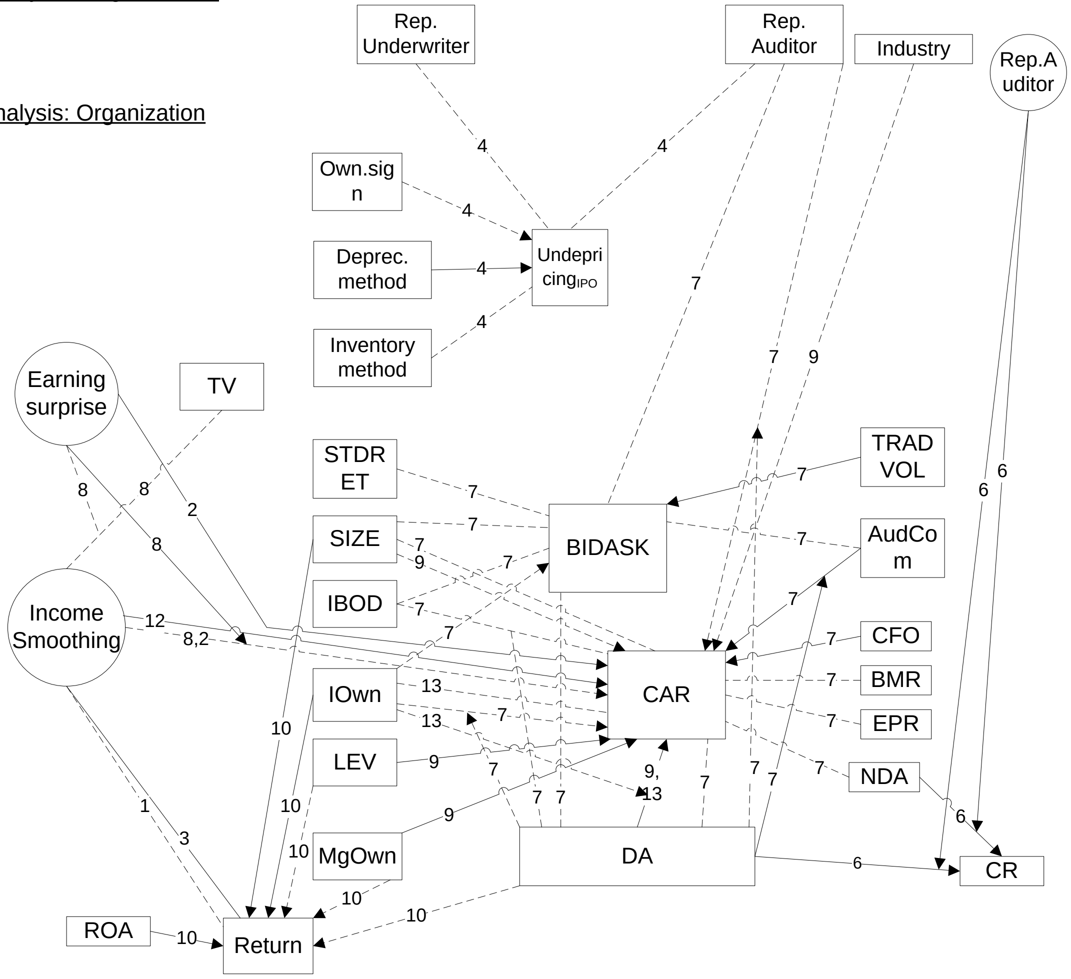
Appendix 7A Discretionary Behavior

Unit of analysis: organization



Appendix 7B Discretionary Behavior

Unit of analysis: Beyond organization



Unit of analysis: Organization Subunit

–

Constructs:

1. Rep. Auditor: Auditor reputation, sample divider
2. Earning surprise: Sample divider
3. Income smoothing: Sample divider (smoother vs. non-smoother)
4. IPO: Initial public offering

Dependent variables:

1. BHR_{t+n}: Buy and hold return after IPO
2. BIDASK: Bid-ask spread
3. CAR: Cumulative abnormal return
4. CAR_{t+n}: Cumulative abnormal return after IPO
5. CR: Cumulative return.
6. Return: Stock return
7. TVA: Trading volume activity
8. Under-pricing: The gap between first closing price in secondary market and initial price in primary market

Independent variables:

1. ΔROA: Changes of return on asset
2. AudCom: The dummy of audit committee
3. Rep. Auditor: The dummy of auditor reputation
4. BMR: Book-to-market ratio
5. CFO: Operating cash flow
6. D_PAK: The dummy of IPO date after crisis
7. D_PBK: The dummy of IPO date after crisis
8. DA: Discretionary accrual
9. DA_0: Discretionary accrual at IPO date
10. DA_{t+1th}: Discretionary accrual at year after IPO
11. DCA: Discretionary current accrual at IPO date
12. DLA: Discretionary long-term accrual at IPO date
13. EPR: Earning-to-price

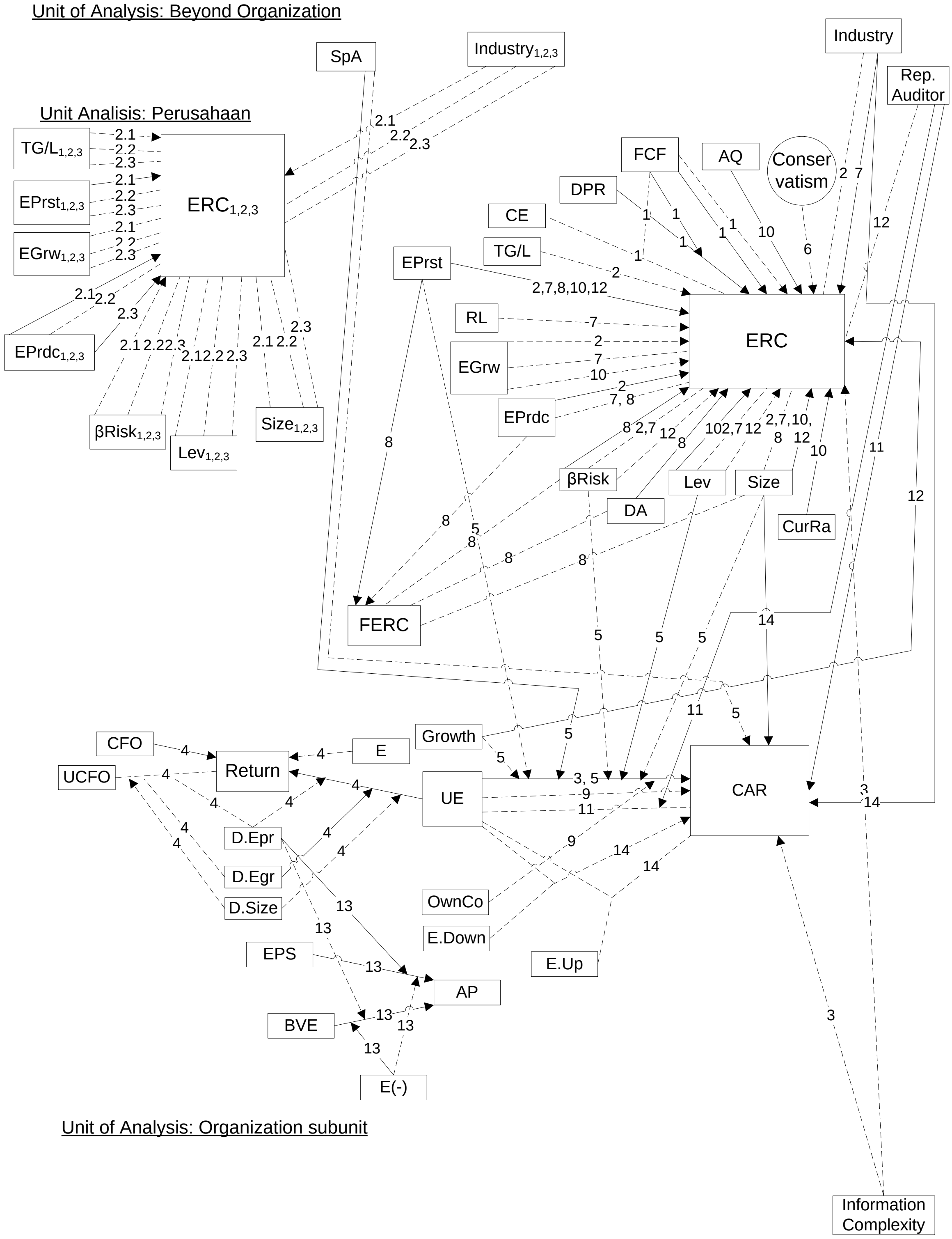
14.	IBOD:	Independent board
15.	Industry:	The dummy of industry
16.	IOwn:	Institutional ownership
17.	IR:	Initial return
18.	LEV:	Leverage
19.	LogAGE:	Company age
20.	LogMV:	Firm market value
21.	Deprec. method:	Depreciation method
22.	Inventory method:	Inventory method
23.	MgOwn:	Managerial ownership
24.	NDA:	Non-discretionary Accrual
25.	NDCA:	Non-discretionary current accrual
26.	NDLA:	Non-discretionary long-term accrual
27.	OFF:	Offering price
28.	Rep. underwriter:	Underwriter reputation
29.	ROA:	Return on asset
30.	Own. sign:	Ownership signal
31.	SIZE:	Firm size
32.	STDRET:	Stock return deviation standardized
33.	TRADVOL:	Average of trading volume

Moderating variables:

1.	DA:	Discretionary accrual

Sources:
1. Salno and Baridwan (2000)
2. Assih and Gudono (2000)
3. Prasetio *et al.* (2002)
4. Ali and Hartono (2003)
5. Saiful (2004)
6. Ardiati (2005)
7. Veronica and Bachtiar (2005)
8. Juniar *et al.* (2006)
9. Sukartha (2007)
10. Widyastuti (2007)
11. Rahman and Hutagaol (2008)
12. Oktorina and Hutagaol (2009)
13. Joni and Hartono (2009)

Appendix 8 Earnings Response Coefficient



Constructs:
1. Conservatism: Sample divider (conservative and other)

Dependent variable
1. AP: Adjusted stock price
2. CAR: Cumulative abnormal return
3. ERC: Earnings response coefficient
4. $ERC_{1,2,3}$: Earnings response coefficient for particular sample
5. FERC: Future ERC
6. Return: Stock return

Independent variables:
1. AQ: Accrual quality
2. BVE: Book value of equity per share

3. CE: Capital expenditure
4. CFO: Operating cash flow
5. CurRa: Current ratio
6. DA: Discretionary accrual
7. DPR: Dividend pay-out ratio
8. Earnings: Firms income
9. EGrw: Earnings growth
10. $EGrw_{1,2,3}$: Earnings growth for particular sample
11. EPrdc: Earnings predictability
12. $EPrdc_{1,2,3}$: Earnings predictability for particular sample
13. EPrst: Earnings persistency
14. $EPrst_{1,2,3}$: Earnings persistency for particular sample
15. EPS: Earnings per share
16. FCF: Free cash flow
17. Industry: The dummy for industry
18. $Industry_{1,2,3}$: The dummy for industry for particular sample
19. Information complexity
20. Lev: Leverage
21. $Lev_{1,2,3}$: Leverage for particular sample
22. Rep. Auditor: Auditor reputation
23. RL: Reporting lag
25. $Size_{1,2,3}$: Firm size for particular sample
26. SpA: Auditor specialization
27. TG/L: Foreign currency gain/loss
28. $TG/L_{1,2,3}$: Foreign currency gain/loss for particular sample
29. UCFO: Unexpected operating cash flow
30. UE: Unexpected earnings
31. βRisk: Risk
32. $βRisk_{1,2,3}$: Risk for particular sample

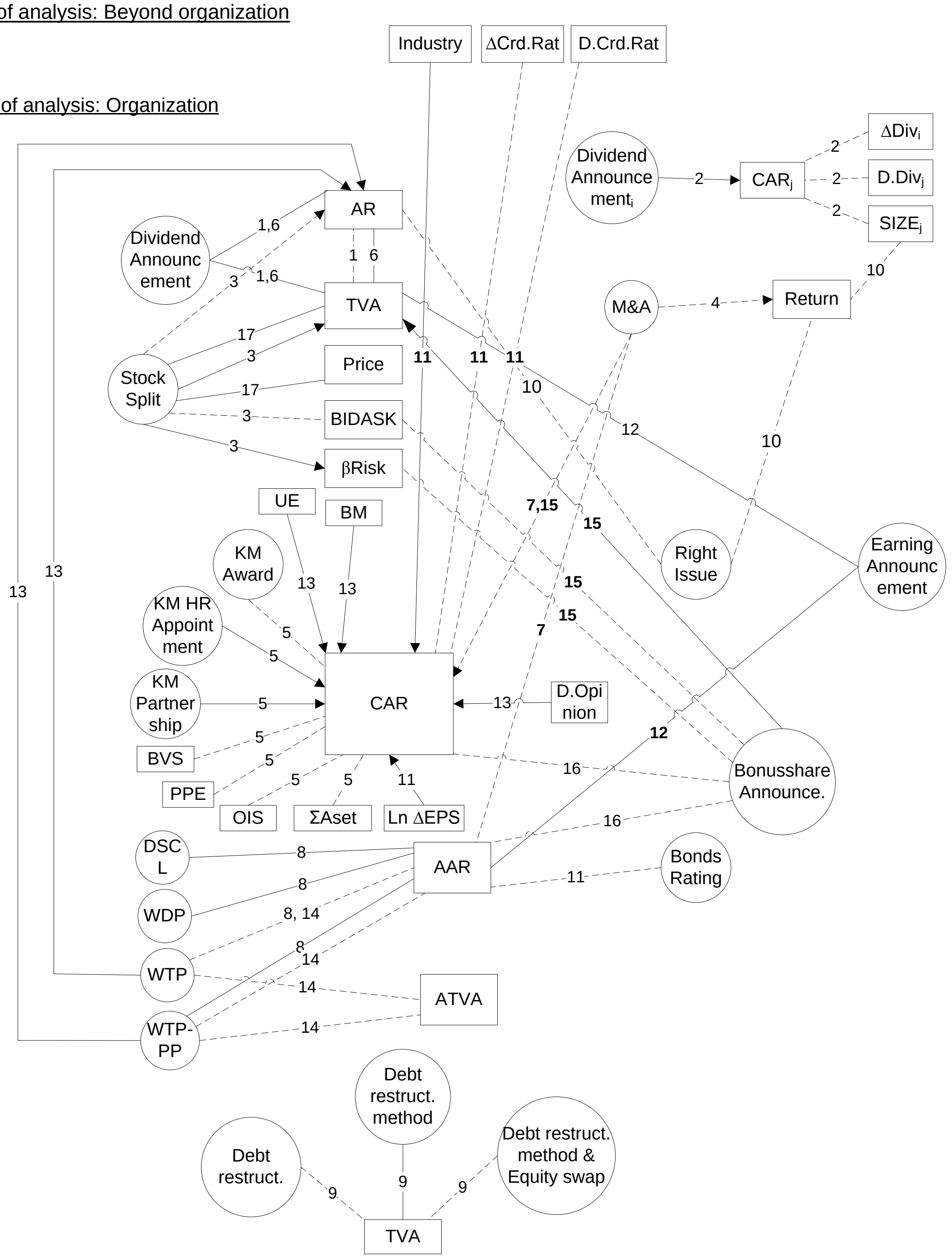
Moderating variables:
1. Rep. Auditor: Auditor reputation
2. D.Egr: Dummy for earnings growth
3. D.EPr: Dummy for earnings persistency
4. D.Size: Dummy for firm size
5. E(-): Dummy negative income
6. E.Down: Unexpected negative income
7. E.Up: Unexpected positive income
8. FCF: Free cash flow
9. Growth: Firms growth
10. OwnCo: Ownership concentration
11. SpA: Auditor specialization

Sources:
1. Uyara and Tuasikal (2003)
2. Chandrarin (2003), which divided into 2.1, 2.2, and 2.3
3. Kusuma (2003)
4. Diana and Kusuma (2003)
5. Mayangsari (2004)
6. Dewi (2004)
7. Jaswadi (2004)
8. Bonny *et al.* (2004)
9. Febrianto (2005)
10. Jang *et al.* (2006)
11. Setiawati (2006)
12. Mulyani *et al.* (2007)
13. Naimah and Utama (2007)
14. Sugiri and Sumiyana (2009)

Appendix 9 Accounting Information Content

Unit of analysis: Beyond organization

Unit of analysis: Organization



Unit of analysis: Organization subunit

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Constructs:

1. Bonds rating: Bonds rating announcement
2. Bonus-share announcement: Bonus-share announcement
3. Dividend announcement: Dividend announcement
4. Dividend announce$_i$: Dividend announcement of particular sample
5. DSCL: Disclaimer audit opinion
6. Earning announcement: Earning announcement
7. KM Award: Knowledge management award
8. KM HR Appointment: Publication of knowledge management expert appointment

9.	KM Partnership:	Publication of knowledge management partnership
10.	M&A:	Merger and acquisition announcement
11.	Debt restruct. method& Equity swap:	Sample divider based on the uses of debt restructuring method and equity swap
12.	Debt restruct. method:	Sample divider based on the uses of debt restructuring method
13.	Debt restruct.	Sample divider based on the existence of debt restructuring
14.	Right issue	Right issue announcement
15.	Stock split:	Stock split event
16.	WDP:	Qualified audit opinion
17.	WTP:	Unqualified audit opinion
18.	WTP-PP:	Unqualified audit opinion with explanatory paragraph

Dependent variables:

1.	AAR:	Average abnormal return
2.	AR:	Abnormal return
3.	ATVA:	Abnormal trading volume
4.	BIDASK:	Bid-ask spread
5.	CAR:	Cumulative abnormal return
6.	CAR_j:	Cumulative abnormal return for particular sample
7.	Price:	Stock price
8.	Return:	Stock Return
9.	TVA:	trading volume
10.	βRisk:	Firm risk

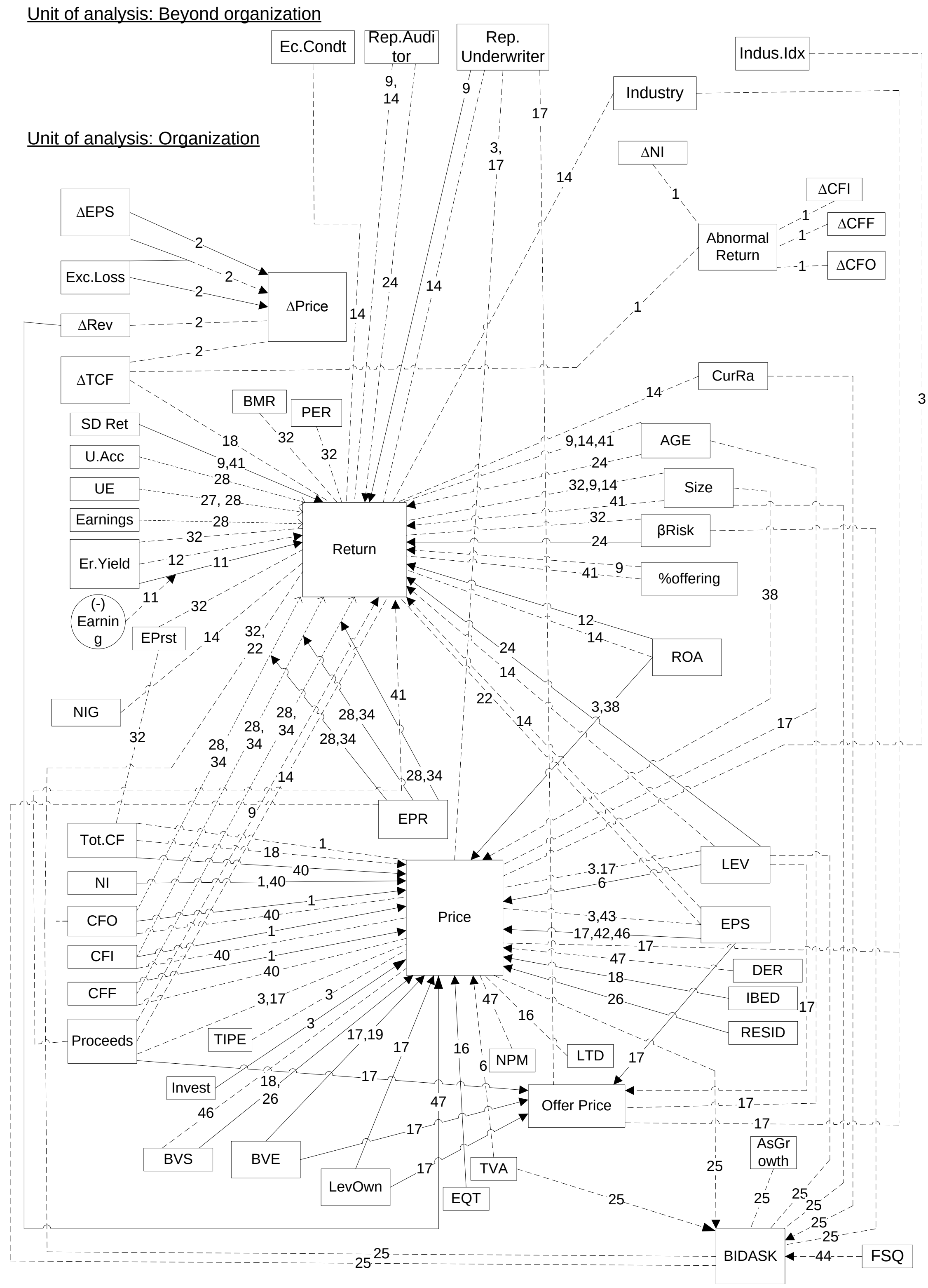
Independent variables:

1.	ΔCrd.Rat:	Credit rating changes
2.	ΔDiv_i:	Dividend changes of particular firm
3.	BMR:	Book to market ratio
4.	BVS:	Book value per share
5.	D.Crd.Rat:	Dummy for credit rating
6.	$D.Div_j$:	Dummy dividend changes of particular firm
7.	D.Opinion:	Dummy for audit opinion
8.	Industry:	Dummy for industry
9.	Ln ΔEPS:	EPS Changes
10.	OIS:	Operating income before depreciation
11.	PPE:	Property and plant
12.	$SIZE_j$:	Firm size of particular firm
13.	UE:	Unexpected earning
14.	ΣAset:	Total asset

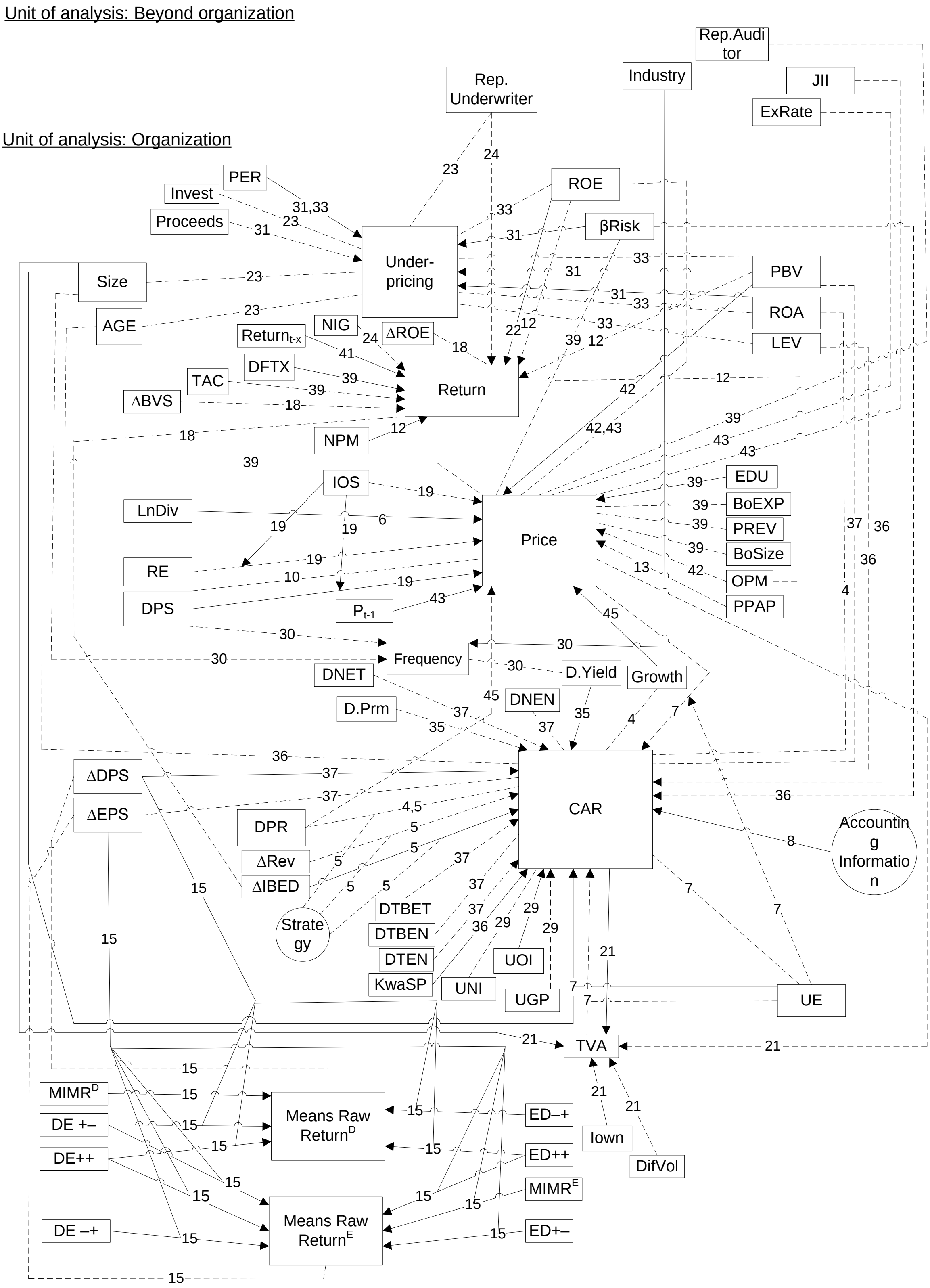
Sources:

1. Bandi & Hartono (2000)
2. Yusnitasari (2003)
3. Kurniawati (2003)
4. Payamta & Setiawan (2003)
5. Warsono (2004)
6. Meiden *et al.* (2004)
7. Sutrisno & Sumarsih (2004)
8. Pujadi *et al.* (2005)
9. Aloysius (2006)
10. Hastuti & Nurhana (2006)
11. Karyani & Manurung (2006)
12. Kurniawati (2006)
13. Leo (2007)
14. Meiden (2007)
15. Gudono (2007)
16. Kurniawati (2007)
17. Tanjung (2007)

Appendix 10 A Value Relevance Study

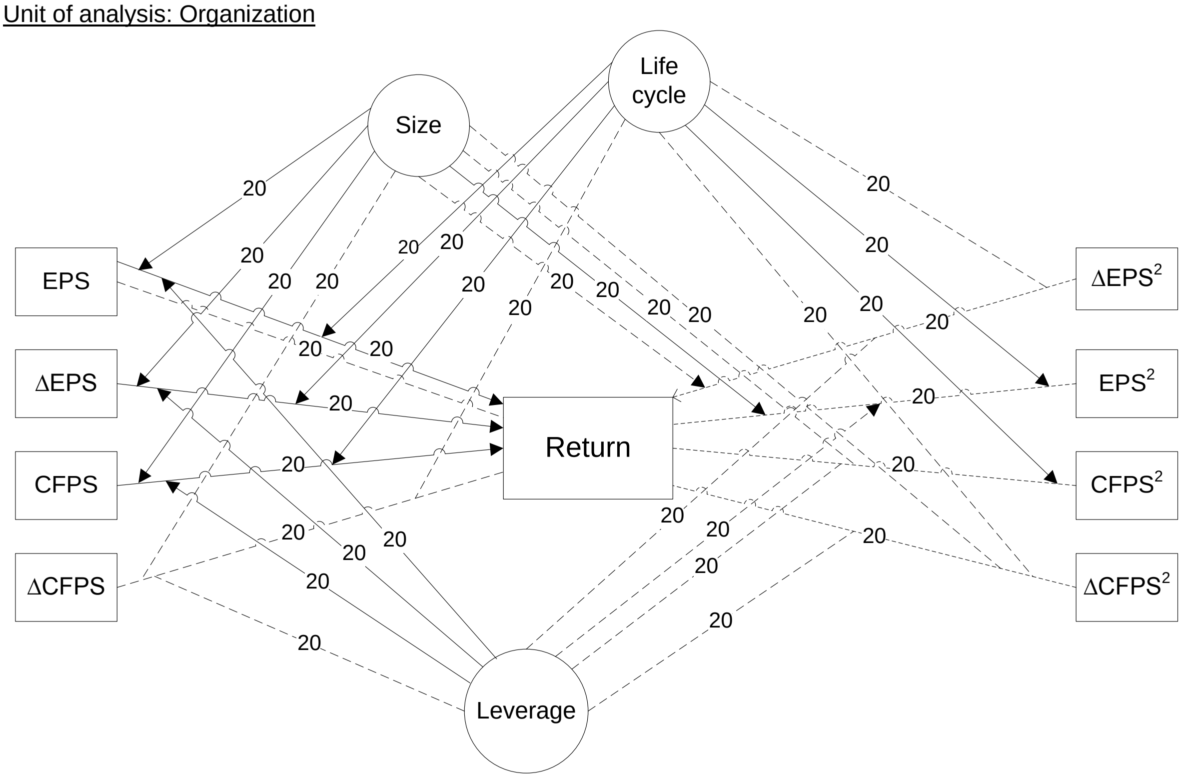


Appendix 10 B Value Relevance Study



Appendix 10 C Value Relevance Study

Unit of analysis: Organization



Unit of analysis: Organization subunit

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Constructs:

1.	(-) *Earning*:	Negative earnings
2.	Accounting information	
3.	Strategy:	Sample divider based on the strategy used

Dependent variables:

1.	Δ Price:	The price changes
2.	AR:	Abnormal return
3.	CAR:	Cumulative abnormal return
4.	Frequency:	Trading frequency
5.	$MRR^{D(E)}$:	Average raw return around dividend announcement
6.	Price:	Stock price
7.	Return:	Stock return

Independent variables:

1.	%Offering:	Ownership percentage offered in IPO
2.	Δ EPS:	EPS Changes
3.	Δ NI:	Net income Changes
4.	ΔBVS:	Book value per share changes
5.	ΔCFF:	Financing cash flow changes
6.	ΔCFI:	Investment cash flow changes
7.	ΔCFO:	Operating cash flow changes
8.	ΔDPS:	Dividend per share changes
9.	ΔIBED:	The changes of income before *extraordinary item* and *discontinued operation*
10.	ΔRev:	Revenue changes
11.	ΔROE:	R*eturn on equity changes*
12.	ΔTCF:	Total cash flow changes
13.	AGE:	Firm age
14.	AsGrowth:	Asset growth
15.	BMR:	*Book-to-market ratio*
16.	BoExp:	Board experience
17.	BoSize:	Board size
18.	BVE:	Book value of equity
19.	BVS:	Book value per share
20.	CFF:	Financing cash flow
21.	CFI:	Investment cash flow
22.	CFO:	Operating cash flow

23. CurRa: *Current ratio*
24. D.Prm: Dividend Premium
25. D.Yield: Dividend *Yield* (DPS/stock price)
26. DE (+–/++/–+): Dummy of dividend announcement before earning announcement for the condition of dividend increase and income decrease/ dividend increase and income increase/dividend decrease and income increase.
27. DFTX: Deferred tax
28. DNEN: Dummy for dividend increase and income increase
29. DNET: Dummy dividend increase and income decrease
30. DPR: Dividend payout ratio
31. DPS: Dividend per share
32. DTBEN: Dummy for dividend unchanged and income increase
33. DTBET: Dummy for dividend unchanged and income decrease
34. DTEN: Dummy for dividend decrease and income increase
35. Earnings: Accounting income
36. Ec.Condt: *Dummy* for economic condition
37. ED (+–/++/–+): Dummy of earning announcement before dividend announcement for the condition of income increase and dividend decrease/income increase and dividend increase/income decrease and dividend increase
38. EDU: Board education
39. EPS: *Earnings per share*
40. EQT: Stockholder equity
41. Er.Yield: Earnings yield (EPS/stock price)
42. EPR: *Earning* per stock price ratio
43. FSQ: Financial statement quality
44. Growth: Firm growth
45. IBED: Income before *extraordinary item* and *discontinued operation*
46. Indus.Idx: Index of average Industry stock price
47. Industry: *Dummy* for industry
48. Invest: *Investment Proceeds*
49. IOwn: Institutional ownership
50. JII: *Jakarta Islamic Index*
51. ExRate: Rupiah to dollar exchange rate
52. KwaSP: Absolute announcement timeline after audit
53. Lev: *Leverage*
54. LevOwn: Ownership level
55. LnDiv: Dividend
56. LTD: *Long-term debt*
57. $MIMR^{D(E)}$: Weighted average market return around dividend announcement
58. NI: Net income
59. NIG: Net income growth
60. OPM: *Operating profit margin*
61. PBV: *Price-to-book value of equity ratio*
62. PER: *Price-to-earnings ratio*
63. PPAP: Productive asset allowance
64. PREV: Board experience
65. Proceeds: Proceeds of equity offered
66. RE: Retained earnings
67. Rep. Auditor: Auditor reputation
68. Rep. Underwriter: *Underwriter* reputation
69. RESID: *Residual earnings*
70. $Return_{t-x}$: Average *return* for certain time
71. ROA: *Return on assets*
72. ROE: *Return on equity*
73. SD Ret: Standardized deviation of stock return
74. Size: Firm size
75. TAC: Total accrual
76. TIPE: Types of offering
77. Tot.CF: Total cash flow
78. TVA: Trading volume
79. U.Acc: Unexpected accrual
80. UE: *unexpected earning*
81. UGP: *Unexpected gross profit*
82. UNI: *Unexpected net income*
83. UOI: *Unexpected operating income*
84. βRisk: Firm risk

Moderating variables:

1. IOS: Investment opportunity set
2. ΔDPS: Dividend per share changes
3. Δ EPS: EPS Changes

4. EPR: *Earning* per stock price ratio
5. Exc.Loss: Dummy for exchange loss

Intervening variables
1. EPrst: Earnings persistency

Sources:
1. Triyono & Hartono (2000)
2. Chandrarin & Tearney (2000)
3. Payamta (2000)
4. Subekti & Kusuma (2001)
5. Habbe & Hartono (2001)
6. Pujiono (2002)
7. Marfuah (2002)
8. Tuasikal (2002)
9. Nasirwan (2002)
10. Handoyo (2002)
11. Ajie (2003)
12. Meiden & Toumahu (2003)
13. Murni (2003)
14. Ardiansyah (2004)
15. Hartono (2004)
16. Maryanto & Muchlis (2004)
17. Gumanti (2005)
18. Linda & Syam (2005)
19. Jadi (2005)
20. Soepratikno & Hartono (2005)
21. Yuniasih (2005)
22. Spartha & Februwaty (2005)
23. Dewi (2005)
24. Meiden *et al.* (2005)
25. Tumirin (2005)
26. Suwardi (2005)
27. Rahmawati (2005)
28. Rahmawati (2006)
29. Febrianto & Widiastuty (2006)
30. Ria & Husnah (2006)
31. Gumanti & Wianandi (2007)
32. Meythi (2007)
33. Susanto (2007)
34. Sumarni & Rahmawati (2007)
35. Handary *et al.* (2008)
36. Wirakusuma (2008)
37. Astuty & Siregar (2008)
38. Aini & Sumiyana (2008)
39. Damayanti (2008)
40. Keni (2008)
41. Hastuti (2008)
42. Murni (2008)
43. Endri (2008)
44. Fanani (2009)
45. Riadi (2009)
46. Wijaya (2009)
47. Ayu & Handoyo (2009)

The relationship between ownership structure and firm financial performance

Evidence from Jordan

Tariq Tawfeeq Yousif Alabdullah
Accounting Department, College of Administration and Economics, University of Basrah, Iraq

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Abstract

Purpose – Previous studies that dealt with corporate governance have witnessed gradually significant growth that created some new trends. The purpose of this paper is to be involved in such trends through examining the link between ownership structure as one of the important corporate governance mechanisms and firm performance in Jordan as one of emerging economies.

Design/methodology/approach – The current study used the multiple regression method to analyze available data for non-financial firms listed in the Amman Stock Exchange for the fiscal year 2012.

Findings – The findings revealed that managerial ownership has a positive impact on performance. On the other hand, the findings surprisingly showed no evidence to support the impact of foreign ownership on performance. Moreover, there is a significant evidence to support the fact that company size has no impact on firm performance. The findings also revealed that industry type has no impact on firm performance.

Practical implications – The practical implications of the current study demonstrated that good corporate governance is imperative to all organizations and must be encouraged for the interest of all stakeholders. Unlike the majority of the previous studies, the current study unexpectedly found that foreign ownership is not significantly contributing to the firm performance. Thus, Jordanian Government and other related/responsible parties should formulate policies for the foreign investors.

Originality/value – Interestingly, from developed and developing countries perspective, the study is the first of its kind that exclusively chose the mechanisms of ownership structure in its relationship with firm performance represented by market share, where no previous study has tested foreign ownership in such relationship. In that, this study is the first study in emerging economies to investigate such a link. Such new insights on this relationship by current study provide helpful information that is of great value to the government, academics, policy makers, and other stakeholders.

Keywords Industry type, Firm performance, Firm size, Ownership structure

Paper type Research paper

Introduction

Corporate governance has got wide attention as one of the most researched issues in the organizational and other fields (Becht *et al.*, 2003; Daily *et al.*, 2003; Shleifer and Vishny, 1997). Corporate governance field addresses a wide variety of topics in its relationship with financial performance (see Bhagat and Bolton, 2008; Brown and Caylor, 2006; Chaghadari, 2011). Nevertheless, corporate scandals and failures in several corporations, such as the cases of Enron, WorldCom, and Arthur Andersen, and other scandals, continue to fuel the argument over whether companies should issue or use new perspectives as new trends to measure firm performance to be as essential part of their strategic goals to eventually maximize shareholders' wealth (Alabdullah, 2016; Alabdullah *et al.*, 2014a, b, 2016; Khanchel, 2007; Marr and Schiuma, 2003). This also will have a lot of concerns about the way corporations are governed and what performance measurements can effectively reflect firm performance in its relationship with corporate governance structures. Corporate governance is related to the structures and processes through which parties interested in the overall well-being of the company take measures to look after the stakeholders' interests. Precise corporate governance is centered on the mechanisms, transparency, principles of accountability, fairness,

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and responsibility in the management of the company. The existence of corporate governance in a company is an attempt to alleviate principal-agent problems regarding the matter of separation of ownership and control (Chen and Wei, 2009; Jensen and Meckling, 1976). From the perspective of agency theory, it explains the conflict of interests and the arising agency costs between shareholders and managers. The separation of ownership and control has been considered as one of the most contentious and important issues in the management, accounting, and financial literatures.

Prior work revealed that one of the most important components in the structure of corporate governance mechanisms is ownership structure, such as the managerial ownership and foreign ownership (Mai *et al.*, 2009), together with their relationship with firm performance (Abor and Biekpe, 2007). Furthermore, a review of the literature led to the decision of including and investigating two control variables in the multiple regression models. These are firm size (Alabdullah *et al.*, 2014a, b) and industry type (Ho and Wong, 2001). In the same vein, therefore, as mentioned by Brooks (2014), firm size as a control variable is important to be tested in the model because it may have a significant effect on the dependent variable. Thus, firm size and industry type as control variables were introduced in this study. They have been used constantly by several previous studies as control variables (Ang *et al.*, 2000; Bhagat and Black, 2001; Watts and Zimmerman, 1978) and in the field of corporate governance and firm performance (Connelly *et al.*, 2012). In the same vein, Ferrier *et al.* (1999) showed the importance of firm size as a control variable to measure market share, in that, as they explained, the firm size has its effect on the market share, and the competitive advantage among companies has a different size. However, using control variable in the analysis is important because it may have an effect on results (Guest, 2009). Scholars and researchers of corporate governance, starting from Ross (1973) and Fama (1980), have focused on how to deal with the principal-agent problem that occurs from the separation of ownership and control. The recent crises faced by so many countries-related companies have again stimulated academics, policy makers, and other interested stakeholders, both in the private and public sectors, to take interest in adopting strong corporate governance. These recent events and their challenges have encouraged taking different measures across the world such as the Act of Sarbanes-Oxley in 2002 which regulates the corporate governance system to ensure compliance to principles of good corporate governance (Alabdullah *et al.*, 2014a, b). Recently, to enhance development and economic growth, the Jordanian Government established the first corporate governance code in 2009 (Abed *et al.,* 2012; Makhlouf *et al.*, 2014) to intervene in the case of poor financial performance (Alabdullah *et al.*, 2014a, b) and other forms of mal-management (Al-Zawahreh and Cox, 2009) both in industrial and service sectors in Jordan. Moreover, as mentioned by Alabdullah *et al.* (2016), Jordanian non-financial firms have faced several problems and declining starting from 2011. They showed that Jordan economy, especially non-financial firms, have faced several problems and challenges because of the regional instability, high level of unemployment, a dependency on remittances, and grants from Gulf economies besides continued pressure on natural resources.

Stakeholders and other interested parties have started to realize the important role of dealing with good practices of corporate governance to eventually protect their interests. Thus, good corporate governance leads to better firm performance, in that, firms dealing with better practices of corporate governance must perform better than those having worse practices of corporate governance. The Jordanian Government identified corporate governance system as a requirement for contemporary development and economic growth. Previous studies on corporate governance have undergone a notable development over the past few decades, especially in developed economies where data are available. Different theorists of corporate governance discipline have tried to investigate the relationship between corporate governance mechanisms and the general well-being of a company.

Majority of previous studies have admitted that corporate governance has significant impacts on firm performance. For example, Kren and Kerr (1997) admit that increasing the share stock for the managers/increased managerial ownership is the instrument to promote improved performance of the firm. Recently, there have been a wave of intensive studies in developed countries that focused on/investigated the firm performance. Nonetheless, a little attention has been given for firm performance in the developing countries especially in Jordan (Alabdullah *et al.*, 2014a, b). Therefore, in this context, the current study attempts to provide empirical evidence on the relationship between ownership structure as an important mechanism of corporate governance and firm performance in Jordan. Using data from the Amman Stock Exchange (ASE) over a sample of 109 listed companies, it was shown that there is a significant positive relationship between managerial ownership and market share. On the other hand, foreign ownership has no effect on firm performance. The study further revealed that firm size has no effect on market share. It was found that industry type also has no effect on market share. This study contributes to the existing literature on corporate governance-financial performance relationship in a number of ways. First, it uses, for the first time, market share as a measurement to measure firm financial performance in its relationship with ownership structure in all contexts (including Jordanian ones), where no previous study has tested foreign ownership in such relationship. In that, from both developed and developing countries' perspective, the present study uniquely contributes to the existing literature that investigated corporate governance and firm performance. Market share has been chosen as a proxy to represent firm performance but not in the area of corporate governance. For example, Eccles (1991) and Hansen and Wernerfelt (1989) assure that market share is a proxy to measure firm performance. Mayer (1997) shows that market share is a measurement for firm performance. Second, the finding also reveals that ownership structure has some influence on market share. Third, the current study chooses the market share measurement as an indicator to the firm performance, measured as net sales of the firm divided by the total sales of the industry (Cheung and Wei, 2006; Hansen and Wernerfelt, 1989; Oxenfeldt, 1959), knowing that the market share is also good as an indicator characterizing the firm financial performance. Market share measurement is valid to be used in the present study because as argued by Oxenfeldt (1959), market share indicator is valid and more suitable in the safe country characterized by its stable market. Thus, this is quite suitable in the Jordanian context. Jordan is considered as one of competing and stable countries in the region due to its high safety and stability (Alkhatib and Marji, 2012). Since market share is calculated as a net sale of the firm divided by total sales of the industry, using this measurement will help avoid the matter of manipulation, if any. The justification is that market share measurement is dealing with sales, where sales processes are either in cash or on credit. This means that there would be a case of dealing with only two accounts: cash and receivables. More detailed, this would establish that such indicator avoids dealing with expenses. In this case, manipulation will be exclusively in process-related expenses rather than sales. It is worth mentioning that manipulation would occur with expenses, not with sales. Ball (1972) and Lindhe (1963) show that managers of some firms tend to change in accounting technique as a way of manipulation to smooth corporate incomes, which is called as income smoothing behavior. They showed that such behavior deals with expenses through manipulating the income, for example, companies changed to accelerated depreciation to smooth income as a way of manipulation. More explicitly, as mentioned by Atik (2009) from accounting perspective, although income statement is considered as a very important tool that generates information about companies and their operations' success, income statement has one vital limitation. This limitation is that it is affected by the accounting methods. For instance, a company may see that it is better to accelerate depreciation of their assets, while another may use a straight line way to do so. If we suppose that all other factors are equal, the income of the first will be lower than that of the second even if the companies are basically the same. Overall, manipulation is through expenses rather than sales, such as using depreciation and inventory evaluation like "first-in, first-out" and "last-in, first-out" (Atik, 2009; Hughes and Schwartz, 1988). There were several of previous studies depending on utilizing measurement, for instance, ROA, ROE, and Tobin's *Q*, as profitability measurements to measure firm financial performance and all such measurements include either total assets or net income. Hence, this might lead to the probability of these profitability measurements to be included with income smoothing (manipulation) and as a result leads to unreal picture of firm performance.

The current study is structured as follows: after the introduction, the literature review and research hypotheses are explained in the second section. The third section sheds light on the sample, data, and methodology used in the current study. The fourth section provides results of the regression analysis, while the last section shows a number of concluding remarks.

Literature review and research hypotheses

A wave of previous studies has focused on the relationship between corporate governance and firm performance by providing several empirical evidence related to the mechanisms of corporate governance. All such studies whether in developed or developing countries have not investigated the relationship between ownership structure represented by managerial ownership and foreign ownership, and market share as a measurement of firm financial performance. Previous literature has revealed that managerial ownership in the company is a vital factor that alleviates agency conflicts and promotes company performance (Abor and Biekpe, 2007; Al-Khouri, 2006; Bai *et al.*, 2004; Gedajlovic and Shapiro, 2002; Hiraki *et al.*, 2003; Jaafar and El-Shawa, 2009; Klein, 1998; Kren and Kerr, 1997; Kumar and Singh, 2013; Sanders, 1999; Vafeas and Theodorou, 1998) . For example, Kren and Kerr (1997) argued that increasing managerial ownership is the important tool to promote improved performance of the company. Kumar and Singh (2013) investigated the relationship between managerial ownership and firm performance, and they found that there is a significant positive relationship between these two variables. At the international and local levels, in both developed and developing countries, the only study conducted by Alabdullah *et al.* (2014a, b) chose market share to represent firm financial performance but in its relationship with board characteristics. In the Jordanian context, a study conducted by Zeitun (2009) investigates the impact of government ownership and ownership concentration on firm performance and the findings revealed that they played a significant role in the firm performance. In the Bahrain context, Al-Matari *et al.* (2014) examine the relationship between size of audit committee, independence of audit committee and size of executive committee, and firm performance. The finding revealed a positive relationship between them and firm performance. However, globally, the current study is the first to investigate ownership structure with firm financial performance represented by market share.

Agency theory deals with the problem arising between a principal (stockholders) and agent (managers), when the managers hold an inadequate equity in the firm. In that, a small level of ownership held by managers leads to failure of maximizing shareholders' wealth and this leads to the fact that they have incentive to consume perquisites. Jensen and Meckling (1976) argue that agency costs will increase when the managers hold a small proportion of company's share because the managers in such a case will pursue to use firm's assets to enhance their benefits rather than maximize stockholders' wealth. Previous studies have revealed that increasing managerial ownership in the firm is an important element that decreases agency problems and promotes managers to enhance firm performance (Arora *et al.*, 2016; Kumar and Singh, 2013). Also, Vafeas and Theodorou (1998) argue that when managers own a high proportion of managerial ownership, they will have extreme eagerness to maximize firm performance as the same interest that shareholders have.

On the other hand, there are other previous studies that revealed a negative relationship between managerial ownership mechanism and firm performance, such as Acharya and Bisin (2009). Some previous studies (see Demsetz and Villalonga, 2001) demonstrate that there is no association between managerial ownership and firm performance.

Following agency theory (Jensen and Meckling, 1976), the current study predicts that increasing managerial ownership will lead to increased firm performance:

H1. There is a positive relationship between managerial ownership and market share.

Besides, the literature admitted that the foreign ownership mechanism in the firm enhances firm performance (Abor and Biekpe, 2007; Bai *et al.*, 2004; Balasubramanian *et al.*, 2010; Chhibber and Majumdar, 1997; Durnev and Kim, 2005; Gedajlovic and Shapiro, 2002; Kang and Shivdasani, 1995; Tornyeva and Wereko, 2012; Yoshikawa and Phan, 2003). Previous studies in the literature admit that the anticipation of foreign ownership in the corporation enhances the extent of firm performance (see Gedajlovic and Shapiro, 2002). Tornyeva and Wereko (2012) admit that there is a positive relation between foreign ownership and corporate performance. Therefore, the present study predicts that increasing foreign ownership will be associated with increased firm performance. Chhibber and Majumdar (1997) examined the link between foreign ownership and company performance in 1,000 Indian companies listed on the Bombay Stock Exchange. The findings revealed that foreign ownership has a positive and significant impact on company performance represented by return on sales and return on assets. Other studies also explained the vital role for the foreign ownership on company performance, for example, Yoshikawa and Phan (2003) examined corporate governance reform and the performance implications of ownership driven in Japan. They showed the effect of changes in foreign ownership and board of directors' performance of reforms in Japan. Following the findings of previous studies, the present study predicts that increasing foreign ownership will lead to increased firm performance:

H2. There is a positive relationship between foreign ownership and market share.

Data and methodology

The current study investigates the link between corporate governance represented by ownership structure and firm performance expressed by market share in Jordan. The study focused on companies listed on the ASE as it is one of the largest stock exchanges in the Middle East. It is worth mentioning that the first Company Law in Jordan was Law No. 12 in 1964 and moreover, it is the first administration of the first Commercial Law enacted in 1966. In addition, one of the major features that makes Jordan an important center in the Middle East is its strategic and vital location among the countries of the region and because it is an economic channel to large markets with more than one billion consumers. Despite the importance explained above about the Jordan and the significant role played by this country as one of the important emerging economies, Jordanian non-financial sector nevertheless suffered from problems and setbacks that had impact on its performance specifically in the last few years (Alabdullah *et al.*, 2014a, b). The present study chooses a sample consisting of a non-financial sector (service and industrial sectors) for listed Jordanian companies as cross-sectional study. This study collected the data from the annual reports for 2012. Choosing such a year lies in the justification that in the last few years, Jordanian listed companies suffered from problems on its performance. Furthermore, as revealed by Alabdullah (2016) and the indicators by The World Bank (2016), non-financial sector faced declining in GDP in last ten years (Figure 1).

In addition, the data in this year are sufficient and available to serve the objective of the present study. According to the companies belonging to the financial sector:

(1) health care services;

(2) educational services;

(3) hotels and tourism;
(4) transportation;
(5) technology and communication;
(6) media;
(7) utilities and energy;
(8) commercial services;
(9) pharmaceutical and medical industries;
(10) chemical industries;
(11) paper and cardboard industries;
(12) printing and packaging;
(13) food and beverages;
(14) tobacco and cigarettes;
(15) mining and extraction industries;
(16) engineering and construction;
(17) electrical industries;
(18) textiles, leathers and clothing; and
(19) glass and ceramic industries.

The current research analyzes data on a sample of 109 companies listed at ASE.

This study is the first to measure financial performance (dependent variable) through market share in its relationship with ownership structure. The internal corporate governance represented by ownership structure mechanisms, namely the managerial ownership (MO) and foreign ownership (FO) as independent variables and the dependent one is market share to represent financial performance. In addition, firm size (FS) and industry type (ID) are the control variables. Table I shows a summary of variables measurement.

The model used in the current study for analysis included specific variables, which are also probably to have impact on the firm performance (market share). These variables are size and the industry type. To examine the relationship between ownership structure and firm performance in developing countries, a cross-sectional study was adopted in the analysis through collecting the real data from the annual reports for the year 2012. A multiple linear regression analysis was estimated linking the direct relationship between the independent and dependent variables, after controlling for some firm-specific

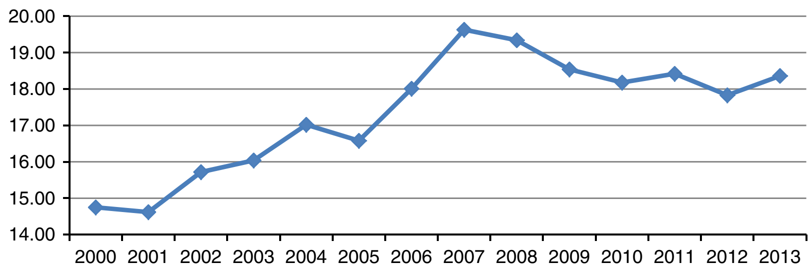

Figure 1.
Non-financial sector (share in GDP)

No.	Variables	Acronym	Measurement
1	Dependent variable market share (%)	MS	Market share: net sales divided by the total sales of the industry
Independent variables			
2	Managerial ownership (%)	MO	Managerial ownership is measured as the percentage of total shares held by firm directors and officers
3	Foreign ownership (%)	FO	The percentage of the share owned by foreign shareholders to total number of shares issued
Control variable			
4	Firm size (number)	FS	Natural logarithmic of the firm's total assets
5	Industry type (number)	ID	Dummy variable with 1 if it is an industrial firm and 0 if it is a service firm

Table I. Summary of variables measurement

characteristics that lie in firm size and industry type. The model of this study is defined by the following equation:

$$MS = \alpha + \beta_1 MO + \beta_2 FO + \beta_3 FS + \beta_4 ID + \varepsilon$$

The variables used in the current study in the sample, their definition, and measurement are shown in Table I.

This study examines the relationship between market share (MS) and MO, FO, FS, and ID. To investigate the effect of these exogenous variables on firm performance, this study adapts a lagged regression model, wherein the independent variable of current year (X_t) predicts the dependent variable of next year (Y_{t-1}):

$$MS_{2013} = \alpha + \beta_1 MO_{2012} + \beta_2 FO_{2012} + \beta_3 FS_{2012} + \beta_4 ID_{2012} + \varepsilon$$

Results and discussion

This section explains the descriptive analysis of the study variables: dependent and independent variables for the 109 industrial and service companies that belong to non-financial sector listed at ASE by using descriptive statistics represented by mean, standard deviation, minimum, and maximum. Table II presents the distribution of the all variables in this study. Based on the results of descriptive statistics, the dependent variable which is market share showed that the mean market share of Jordanian non-financial companies is 45.85 percent with a standard deviation of 0.288. Furthermore, minimum rate of market share in the Jordanian industrial and service companies is 5.1 percent with maximum level of market share equal to 91 percent. Moreover, the descriptive analysis reveals that the mean for managerial ownership is 4,398.81 with a standard deviation of 0.292. For the foreign ownership of the companies in the sample, the result shows that the mean is 24.8 percent with a standard deviation of 0.319. In Table II, the results also reveal

Variables	Mean	SD	Minimum	Maximum	Skewness	Kurtosis
Market share	0.458	0.288	0.051	0.910	0.352	−1.293
MO	0.439	0.292	0.000	1	0.196	−1.113
FO	0.248	0.319	0.000	0.900	1.149	−0.286
FS	7.291	0.599	5.69	9.09	0.433	0.914
ID	0.293	0.457	0.00	1.00	0.919	−1.177

Table II. Descriptive analysis

that the values for the skewness and kurtosis show that our sample is normally distributed since they are within the acceptable range of normality for both skewness and kurtosis. According to Brooks (2014), the normality of data can be achieved if standard kurtosis is within ±3 and standard skewness ±1.96. In addition, the current study resorts to choose industry type, a control variable regarding the issue of different nature of the firms' work that exists within the sector.

The correlation between the dependent and independent variables is explained in Table III. The result reveals that two independent variables have negative relationship with market share, with values MO −0.536 and FO −0.080. Furthermore, I examined the multicollinearity level between the independent variables which must be less than 80 percent as suggested by Yoshikawa and Phan (2003). I find the data did not have multicollinearity problems, which usually require 80 percent or more to point out that the correlations between the variables (independent variables) have multicollinearity problems. Table VI reports the correlations of the variables. Moreover, I investigated the multicollinearity through using two other indicators, namely variance inflation factor (VIF) and tolerance as shown in Table VII. It reveals that all the values of tolerance for the variables are more than 0.1 with the VIF values that is less than 10, as suggested by Hair *et al.* (2010). Although other previous studies in the literature such as Shihab *et al.* (2010) set the maximum value of VIF to be 2.5, the present study reached this level that did not exceed 2.5. This means that all results, as shown in Table IV, point out that data in the present study are absence of multicollinearity problems thus the model contains no multicollinearity.

In the present study, to investigate the direction of the relation between predictors and criterion variables, linear regression analysis was used to do so. This statistical method has been used in several studies in the literature for several science disciplines (Nathans *et al.*, 2012; Raftery *et al.*, 1997). In Table V, regression analysis results reveal that R^2 value is 0.297 for market share. In that, R^2 value is explaining 30 percent of the independent variables

	MO	FO	ID	FS	MS
MO	1				
FO	0.027	1			
ID	−0.150	−0.114	1		
FS	−0.142	0.033	−0.160	1	
MS	−0.536**	−0.080	0.081	−0.074	1

Notes: $*p < 0.10$; $**p < 0.05$

Table III.
Correlations between variables

Variables	Tolerance value	VIF
MO	0.961	1.040
FO	0.985	1.016
FS	0.960	1.042
ID	0.945	1.058

Table IV.
Multicollinearity test

Model	Market share
R^2	0.297
Sig F change	0.000

Table V.
R^2 of market share

(MO and FO) on the dependent one: market share. After analysis, as shown in Table V, the study found that corporate governance mechanisms (IVs) jointly influence firm financial performance (DV).

The current study examined the autocorrelation by using Durbin-Watson (DW) test. In this regard, the DW of 1.757 is a good value because it falls between the acceptable range of 1.5-2.5 as mentioned by Knoke (2003), and it reveals that the sample of the current study has no autocorrelation problem in its data. Regression analysis was run for all variables that have been selected in the present study represented by the MO and FO (independent variables), FS and ID as control variables, and market share (dependent variable); the output reveals that managerial ownership has a positive relationship with market share (MO, $\beta = 0.541$), whereas foreign ownership has negative relationship ($\beta = -0.096$). For the others (control variables), FS (log of total assets) has a positive relationship and industry has a negative relationship with market share (FS, $\beta = 0.005$; ID, $\beta = -0.010$).

The regression analysis results reveal that FS and ID are insignificant with financial performance (market share). In addition, the results related to managerial ownership showed that there is highly significant positive relationship between managerial ownership and firm market share ($\beta = 0.541$, t-value $= 6.542$, $p < 0.00$). This indicates that the firm financial performance is significantly influenced by managerial ownership in the Jordanian non-financial listed companies. This result is in line with what has been set in the objectives of the current study. The study can deduct significant relationship between managerial ownership and market share. This result provides support to prior studies that were conducted in both developed and developing countries (see Abor and Biekpe, 2007). Therefore, *H1* is supported. This result demonstrates that the more managerial ownership in non-financial companies in Jordan, the more market share (better performance). This result is consistent with agency theory perspective. In that, such a result matches with the result in the previous studies which admit that managerial ownership improves firm performance. The testing hypotheses of the present study find surprising results in respect to the association between foreign ownership and financial performance (market share). There is insignificant relationship between these two variables at FO at $p < 0.00$, t-value $= -1.161$, and $\beta = -0.096$. Globally, this result is unique because no previous study found insignificant relationship between foreign ownership and firm performance.

This result is inconsistent with the literature that deals with the relationship between foreign ownership and firm performance. Previous studies found a positive relationship (see Abor and Biekpe, 2007). For instance, Stulz (1999) shows that the higher foreign ownership leads to get lower agency cost. However, I find contradiction in the common belief that foreign ownership is a good mechanism to reduce agency cost and to enhancement of firm performance, which indicate that agency theory is limited/unable in its explanation of the link between foreign ownership and firm performance. The findings revealed insignificant effect of foreign ownership on firm performance in non-financial companies in Jordan. Therefore, *H2* is not supported. The reason is although Jordanian Government issued regulations (such as privatization) since 1996 as mentioned by Abu-Shams and Rabadi (2003), still traditional business dominates the majority of Jordanian business as stated by Rajoub (2013) and thus the country did not achieve attraction of foreign investments as anticipated. The current study found that foreign ownership is not positively contributing to the firm performance, which implies that foreign investors are still minor since Jordanian businesses are not attractive enough due to its volatile return and high risk. To tackle this issue, the government should formulate special programs (policiesfor the foreign investors). The testing hypotheses of the present study regarding the association between every independent variable and dependent ones are shown in Table VI.

Additional regression analysis has been done by the current study by using lagged independent variables to test whether managerial ownership improves future performance as the question made by the current study. This analysis revealed that the findings show that FS and ID are also insignificant with financial performance. Besides, the results related to managerial ownership showed that there is a significant positive relationship between managerial ownership and firm market share and it is higher than the one that is revealed in the previous model (the model that examines the concurrent relationship between ownership structure and firm performance, the concurrent relationship). It showed that $\beta = 0.555$, t-value $= 6.717$, and $p < 0.00$, while the first model showed that $\beta = 0.541$, t-value $= 6.542$, and $p < 0.00$). This indicates that managerial ownership improves future performance. The results of the testing hypotheses in respect to the relationship between foreign ownership and financial performance (market share) still show insignificant relationship between these two variables at FO at $p < 0.00$, t-value $= -1.210$, and $\beta = -0.099$, whereas in the first model it was $p < 0.00$, t-value $= -1.161$, and $\beta = -0.096$. Globally, this result is unique because no previous study found insignificant relationship between foreign ownership and firm performance, as shown in Table VII.

Conclusion

The objective of this study is to investigate the effect of ownership structure as one of important corporate governance mechanisms on firm financial performance using cross-section data of a sample of 109 listed Jordanian non-financial companies from the website of ASE. After analysis, the current study found the following key issues:

(1) There is a positive and significant relationship between managerial ownership and market share. This supported the notion of agency theory that managerial ownership has its positive impact on firm performance. As the current study implies that there is a positive and significant relationship between this mechanism and firm financial performance.

(2) There is no significant relationship between foreign ownership and market share. This indicates that the relationship between such mechanism and firm financial performance is insignificant.

(3) The current study also revealed that there is no impact of the control variables: firm size and industry type on market share.

Table VI. Regression statistical analysis

Variables	Market share Standardized coefficients β	t-value	Sig.
MO	0.541***	6.452	0.000
FO	−0.096	−1.161	0.248
FS	0.005	0.058	0.954
ID	0.010	−0.028	0.904

Notes: $^*p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$

Table VII. Lagged regression analysis

Variables	Market share Standardized coefficients β	t-value	Sig.
MO	0.555***	6.717	0.000
FO	−0.099	−1.210	0.229
FS	0.003	0.041	0.967
ID	0.013	−0.159	0.874

The contribution of the current study to the literature lies in its investigation of the relationship between ownership structure and firm financial performance represented by market share. In doing so, the present study contributes to the literature, via this link, through using uniform and useful measurements. Therefore, this study globally contributes to the field of corporate governance and firm performance by investigating the link between ownership structure and market share in one of emerging economies, Jordan. In that, it should be noted that the current study is the first of its kind to provide new insights on the relationship between these two variables. It therefore provides a new investigation considered as extending for prior studies in this discipline to the best of researcher's knowledge; no prior study has been conducted in both developed and developing countries including Jordan.

Second, in non-financial Jordanian companies (service and industrial sectors), the current study shows that agency theory is unable to explain the link between foreign ownership and firm performance. This suggests a dire need for issuing the key and precise policies regarding the role of foreign ownership in non-financial companies in the Jordanian context.

This study provides theoretical implications regarding the firm financial performance (dependent variable). It takes into account an important thing regarding choosing the measurement of the dependent variable. This study chooses market share to avoid income smoothing behavior, as such measurement is suitable to be chosen in the Jordan context. Thus, this study is a response to calls for new study into the field of corporate governance and firm performance because as demonstrated by Marr and Schiuma (2003), the firm performance issue is still in a dire need for more contributions to overcome the lack in company performance's measurements. Therefore, the current study internationally contributes to the field of firm performance through choosing market share indicator to measure firm performance, especially in its relationship with foreign ownership mechanism.

Finally, for the future research in both developed and developing countries, consideration must be taken to investigate the relationship between these two variables (ownership structure and market share) to identify the results from different perspective and from different levels of development in the countries. In addition, future research should investigate other variables, such as institutional and family ownership. Furthermore, future research should investigate the framework of the study for more than one year. In that, they should use time series or panel data which might get new results to enrich the framework drown by the current study.

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About the author

Tariq Tawfeeq Yousif Alabdullah holds a PhD Degree in Accounting (2015) from Universiti Sains Malaysia (USM). He is currently a Lecturer in Accounting in the College of Administration and Economics at the University of Basrah, Iraq. His research interests are mainly in the areas of corporate governance and firm performance. Tariq is one of the Advisory Board Members in Cambridge Scholars Publishing. He has published several papers (Scopus and ISI) in international journals and proceedings, and has presented 17 papers at several international conferences in Turkey, Malaysia, Italy, the USA, Germany, France, Spain, Austria, and Jordan. He is an Editorial Board Member and a regular reviewer for *International Business Research*, a peer-reviewed, open access journal, published by the Canadian Center of Science and Education. Tariq is also a regular reviewer for the *International Journal of Business and Management*, which is also a peer-reviewed, open access journal, published by the Canadian Center of Science and Education. He is a Corporate Governance Expert for Virtus InterPress and Virtus Global Center of Corporate Governance. In addition, he is an editorial board member and a regular reviewer for the *Asian Journal of Social Science Studies* in Singapore. He is a member in the Conference Technical Committee in the 2018 7th International Conference on Industrial Technology and Management (ICITM 2018) that will be held during March 7-9, 2018, at St Anne's College in Oxford University, Oxford, UK (IEEE Conference). Also, he holds as a member in the International Program Committee for the 2018 International Conference on Multidisciplinary Research to be held at Mauritius from June 22-23, 2018. Tariq Tawfeeq Yousif Alabdullah can be contacted at: tariqtariq1984@gmail.com

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Review

The Importance of financial reporting to capital market development in Ghana

Williams Abayaawien Atuilik* and Hussein Salia

Department of Accounting, School of Business, Heritage Christian University College, Amasaman – Accra, Ghana.

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The finance literature suggest that investment decisions are largely influenced by the quality of corporate financial information released by firms in their financial statements, and that capital market participants use corporate financial information released by firms for investment decisions. Factors that influence the development of capital markets in developing markets include: appropriate legal and regulatory framework, effective securities exchange commission, an active stock exchange market, availability of accurate and reliable information about firms' financial performance and position. An improved financial reporting environment that produces accurate and high-quality financial reports on a timely basis contributes significantly to the development capital markets in developing economies. It is therefore important that the Institute of Chartered Accountants Ghana (ICAG), regulator of accounting practice in Ghana should strengthen its regulatory role to ensure that accountants in Ghana helping generate financial information for firms listed on the Ghana Stock Exchange are sufficiently knowledgeable and skilled in matters regarding financial reporting and provide financial reports guided by sound reporting ethics and the principle of integrity.

Key words: Accounting standards, capital markets, financial reporting.

INTRODUCTION

Extensive research has been done in the finance literature and the results suggest that investment decisions made by investors are partly influenced to a large extent by corporate financial information released by firms, and so capital market participants such as brokers and investors tend to follow closely the release of corporate financial information by corporate entities (Ball and Brown, 1968; Lev, 1989; Myring, 2006; Habib, 2008; Acquah-Sam and Salami, 2014). The corporate finance literature is replete with a number of theories, including: pecking order theories, arbitrage pricing theories, efficient market hypothesis theories, signaling models, capital asset pricing theories, and theories on dividend policy (Frank and Goyal, 2003; Larcker and Lys, 1987; Malkiel and Fama, 1970; Myers and Majluf, 1984; Sharpe, 1964; Skinner, 2006). All these important theories suggest that stock prices change in response to knowledge of a number of financial variables obtained from corporate financial information. Some of the important variables that are obtained from corporate financial information include earnings, dividends, cash flow projections, net assets, returns on investments, levels of debt among others.

*Corresponding author. E-mail: atuilik@yahoo.com.

These variables are either reported in the financial statements or are derived from information contained in the financial statements. The purpose of this paper is to address the role of financial information in capital market development and use this as basis to argue the need for ensuring improved quality of disclosures in financial statements.

Factors that influence the development of capital markets

The capital market refers to interactions among firms or organisations with funding needs and investors with surplus funds for investments whereby firms raise debt and equity capital for their operations, and investors make funds available to firms either in the form of debt or equity investments at a return. In highly developed capital markets, firms are able to raise debt or equity capital from the market much easily and investors are able to place their surplus funds much easily. The converse is the case for less developed capital markets where it is difficult for firms to raise capital and those who have surplus funds do not have readily available channels for placing those funds for productive ventures. There are a number of factors that may possibly influence the level of development of capital markets. According to Osei (1998) and Gnanarajah (2015), the appropriate legal and regulatory infrastructure, such as an effective Securities Exchange Commission, an active stock exchange market, and the availability of accurate and reliable corporate financial information about firms' financial performance and financial position are key influencers of the level of development of the capital market. Thankfully, Osei (1998) observed that there seems to be appropriate and effective legal and regulatory structures in Ghana to promote the development of the Ghanaian capital market. What was found to be a problem is non-reflection of all available financial information on stock prices (Salami and Acquah-Sam, 2013). Embedded in this problem is the question of the reliability of the financial information generated by firms listed on the Ghana Stock Exchange. It is in this regard that it is necessary to take steps first to improve the credibility of the financial information generated by firms listed on the Stock exchange, and then to ensure that the financial information available is actually used by investors to make investing decisions. Generating reliable financial information by firms listed on the Ghana Stock exchange is thus a necessary step towards uplifting Ghana's capital market.

The role of financial information in capital markets development

Firms usually provide financial information through the financial reports they publish. The financial reports often comprise: financial statements, management discussion of those financial statements and other regulatory filings. Some firms engage in additional voluntary communication, such as management forecasts, analysts' presentations, other corporate reports and press releases on key issues. Some publish these reports in hard copy and file same with the regulators while other firms additionally post all this information on their web sites. There are also some disclosures about firms provided by information intermediaries, such as financial analysts, industry experts, and the financial press. There is a preponderance of evidence in the finance literature indicating that capital market participants depend on financial information to make various decisions (Agyei-Mensah, 2013; Bernard, 1992; Bernartzi et al., 1997; Bhattacharya, 1979; Fama, 1965; Fama, 1970; Gnanarajah, 2015; Kothari, 2001).

It has been suggested that no perfect stock market exists anywhere in the world, and that most stock markets exhibit weak form market efficiency (Hasanov and Omay, 2007; Magnusson and Wydick, 2002). Weak form efficiency imply that the market uses historical corporate financial information in making investment decisions. The implication is that through the financial reports and disclosures prepared by accountants for firms, capital market participants are provided with information that forms a basis for making fair decisions regarding stock prices in order to make and execute reasoned investment and financing decisions. There is overwhelming evidence from the literature that argues that market participants including, regulators, creditors, and the investing public often rely on corporate financial information to value stock prices and make investment decisions (Appiah-Kusi and Menyah, 2003; Bennard, 1992; Chambers and Renman, 1984; Fama, 1965; Fama et al., 1969; Gnanarajah, 2015; Habib, 2008; Healey and Palepu, 2001; Holthausen and Larcker, 1992; Osei, 2002). What this means is that steps need to be taken to ensure that firms prepare their financial statements in a credible manner. This has implication for the regulation of the practice of accountancy in Ghana.

The regulators of accountancy practice must ensure that persons who prepare the financial statements of firms are qualified to do so, and do actually prepare the financial statements of firms in line with appropriate standards. The questions that beg for answers are: Does the regulator of accounting practice in Ghana ensure that only qualified persons are engaged to prepare financial statements for firms listed on the stock exchange? Do the firms use the appropriate standards to prepare their financial statements? Are the financial statements of listed firms audited by qualified accountants in line with appropriate standards for auditing? It is only when these questions are answered in the affirmative that that one can begin to expect quality corporate financial information from listed firms that should subsequently induce high quality capital market decisions.

Nyor (2012) asserts that financial statements prepared using global financial reporting benchmarks help investors better equip and appreciate risk associated with decisions about flows of economic capital. This is confirmed by the findings that market participants use financial information to make general investments decisions to reduce financial risks and optimize returns on investments (Healey and Palepu, 2001; Onulaka, 2014). From the foregoing, one can only conclude that the disclosure of reliable financial information by corporate entities is a “sine qua non” for the development of the capital market. Against the background of the critical role of quality financial information in the development of capital markets, it is critically important to improve the quality of the financial disclosures by listed firms through improved financial reporting. The question is, how can this be done? This can be achieved by requiring listed firms to report in line with approved accounting standards and ensuring strict compliance by the regulator of the practice of accountancy.

Accounting standards

Accounting standards prescribe the accounting treatment for financial transactions and the minimum disclosure requirements with respect to those financial transactions. Having a standardized set of prescriptions for purposes of reporting eliminates arbitrariness and opportunities for manipulation in terms of reporting and consequently improves the quality of financial reports. Hail et al. (2010) argued that high-quality accounting standards lead to improved financial reporting which in turn leads to improvement in corporate decision making. It is thus expected that the application of Financial Reporting Standards (IFRSs) should lead to improved financial reporting.

Improving Financial Reporting

According to Kothari (2000), the rise in the volatility of stock returns across the globe in the past couple of years has been of concern to many commentators and has led to the questions as to whether greater transparency in financial statement information could reduce volatility and produce more accurate stock valuations? And whether more transparent financial statements of financial services firms (for example, banks) could improve lending and credit evaluation decisions and contain the risks of a banking crisis? These issues are of central interest to all market participants and, in particular, to the Securities and Exchange Commission (SEC). It is for these reasons that Institute of Chartered Accountants Ghana (ICAG) in collaboration with SEC (and other regulatory bodies) mandated all listed companies in Ghana to adopt the International Financial Reporting Standards (IFRSs) as their financial reporting framework since 2007. It is important that financial reports presented by firms communicate corporate performance accurately and reliably. Barton (2005) and Agyei-Mensah (2013) suggested that for financial information to be useful, they must possess the characteristics of relevance, reliability, comparability, and understandability. One mechanism for ensuring improved financial reports is the adoption of International Financial Reporting Standards (IFRSs) by reporting firms. The need for improving financial reporting with particular respect to firms listed on the Ghana Stock Exchange is more urgent against the findings that the Ghana Stock Exchange exhibits weak form market efficiency (Ntim et al., 2007; Osei, 1998; Salami and Acquah-Sam, 2013).

Advantages of adoption of IFRS

The adoption of IFRS by reporting entities present tremendous advantages. Epstein and Jermakowicz (2010) and Onulaka (2014) argued that convergence facilitates the free flow of capital across boundaries as it eliminates accounting risk and reduces listing requirements and costs on international stock exchanges. Marfo-Yiadom and Atsunyo (2014) advanced a similar argument, that financial statements presented in compliance with IFRS facilitate the integration of international markets. They argued that IFRS-based financial statements are often more appealing to the international audience due to the higher level of comparability and quality. Given that national domestic accounting standards are harmonized with the IFRS, the likelihood of any unfamiliar national domestic accounting standards will be eliminated. Wyatt (1989) also found that convergence of Generally Accepted Accounting Principles (GAAP) with IFRS yields a number of benefits including: “increased cross- border financing; emergence of true multinational companies; a heightened willingness to cooperate across borders to enhance national, regional and even global economic strength; an awareness by securities regulators around the world of the necessity for comparable data” (p. 108). Epstein (2009) confirms that “there is certainly empirical research evidence to support the notion that uniform financial reporting standards will increase market liquidity, decrease transaction costs for investors, lower cost of capital and facilitate international capital formation and flow” (p. 31). There are however some challenges in implementing IFRSs in the form of the cost to migration, the problem of change, the need to close the knowledge gap between existing reporting regime and IFRSS, and keeping up with constant changes in IFRSs. The benefits seem to outweigh the disadvantages.

The Ghana's experience

Recognizing the important role of quality financial reports in the development of the capital market in Ghana, ICAG being the body responsible for regulating the practice of accounting in Ghana made a number of interventions towards promoting good financial reporting practices in general.

According to Assenso-Okofo et al. (2011), in January 2007, the ICAG, in collaboration with other Regulatory Bodies -Bank of Ghana, National Insurance Commission, and Securities and Exchange Commission- launched the adoption of IFRS in Ghana. By this adoption, all Public Interest Entities [PIEs] (the banks, insurance companies, listed companies and profit-oriented state-owned enterprises) are required to apply IFRS as their financial reporting framework. The adoption of IFRS was led by ICAG with great support from the Regulatory Bodies mentioned above. It is gratifying to note that as at end of April 2013, all the listed entities had adopted IFRSs as the framework for preparing and presenting their financial statements.

Agyei-Mensah (2013) analysed the pre-adoption and post adoption financial statements of firms listed on the Ghana Stock Exchange and concluded that all firms had substantially complied with the reporting requirements of the adopted IFRSs framework. He concludes also, that there was significant improvement in the quality of information in the financial statements of listed firms after the adoption of IFRSs. It thus be concluded that the adoption of IFRSs by listed firms has resulted in the presentation of more credible financial statements, consequently leading to increased investor confidence in the Ghanaian capital market.

ICAG has also introduced audit Quality Assurance Monitoring unit (QAM) to ensure that auditors apply the appropriate auditing standards; the International Standards on Auditing (ISAs) and require their clients to comply with IFRSs as the framework for financial reporting. The introduction of the QAM unit is an important step aimed at fulfilling ICAG's regulatory obligation. The results from a survey conducted by the ICAG in 2016 ON Small Medium Size Audit Practices (SMPs), confirmed by the reports of QAM, indicate that all of the listed companies on the Ghana Stock Exchange are audited by one of the Big Four audit firms (ICAG, 2017). This imply availability of high quality resources for the conduct of the audit of listed firms.

These interventions are expected ultimately to improve the quality of financial disclosures by listed firms and hence provide more accurate and reliable information to capital market participants for decision making. The quarterly publication of financial statements supported by the 'facts behind the figures' regime encouraged by the Ghana Stock exchange adds to the timeliness of information available to market participants. As Chambers and Renman (1984) suggest, the timeliness of availability of financial information to capital market participants is critical to capital market development.

Similarly, Abedana and Gayomey (2016) found that timely publication of financial information significantly enhances the quality of accounting numbers and their value relevance to investors, thereby impacting positively on capital markets. The extent to which listed companies should provide interim reports is another important issue in the discussion on disclosure requirements. The annual reporting regime where financials are released annually is on its way to becoming less useful and in its place, is quarterly reporting regimes. The main critique on mandatory quarterly reporting regimes from a practical point of view, however, is the disproportionate costs associated with the higher reporting frequency, which according to opponents, is not compensated by potential benefits (especially for smaller firms). For example, Ozturk (2008) has identified high costs including cost of sponsoring staff attending conferences and seminars, organizing in-house training, personnel cost for preparers and auditors of financial statements that are IFRSs compliant, as the major hindrances to frequent reporting.

The way forward

Having adopted IFRSs, one critical issue that needs the attention of listed firms is compliance with the recognition, measurement and disclosure requirements of the IFRSs. Listed firms need to train their reporting accountants on the IFRSs. Audit firms also need to insist that the financial reports of their clients, especially those listed on the stock exchange are in compliance with the requirements of IFRSs. In this regard, the joint efforts of ICAG, SEC, the Stock Exchange and other regulators at ensuring compliance cannot be over emphasized.

The findings of the SMPs survey conducted by ICAG in 2016 (ICAG, 2017) reveals that accounting practitioners who practice in the Small to Medium Size practice firms need a lot of support to improve the quality of practice. Most of the practitioners requested support from ICAG in the form relevant CPDs that provided current updates on IFRSs, provision of implementation frameworks for IFRSs, regular and increased quality assurance and monitoring service by QAM to support small firms to improve their practices, regular reviews of firms to weed out non-qualified firms that practice illegally. Whiles as has been noted already, the SMPs do not audit the listed firms, accountants that work for the listed firms share similar characteristics and have some influence on the quality of financial reporting of the listed firms. It is therefore important that ICAG as regulator pay more attention to the work of QAM and possibly expand the ambit of QAM to oversee the work of accountants in industry. This will ensure that accountants are well resourced and motivated to keep proper books of accounts, prepare appropriate and credible financial statements from those books of accounts in compliance with relevant standards.

Perhaps a reporting regime that should be considered by listed entities going forward is integrated reporting. According to the International Integrated Reporting Committee (IIRC), integrated reporting is a process that results in communicating the value creation of an entity over time through an Integrated Report. The IIRC defines an Integrated Report as “a concise communication about how an organization’s strategy, governance, performance, and prospects lead to the creation of value over the short, medium, and long-term” (www.theiirc.org) Integrated reporting provides information not only on the financials of an entity, but also information on strategy, governance, performance, and prospects. The primary benefit of integrated reporting is that it allows a company to better understand, manage and report on multiple dimensions of value. A properly designed set of performance measures often included in integrated reports will give management the incentive and urge to improve performance. For other stakeholders, the report is intended to provide more and better information to increase stakeholder understanding of the company—its management, strategy and operations, and its perils and prospects. It has been suggested that the integrated report will become an organization’s primary report, which links in with various supporting, more detailed, reports.

Conclusion

Improved financial reporting that produces accurate high-quality financial reports on a timely basis is critically important for the development of capital markets especially in developing capital markets as good investment decisions are anchored on high-quality corporate financial information. In this regard, the regulator of the accounting profession should take concrete steps to ensure that accountants who keep the financial records and prepare financial reports for listed firms are sufficiently knowledgeable and skilled in the matters of financial reporting and are guided by sound reporting ethics and the principle of integrity when preparing financial statements. This should be done through collaboration with all relevant stakeholders, especially, other regulatory bodies such as the Securities & Exchange Commission, the Insurance Commission, the Bank of Ghana, and the Ghana Stock Exchange. ICAG should also strengthen its quality assurance and monitoring function and extend it to cover accountants working for firms listed on the Ghana Stock Exchange.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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JIANLEI HAN, JING HE, ZHEYAO PAN, AND JING SHI

Twenty Years of Accounting and Finance Research on the Chinese Capital Market

The Chinese capital market has attracted increasing academic attention due to its rising global influence, ongoing regulatory reforms, and distinct institutional background. In this paper, we review scholarly accounting and finance research pertaining to the Chinese capital market in Mainland China published in Tier 1 and Asia-Pacific regional journals during the 1999–2018 period. Our review is based along four dimensions: top-cited articles, main research fields, frequently contributing authors, and emerging research trends. We find that the increasing presence of China in global capital markets, along with its ongoing economic reforms, provides academics with opportunities to investigate distinct institutional environments and utilize natural experiments. This has led to the formulation of novel accounting and finance research questions, greatly advancing our understanding of accounting and finance research.

Key words: Accounting; Chinese capital market; Finance; Research; Review.

Accounting and finance research on the Chinese capital market has attracted the attention of an increasing number of academic researchers. Since the Shanghai Stock Exchange and the Shenzhen Stock Exchange, the two main stock exchanges in China, were established in the 1990s, the Chinese capital market has experienced rapid growth and become one of the most important players in global financial markets. Notably, China now has the second largest stock market and the third largest bond market in the world, significantly increasing its global influence and contribution to global economic development.

The distinct features of the Chinese capital market allow academic researchers to examine unanswered research questions and report new research findings, which contribute to our understanding of capital markets and complement the knowledge of financial systems in other institutional environments. For instance, unlike developed markets, China's financial system is centrally controlled, bank-dominated, and uniquely relationship-driven (Allen *et al.*, 2005). These features offer researchers a unique opportunity to study how a country's institutional

Jianlei Han (jianlei.han@mq.edu.au), Jing He (jing.he4@hdr.mq.edu.au), and Zheyao Pan (terry.pan@mq.edu.au), are with the Department of Applied Finance, Faculty of Business and Economics, Macquarie University. Jing Shi (jing.shi@mq.edu.au) is with Shandong University of Finance and Economics and Macquarie University.

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background fundamentally affects corporate policies and investor behaviours. In this spirit, research on the Chinese capital market enhances our understanding of other emerging or transitional economies.

China's capital market is experiencing dynamic development through a series of structural breaks. Specifically, Chinese regulators have implemented various financial reforms to monitor the capital market, protect market participants, and allocate financial resources. The ongoing financial reforms allow researchers to examine empirically the effects of regulatory policies on corporate decisions or outcomes. Those reforms also supply researchers with a wealth of natural experiment settings to examine accounting and finance research questions, report more plausible casual inferences, and formulate novel research areas and directions. Furthermore, since joining the World Trade Organization (WTO) in 2001, China has expanded the openness of its capital market, attracting both domestic and foreign investors. Thus, the findings of academic research provide academics, practitioners, and investors with insights and knowledge on one of the world's largest capital markets. The increasing importance of the Chinese capital market and the distinctiveness of the Chinese institutional environment provide great opportunities to address important and interesting accounting and finance research questions.

Our objective is to provide an overview of the accounting and finance research on China's capital market for the 1999–2018 period by identifying top-cited articles, summarizing the main research fields, highlighting frequently contributing authors, and discussing emerging research trends and future directions.

We analyze academic papers in both Tier 1 journals and Asia-Pacific regional journals. For the Tier 1 journals, we focus on a list of 24 business journals developed by the Naveen Jindal School of Management at the University of Texas at Dallas.[1] We additionally consider five well-respected international journals. Specifically, the Tier 1 journals we focus on are (in alphabetical order by journal abbreviation): *American Economic Review* (AER), *Academy of Management Journal* (AMJ), *Administrative Science Quarterly* (ASQ), *Contemporary Accounting Research* (CAR), *Journal of Accounting and Economics* (JAE), *Journal of Accounting Research* (JAR), *Journal of Finance* (JF), *Journal of Financial Economics* (JFE), *Journal of Financial and Quantitative Analysis* (JFQA), *Journal of International Business Studies* (JIBS), *Management Science* (MS), *Organization Science* (OS), *Review of Accounting Studies* (RAS), *Review of Finance* (RF), *Review of Financial Studies* (RFS), *Strategic Management Journal* (SMJ), and *The Accounting Review* (TAR).[2]

[1] In our discussion of accounting and finance research on the Chinese capital market, we exclude the following 11 journals listed by the Naveen Jindal School of Management, namely: *Information Systems Research*, *Journal of Consumer Research*, *Journal of Marketing*, *Journal of Marketing Research*, *Journal of Operations Management*, *Journal on Computing, Manufacturing and Service Operations Management*, *Marketing Science*, *MIS Quarterly*, *Operations Research*, and *Production and Operations Management.* According to our analysis, these journals did not contain accounting or finance publications on the Chinese capital market during our sample period.

[2] We also examine publications in the top five economics journals (*American Economic Review*, *Econometrica*, *Journal of Political Economy*, *Quarterly Journal of Economics*, and *Review of*

Following Benson *et al.* (2014, 2015) and Linnenluecke *et al.* (2016, 2017), the eleven Asia-Pacific regional journals we focus on are (in alphabetical order by journal abbreviation): *Accounting, Auditing and Accountability Journal* (AAAJ), *Australian Accounting Review* (AAR), *Abacus* (Abacus), *Accounting and Finance* (AF), *Australian Journal of Management* (AJM), *Accounting Research Journal* (ARJ), *International Review of Finance* (IRF), *Journal of Contemporary Accounting and Economics* (JCAE), *Managerial Auditing Journal* (MAJ), *Pacific Accounting Review* (PAR), and the *Pacific-Basin Finance Journal* (PBFJ).

For each journal, we identify papers that contain either ‘China’ or ‘Chinese’ anywhere in the paper. Next, we read the papers to ensure that they indeed address accounting or finance research questions related to the Chinese capital market in Mainland China, the focus of our study. Papers that utilize China as one of two or three countries for research analyses are also included. We delete papers that include China for the purpose of cross-country investigations.

We identify six distinct research fields each for both accounting and finance. The six accounting fields are: auditing (AU), financial accounting (FA), management accounting (MA), regulation and disclosure (RD), social and environmental (SE), and taxation (TA). The six finance research fields are: asset pricing and investments (AI), banking and financial intermediation (BF), corporate finance (CF), derivatives (DE), international finance (IF), and market microstructure (MM).

The dataset contains 436 accounting and finance papers on the Chinese capital market, including 129 papers in Tier 1 journals and 307 papers in Asia-Pacific regional journals. Figure 1 illustrates the rapid growth of papers on China’s capital market across all journals. The growth in the number of papers is evident in both accounting and finance research, increasing from just six in 1999 to 79 in 2017.

Figure 2 shows that while only one paper appeared in Tier 1 journals in 1999, there are 18 papers in 2017. Also, from an initial five papers in regional journals in 1999, there are 61 Chinese market research papers in 2017.

Table 1 presents the frequency distribution of accounting and finance papers we review. Panel A of Table 1 shows that five Tier 1 journals (i.e., CAR, JAE, RAS, RF, and TAR) published more than 1% of their total papers on the Chinese capital market, with TAR publishing 20 papers, accounting for 1.52% of its total papers.

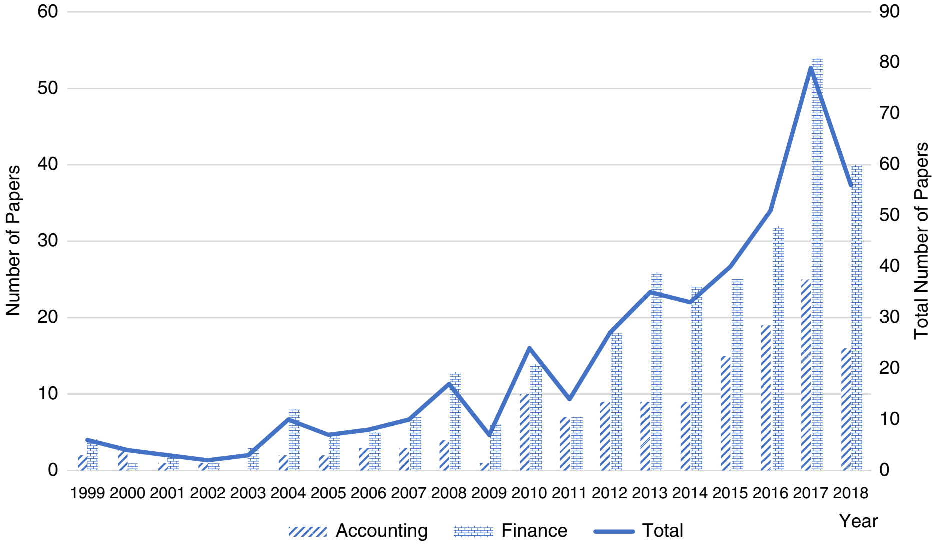
In contrast, Panel B of Table 1 shows that Asia-Pacific regional journals publish far more accounting and finance papers on China’s capital market. For instance, PBFJ published 158 papers on the Chinese capital market, which accounts for 14.89% of its total output over the sample period. The average percentage of accounting and finance papers on the Chinese capital market is 4.22% for Asia-Pacific regional journals, compared to 0.61% for Tier 1 journals.

The growing importance of the Chinese stock market has prompted two Asia-Pacific regional journals to organize special issues on accounting (i.e., *Abacus*) and

Economic Studies). The only publication in these journals on the Chinese capital market is Xiong and Yu (2011), published in the *American Economic Review*.

Figure 1

TIME SERIES DISTRIBUTION OF ACCOUNTING AND FINANCE PAPERS ON THE CHINESE CAPITAL MARKET PUBLISHED IN BOTH TIER 1 AND ASIA-PACIFIC REGIONAL JOURNALS IN 1999–2018



[Colour figure can be viewed at wileyonlinelibrary.com]

finance (i.e., AF) research in China. In 2016, *Abacus* published a special issue (Accounting in China), with a focus on accounting research fields, including auditing (Chen *et al*., 2016; Xiao *et al*., 2016), financial accounting (Banker *et al*., 2016; Chen *et al*., 2016; Lin *et al*., 2016; Mao and Ettredge, 2016), management accounting (Zhou *et al*., 2016), and regulation and disclosure (Ding *et al*., 2016).

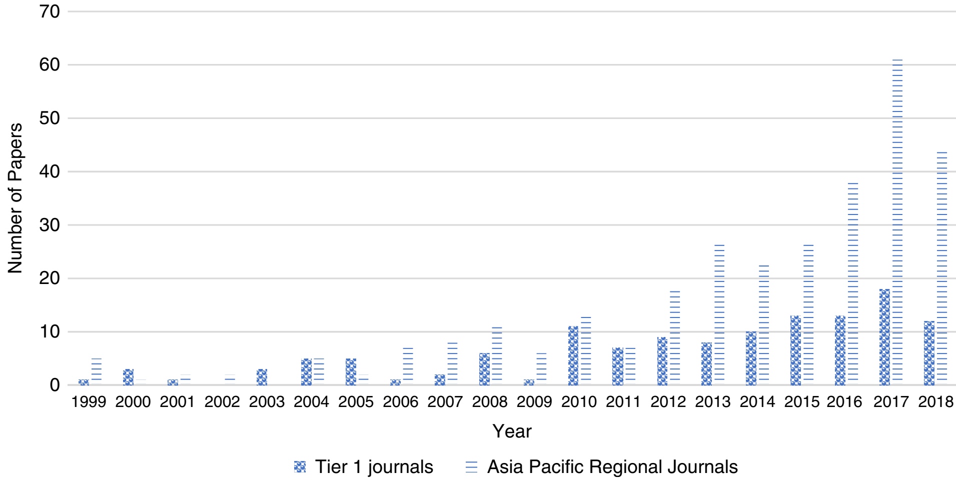
In 2017, AF published a special issue focusing on finance research fields, including asset pricing and investments (Chen *et al*., 2017; Chen *et al*., 2017; Liao *et al*., 2017; Liu *et al*., 2017), banking and financial intermediation (Li *et al*., 2017), corporate finance (Cen *et al*., 2017; Cheng *et al*., 2017; Luo *et al*., 2017; Peng *et al*.; 2017; Zhong *et al*., 2017; Zhu *et al*., 2017), derivatives (Chen *et al*., 2017), and market microstructure (Xiong *et al*., 2017).

TOP-CITED PAPERS

In this section, we examine the top-cited accounting and finance papers on the Chinese capital market in Tier 1 journals and Asia-Pacific regional journals, respectively. The citation counts are drawn from Google Scholar in September 2018 using the software program 'Publish or Perish'. We use Google Scholar citations to ensure consistency of citation counts, as not all of these journals are covered by other applications (e.g., Web of Science or Scopus) for the entire sample period (Benson *et al*., 2014).

FIGURE 2

NUMBER OF ACCOUNTING AND FINANCE PAPERS ON THE CHINESE CAPITAL MARKET PUBLISHED IN TIER 1 AND ASIA-PACIFIC REGIONAL JOURNALS IN 1999–2018



[Colour figure can be viewed at wileyonlinelibrary.com]

Using Google Scholar citations, in Panel A of Table 2 we list the top 30[3] cited accounting and finance papers on the Chinese capital market published in Tier 1 journals during our sample period. The top-cited paper based on total citation count is the JFE paper by Allen *et al.* (2005) on law, finance, and China's economic growth, with 3,301 citations. It is followed by another JFE paper by Fan *et al.* (2007), which examines politically-connected CEOs and initial public offering (IPO) performance in China, with 1,937 citations. Both papers are in the corporate finance field. The top-cited accounting paper on the Chinese capital market across Tier 1 journals is the JAR paper by Aharony *et al.* (2000) on the role of earnings management in Chinese firms' IPO process, with 779 citations.[4]

In Table 3, we list the top-cited accounting and finance papers on the Chinese capital market published in Asia-Pacific regional journals during our sample period. The paper with the greatest total citation count is the PBFJ paper by Qi *et al.* (2000) on the relation of shareholding structure and corporate performance, with

[3] Actually, we have included 31 papers, as Tan and Peng (2003), *Strategic Management Journal*, and Cull and Xu (2005), *Journal of Financial Economics*, are both ranked 5th.

[4] We also rank the articles by citations per year to account for the fact that total citations increase with an article's publication history. Park and Luo (2001), *Strategic Management Journal*, Allen *et al.* (2005), *Journal of Financial Economics*, Fan *et al.* (2007), *Journal of Financial Economics*, continue to be the three most widely cited papers, with citations per year of 109.06, 253.92, and 176.09, respectively. The majority of the articles remain on the list, with five new articles entering into the top 30 articles by citations per year, namely: Liao *et al.* (2014), *Journal of Financial Economics,* Cumming *et al.* (2015), *Academy of Management Journal,* Giannetti *et al.* (2015), *Journal of Finance,* Piotroski *et al.* (2015), *Journal of Accounting Research,* Luo *et al.* (2017), *Academy of Management Journal.*

TABLE 1

FREQUENCY DISTRIBUTION OF ACCOUNTING AND FINANCE PAPERS ON THE CHINESE CAPITAL MARKET PUBLISHED IN 1999–2018

Journal	Accounting Papers (1)	Finance Papers (2)	Accounting and Finance Papers (1) + (2)	Total Papers (3)	Percentage (1 + 2)/(3)
Panel A: Tier 1 journals					
AMJ	2	3	5	1,461	0.34%
ASQ	–	1	1	983	0.10%
CAR	12	–	12	1,006	1.19%
JAE	10	–	10	686	1.46%
JAR	5	–	5	729	0.69%
JF	–	6	6	1,576	0.38%
JFE	–	11	11	1,919	0.57%
JFQA	–	10	10	948	1.05%
JIBS	–	3	3	1,204	0.25%
MS	–	6	6	3,076	0.20%
OS	1	4	5	1,329	0.45%
RAS	6	–	6	598	1.00%
RF	–	8	8	571	1.40%
RFS	–	12	12	1,476	0.81%
SMJ	–	9	9	1,768	0.51%
TAR	20	–	20	1,315	1.52%
Total	56	73	129	20,645	0.61%
Panel B: Asia-Pacific regional journals					
AAAJ	11	–	11	1,204	0.91%
AAR	12	–	12	695	1.87%
Abacus	11	–	11	520	2.12%
AF	2	35	37	895	4.13%
AJM	–	5	5	474	1.05%
ARJ	4	–	4	277	1.44%
IRF	–	24	24	367	6.54%
JCAE	11	–	11	205	5.37%
MAJ	21	–	21	1,225	1.71%
PAR	13	–	13	358	3.63%
PBFJ	–	158	158	1,061	14.89%
Total	85	222	307	7,281	4.22%

The Tier 1 journals are: *Academy of Management Journal* (AMJ), *Administrative Science Quarterly* (ASQ), *Contemporary Accounting Research* (CAR), *Journal of Accounting and Economics* (JAE), *Journal of Accounting Research* (JAR), *Journal of Finance* (JF), *Journal of Financial Economics* (JFE), *Journal of Financial and Quantitative Analysis* (JFQA), *Journal of International Business Studie*s (JIBS), *Management Science* (MS), *Organization Science* (OS), *Review of Accounting Studies* (RAS), *Review of Finance* (RF), *Review of Financial Studies* (RFS), *Strategic Management Journal* (SMJ), and *The Accounting Review* (TAR). The Asia-Pacific regional journals are: *Accounting, Auditing and Accountability Journal* (AAAJ), *Australian Accounting Review* (AAR), *Abacus* (Abacus), *Accounting and Finance* (AF), *Australian Journal of Management* (AJM), *Accounting Research Journal* (ARJ), *International Review of Finance* (IRF*), Journal of Contemporary Accounting and Economic*s (JCAE), *Managerial Auditing Journal* (MAJ), *Pacific Accounting Review* (PAR), and the *Pacific-Basin Finance Journal* (PBFJ). This table presents the total number of papers published in each journal over the period 1999–2018, and the number and percentage of these papers identified as accounting or finance papers on the Chinese capital market.

TABLE 2

TOP CITED ACCOUNTING AND FINANCE PAPERS ON THE CHINESE CAPITAL MARKET PUBLISHED IN TIER 1 JOURNALS IN 1999–2018

#	Author(s) and Year	Journal	Citation	Citation p.a.
1	Allen *et al.* (2005)	JFE	3,301	253.92
2	Fan *et al.* (2007)	JFE	1,937	176.09
3	Park and Luo (2001)	SMJ	1,854	109.06
4	Sun and Tong (2003)	JFE	1,153	76.87
5	Tan and Peng (2003)	SMJ	871	58.07
5	Cull and Xu (2005)	JFE	871	67.00
6	Aharony *et al.* (2000)	JAR	779	43.28
7	Wang *et al.* (2008)	JAE	767	76.70
8	Li and Zhang (2007)	SMJ	753	68.45
9	Chen and Yuan (2004)	TAR	739	52.79
10	Jiang *et al.* (2010)	JFE	733	91.63
11	Peng (2004)	SMJ	726	51.86
12	Ayyagari *et al.* (2010)	RFS	709	88.63
13	DeFond *et al.* (1999)	JAE	679	35.74
14	Feng and Seasholes (2005)	RF	617	47.46
15	Jian and Wong (2010)	RAS	538	67.25
16	Gul *et al.* (2010)	JFE	530	66.25
17	Wei *et al.* (2005)	JFQA	518	39.85
18	Batjargal and Liu (2004)	OS	479	34.21
19	Wang and Qian (2011)	AMJ	384	54.86
20	Chen *et al.* (2010)	TAR	323	40.38
21	Chan *et al.* (2008)	JF	310	31.00
22	Chen *et al.* (2011)	CAR	307	43.86
23	Marquis and Qian (2014)	OS	304	60.80
24	Brockman and Chung (2003)	JF	291	19.40
25	Feng and Seasholes (2004)	JF	282	21.69
26	Li *et al.* (2011)	RFS	272	38.86
27	Haw *et al.* (2005)	CAR	255	19.62
28	Berkman *et al.* (2010)	JFQA	243	30.38
29	Gul *et al.* (2013)	TAR	241	48.20
30	Chan *et al.* (2006)	RAS	237	19.75

This table presents the total citation counts and citation counts per year, drawn from Google Scholar in September 2018 using the software program 'Publish or Perish'. Papers with the same number of Google Scholar total citation counts are listed chronologically in the table.

483 citations. This is followed by Kang *et al.* (2002), a PBFJ paper with 379 citations, which analyzes contrarian and momentum strategies in the Chinese stock market. In contrast, the top-cited accounting paper is the MAJ paper by Xiao and Yuan (2007), which looks at the effects of ownership structure and board composition on corporate voluntary disclosure in China, with a citation count of 330.[5]

The total citations of papers in Asia-Pacific regional journals are significantly lower than those in Tier 1 journals. It is not surprising that, in general, the papers

[5] Ranking the papers by citations per year, seven new articles enter into the top cited paper list, including Sharif *et al.* (2014), *Accounting and Finance,* Wang *et al.* (2014), *Pacific-Basin Finance Journal,* Xu *et al.* (2015), *Australian Journal of Management,* Chen *et al.* (2017), *Accounting and Finance*, Guo *et al.* (2017), *Pacific-Basin Finance Journal*, Huang *et al.* (2017), *Pacific-Basin Finance Journal,* Li *et al.* (2017), '*Pacific-Basin Finance Journal.*

TABLE 3

TOP CITED ACCOUNTING AND FINANCE PAPERS ON THE CHINESE CAPITAL MARKET PUBLISHED IN ASIA-PACIFIC REGIONAL JOURNALS IN 1999–2018

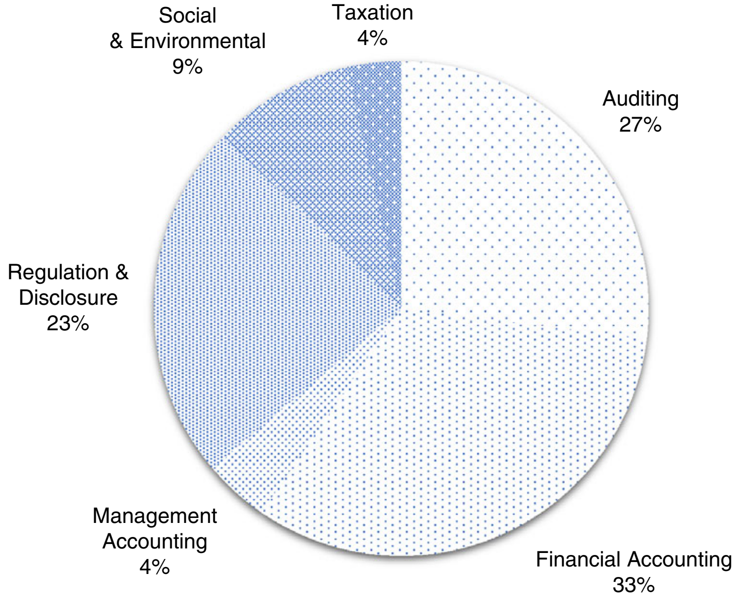
#	Author(s) and Year	Journal	Citation	Citation p.a.
1	Qi *et al.* (2000)	PBFJ	483	26.83
2	Kang *et al.* (2002)	PBFJ	379	23.69
3	Tan *et al.* (2008)	PBFJ	376	37.60
4	Su and Fleisher (1999)	PBFJ	370	19.47
5	Xiao and Yuan (2007)	MAJ	330	30.00
6	Cheung *et al.* (2009)	PBFJ	221	24.56
7	Eun and Huang (2007)	PBFJ	167	15.18
8	Chen *et al.* (2009)	PBFJ	162	18.00
9	Gao and Kling (2008)	PBFJ	156	15.60
10	Gul (1999)	PBFJ	143	7.53
11	Zhou *et al.* (2012)	PBFJ	127	21.17
12	Su and Fleisher (1999)	PBFJ	115	6.05
13	Xu and Chen (2012)	PBFJ	114	19.00
14	Qu and Leung (2006)	MAJ	112	9.33
15	Naughton *et al.* (2008)	PBFJ	109	10.90
16	Wang and Chin (2004)	PBFJ	107	7.64
16	Ng *et al.* (2009)	PBFJ	107	11.89
17	Hwang *et al.* (2008)	MAJ	100	10.00
17	Huang *et al.* (2011)	PBFJ	100	14.29
18	Su and Chong (2007)	PBFJ	98	8.91
19	Xiao *et al.* (2004)	Abacus	94	6.71
20	Chen *et al.* (2010)	PBFJ	90	11.25
21	Cai *et al.* (2008)	PBFJ	89	8.90
21	Feng and Seasholes (2008)	PBFJ	89	8.90
22	Wang (2004)	PBFJ	87	6.21
22	Peng and Bewley (2010)	AAAJ	87	10.88
23	Shafer (2009)	AAAJ	85	9.44
24	Hao (1999)	AAAJ	84	4.42
25	Gao (2010)	PBFJ	76	9.50
26	Ang and Ma (1999)	PBFJ	70	3.68
26	Lam *et al.* (2013)	PBFJ	70	14.00
27	Fan *et al.* (2007)	PBFJ	69	6.27
27	Wang and Wang (2011)	PBFJ	69	9.86
28	Brown and Mitchell (2008)	PBFJ	62	6.20
28	Wang *et al.* (2014)	PBFJ	62	15.50
29	Ng and Wu (2006)	PBFJ	61	5.08
30	Lin *et al.* (2008)	AAAJ	58	5.80
30	Ma *et al.* (2010)	AF	58	7.25
30	Chang *et al.* (2014)	PBFJ	58	14.50

This table presents the total citation counts and citation counts per year, drawn from Google Scholar in September 2018 using the software program 'Publish or Perish'. Papers with the same number of Google Scholar total citation counts are listed chronologically in the table.

in Tier 1 journals attract more citations, given that they typically address broader and more ground-breaking research questions, and have a wider range of readers. On the other hand, Asia-Pacific regional journals have a much larger and rapidly growing number of papers on China's capital market. Additionally, papers published in regional journals pay more attention to research questions on specific aspects of the institutional environment in China.

FIGURE 3

DISTRIBUTION BY RESEARCH FIELD FOR ACCOUNTING PAPERS ON THE CHINESE CAPITAL MARKET PUBLISHED IN 1999–2018



[Colour figure can be viewed at wileyonlinelibrary.com]

ACCOUNTING RESEARCH AREAS

In this section, we summarize the six main accounting research fields we identify from publications on the Chinese capital market in Tier 1 and Asia-Pacific regional journals. The six accounting fields are: auditing (AU), financial accounting (FA), management accounting (MA), regulation and disclosure (RD), social and environmental (SE), and taxation (TA).

Auditing and financial accounting appear to be the most popular accounting research streams (see Figure 3). For Tier 1 journals, Panel A of Table 4 clearly shows that auditing is the most popular accounting research stream, represented by 23 of 56 accounting papers (41.07%) on the Chinese capital market. This is likely due to the distinctive institutional features of the Chinese auditing market, which gives rise to a wealth of research opportunities. As summarized by Fu and Lu (2014), the auditing market is much less concentrated in China than in the United States; there is a series of structural changes in the market and the Chinese auditing profession is regulated and administered by government agencies.

The most widely cited paper in the auditing area is the JAE paper by Wang *et al.* (2008), which examines state ownership and auditor choice, with 767 citations (see Table 2). Other top-cited auditing papers include another JAE paper by DeFond *et al.* (1999), which considers the effect of enhancing auditor

TABLE 4

FREQUENCY DISTRIBUTION BY JOURNAL AND RESEARCH FIELD FOR ACCOUNTING PAPERS ON THE CHINESE CAPITAL MARKET PUBLISHED IN 1999–2018

Journal	AU	FA	MA	RD	SE	TA	Total
Panel A: Tier 1 journals							
AMJ	–	–	–	1	1	–	2
CAR	8	2	–	2	–	–	12
JAE	4	3	–	1	1	1	10
JAR	1	4	–	–	–	–	5
OS	–	–	–	–	1	–	1
RAS	1	5	–	–	–	–	6
TAR	9	5	2	2	–	2	20
Total	23	19	2	6	3	3	56
Percentage	41.07%	33.93%	3.57%	10.71%	5.36%	5.36%	
Panel B: Asia-Pacific regional journals							
AAAJ	2	–	–	7	1	1	11
AAR	–	4	1	3	4	–	12
Abacus	2	5	2	2	–	–	11
AF	1	–	–	1	–	–	2
ARJ	–	2	–	1	1	–	4
JCAE	1	4	–	4	1	1	11
MAJ	7	4	1	8	1	–	21
PAR	2	8	–	1	2	–	13
Total	15	27	4	27	10	2	85
Percentage	17.65%	31.76%	4.71%	31.76%	11.76%	2.35%	

The Tier 1 journals are: *Academy of Management Journal* (AMJ), *Contemporary Accounting Research* (CAR), *Journal of Accounting and Economics* (JAE), *Journal of Accounting Research* (JAR), *Organization Science* (OS), *Review of Accounting Studies* (RAS), and *The Accounting Review* (TAR). The accounting research fields are: auditing (AU), financial accounting (FA), management accounting (MA), regulation and disclosure (RD), social and environmental (SE), and taxation (TA). The Asia-Pacific regional journals are: *Accounting, Auditing and Accountability Journal* (AAAJ), *Australian Accounting Review* (AAR), *Abacus* (Abacus), *Accounting and Finance* (AF), *Accounting Research Journal* (ARJ), *Journal of Contemporary Accounting and Economics* (JCAE), *Managerial Auditing Journal* (MAJ), and the *Pacific Accounting Review* (PAR). The accounting research fields are: auditing (AU), financial accounting (FA), management accounting (MA), regulation and disclosure (RD), social and environmental (SE), and taxation (TA). This table presents the number of accounting papers on the Chinese capital market published in each journal over the 1999–2018 period by research field, and the percentage of total accounting papers on the Chinese capital market by research field.

independence, and a TAR paper by Chen *et al.* (2010) on client economic importance and audit quality in China. In contrast, the auditing field in the Asia-Pacific regional journals is ranked third in terms of number of papers, with 17.65% of accounting papers published in this area. The top-cited auditing paper in Asia-Pacific regional journals with the highest total citation count is the AAAJ paper by Shafer (2009) on the impact of ethical climate on the conflict between organizational value and professional value.

Financial accounting is the second most popular accounting stream of research on the Chinese capital market in Tier 1 journals, represented by 33.93% of the total accounting papers. The top-cited financial accounting paper on the Chinese capital market is the JAR paper by Aharony *et al.* (2000), which studies earnings management and IPO firms in China, with 779 citations. However, in the Asia-Pacific regional journals, financial accounting appears to be the most attractive research field and is represented by 27 of 85 accounting papers (31.76%).

In Tier 1 journals, regulation and disclosure is the third most popular field for Chinese market research and is represented by six of 56 accounting papers (10.71%). The top-cited paper is a TAR paper, at 739 total citations, by Chen and Yuan (2004). The authors examine the relation between earnings management and capital resource allocations in China by exploiting an accounting-based regulation of rights issuance. This is followed by a CAR paper by Haw *et al.* (2005), which examines the market consequences of earnings management in the context of security regulations in China. In contrast, in the Asia-Pacific regional journals, the field of regulation and disclosure appears to be more attractive, represented by 31.76% of papers. Across these regional journals, the top-cited regulation and disclosure paper with the highest total citation count at 330, is the MAJ paper by Xiao and Yuan (2007) on corporate voluntary disclosure.

Table 4 and Figure 3 also reveal that management accounting, and taxation are the least studied fields in accounting for both Tier 1 (8.93% of papers) and Asia-Pacific regional journals (7.06% of papers).

FINANCE RESEARCH AREAS

In this section, we summarize the six main finance research fields identified from publications on the Chinese capital market in Tier 1 and Asia-Pacific regional journals. The six finance research fields are: asset pricing and investments (AI), banking and financial intermediation (BF), corporate finance (CF), derivatives (DE), international finance (IF), and market microstructure (MM).

Table 5 and Figure 4 show that corporate finance and asset pricing and investments together account for more than 80% of research interest across all finance research fields. Corporate finance is the most popular finance research stream, accounting for 64.38% and 45.50% of all finance papers on the Chinese capital market in Tier 1 journals and Asia-Pacific regional journals, respectively. This is mainly due to the distinct institutional environment features encountered by Chinese listed firms. For instance, the 2006 share structure reform in China affects corporate policies, while the political connections of executives have a significant impact on both corporate values and managerial behaviour. Moreover, other regulation changes on property rights, accounting standards, and governance mechanisms provide research opportunities in the area of corporate governance.

With 47 corporate finance papers (out of 73 Tier 1 finance papers), the top-cited corporate finance paper with the greatest citation count is a JFE paper by Allen *et al.* (2005) on law, finance, and China's economic growth. Other top-cited corporate finance papers include another JFE paper by Fan *et al.* (2007) on the political connections of CEOs and post-IPO performance and the SMJ paper by Park and Luo (2001) on the utilization of *guanxi* and its impact on firm performance in China.

TABLE 5

FREQUENCY DISTRIBUTION BY JOURNAL AND RESEARCH FIELD FOR FINANCE PAPERS ON THE CHINESE CAPITAL MARKET PUBLISHED IN 1999–2018

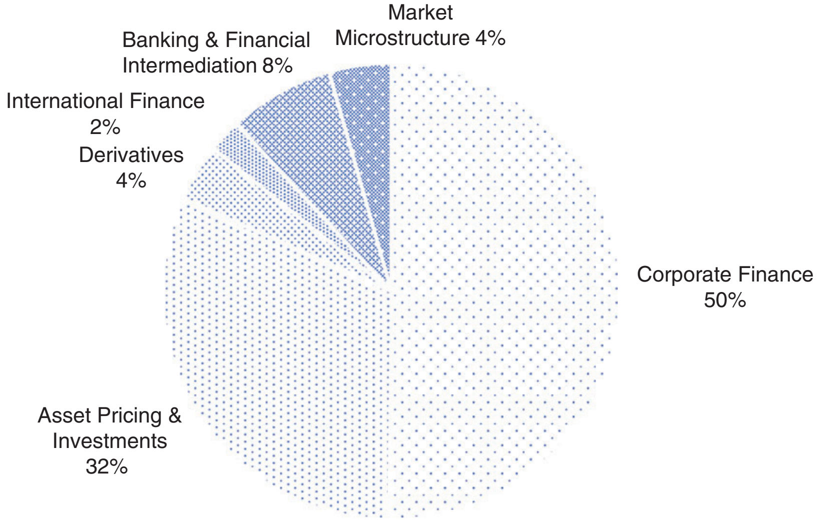
Journal	AI	BF	CF	DE	IF	MM	Total
Panel A: Tier 1 journals							
AMJ	–	–	3	–	–	–	3
ASQ	–	–	1	–	–	–	1
JF	2	2	1	–	–	1	6
JFE	2	–	9	–	–	–	11
JFQA	2	1	7	–	–	–	10
JIBS	1	–	2	–	–	–	3
MS	2	–	3	1	–	–	6
OS	–	–	4	–	–	–	4
RF	4	–	1	1	1	1	8
RFS	4	–	7	1	–	–	12
SMJ	–	–	9	–	–	–	9
Total	17	3	47	3	1	2	73
Percentage	23.29%	4.11%	64.38%	4.11%	1.37%	2.74%	
Panel B: Asia-Pacific regional journals							
AF	7	3	21	1	–	3	35
AJM	1	–	4	–	–	–	5
IRF	10	1	10	–	1	2	24
PBFJ	58	15	66	8	5	6	158
Total	76	19	101	9	6	11	222
Percentage	34.23%	8.56%	45.50%	4.05%	2.70%	4.95%	

The Tier 1 journals are: *Academy of Management Journal* (AMJ), *Contemporary Accounting Research* (CAR), *Journal of Accounting and Economics* (JAE), *Journal of Accounting Research* (JAR), *Organization Science* (OS), *Review of Accounting Studies* (RAS), and *The Accounting Review* (TAR). The accounting research fields are: auditing (AU), financial accounting (FA), management accounting (MA), regulation and disclosure (RD), social and environmental (SE), and taxation (TA). The Asia-Pacific regional journals are: *Accounting, Auditing and Accountability Journal* (AAAJ), *Australian Accounting Review* (AAR), *Abacus* (Abacus), *Accounting and Finance* (AF), *Accounting Research Journal* (ARJ), *Journal of Contemporary Accounting and Economics* (JCAE), *Managerial Auditing Journal* (MAJ), and the *Pacific Accounting Review* (PAR). The finance research fields are: asset pricing and investments (AI), banking and financial intermediation (BF), corporate finance (CF), derivatives (DE), international finance (IF), and market microstructure (MM). This table presents the number of finance papers on the Chinese capital market published in each journal over the period 1999–2018 by research field, and the percentage of total finance papers on the Chinese capital market by research field.

For Asia-Pacific regional journals, corporate finance is represented by 101 of 222 finance papers. The top-cited corporate finance paper is a PBFJ paper by Qi *et al.* (2000) on the impact of different classes of equity ownership on firm performance, which is also the top-cited paper on the Chinese capital market across regional journals between 1999–2018, with 483 total citations. The top-cited corporate finance paper in AF is Ma *et al.* (2010), which examines ownership, ownership concentration, and firm performance, with 58 citations. The top-cited paper in AJM is Xu *et al.* (2015), which examines the impact of corporate social responsibility (CSR) activities on the cost of equity, with 33 citations. The top-cited paper in IRF

FIGURE 4

DISTRIBUTION BY RESEARCH FIELD FOR FINANCE PAPERS ON THE CHINESE CAPITAL MARKET PUBLISHED IN 1999–2018



[Colour figure can be viewed at wileyonlinelibrary.com]

is Otchere and Zhang (2001), which examines privatization in China, with 19 citations.

Asset pricing and investments is ranked second and is represented by 17 (of 73) top-tier finance papers (23.29%). The top-cited asset pricing and investments paper is an RF paper, at 617 citations, by Feng and Seasholes (2005), which examines the effects of investor sophistication and trading experience on behavioural biases. Asset pricing and investments represents 34.23% of finance papers in the Asia-Pacific regional journals. The top-cited paper is a PBFJ paper by Kang *et al.* (2002) on contrarian and momentum strategies, with 379 citations. This is closely followed by another PBFJ paper by Tan *et al.* (2008) on herding behaviour in China's stock market, with 376 citations.

There are fewer than three papers in each of the four remaining finance research fields in the Tier 1 journals. A total of 19 and 11 papers appear in the fields of banking and financial intermediation and market microstructure in the Asia-Pacific regional journals, respectively. Both derivatives and international finance have fewer than 10 papers.

FREQUENT CONTRIBUTORS

The Chinese capital market has attracted the attention of academic researchers worldwide. The 1999–2018 period has seen a rapid increase in the number of researchers interested in untangling accounting and finance research questions in

TABLE 6

FREQUENT CONTRIBUTORS ACCORDING TO THE NUMBER OF PUBLISHED PAPERS ON THE CHINESE CAPITAL MARKET IN TIER 1 JOURNALS IN 1999-2018.

#	Author	Number of Papers	Total Citations	Average Citation per Paper
1	T.J. Wong	9	5,118	568.67
2	Yongxiang Wang	6	323	53.83
2	Donghui Wu	6	1,028	171.33
2	Tianyu Zhang	6	2,493	415.50
3	Phyllis Lai Lan Mo	5	505	101.00
3	K. Hung Chan	5	543	108.60
3	Michael Firth	5	593	118.60
3	Zhifeng Yang	5	415	83.00
4	Bin Ke	4	180	45.00
4	Clive S. Lennox	4	214	53.50
5	Fei Du	3	85	28.33
5	Ferdinand A. Gul	3	781	260.33
5	Hong Zou	3	351	117.00
5	Mingyi Hung	3	162	54.00
5	Nan Jia	3	77	25.67
5	Oliver Zhen Li	3	31	10.33
5	Chen Lin	3	329	109.67
5	Christopher Marquis	3	329	109.67
5	Oliver M. Rui	3	201	67.00
5	Jing Shi	3	77	25.67
5	Xi Wu	3	165	55.00
5	Zhishu Yang	3	514	171.33

China's capital market. Table 6 shows the frequent contributors to the literature on the Chinese capital market. Specifically, we rank contributors according to the number of their published papers on China's capital market in Tier 1 journals during the 1999–2018 period. We list the top 22 contributors who fall within the top five total publication counts.

The most prolific author is T. J. Wong, with nine papers on the Chinese capital market published in Tier 1 journals: eight accounting papers and one finance paper across five well-respected journals. This author's work ranges from DeFond *et al.* (1999) dealing with auditor independence and audit market competition, to Hung *et al.* (2015) examining the value of political ties and market credibility, and Piotroski *et al.* (2015) studying the role of political incentives in corporate disclosures.

In addition, Yongxiang Wang, Donghui Wu, and Tianyu Zhang each have six papers on the Chinese capital market in Tier 1 journals. Yongxiang Wang's earliest paper during the sample period is Calomiris *et al.* (2010) exploring the impact of announcing the sale of government-owned shares in China. More recently, Yongxiang Wang's papers include Chen *et al.* (2018) dealing with mandatory CSR disclosure in China, and Jia *et al.* (2018) examining the relationship between minority shareholders and controlling shareholders. Donghui Wu's papers range from Haw *et al.* (2005) on the consequences of earnings management behaviour in Chinese listed firms, to He *et al.* (2017) on social ties and audit quality. Tianyu Zhang's papers include Piotroski and Zhang (2014), which deals with politicians and IPO activities in China, and Lennox *et al.* (2016), which examines the relation between audit adjustments and earnings quality.

There are many other leading researchers whose work has further enhanced our understanding of the Chinese capital market. In accounting research, for example, Chan *et al.* (2010) analyze tax-based accounting and tax noncompliance; Firth *et al.* (2012) look at the organizational form of auditors; Gul *et al.* (2013) examine the influence of individual auditors on audit outcomes; Ke *et al.* (2015) explore the effect of institutional environment on audit quality; Guan *et al.* (2016) analyze the impact of school ties on audit outcomes; and Du *et al.* (2018) investigate performance measures and evaluations in Chinese state-owned enterprises (SOEs). In finance research, for instance, Firth *et al.* (2010) study the role of government shareholders and mutual funds in the split share structure reform; Jia *et al.* (2013), using related party transactions, investigate coinsurance within business groups in China; Qian *et al.* (2015) study information production and use in the context of bank lending; Zhang *et al.* (2016) deal with the political connections of privately controlled firms in China; Haveman *et al.* (2017) examine political embeddedness and firm performance in China; and Li *et al.* (2017) analyze the effect of dividend tax reform in China on corporate dividend payout policies.

EMERGING TRENDS AND FUTURE DIRECTIONS

In this section, we examine accounting and finance papers on the Chinese capital market over the last five years (2014–2018) to identify emerging research trends and provide research directions. Recent papers in Tier 1 and Asia-Pacific regional journals reveal emerging trends in the following area: media, household finance, corporate social responsibility, and political connections. These areas provide promising avenues for future studies.

Media

An emerging field of research on the Chinese capital market is the media's impact on corporate outcomes. The media, as an information intermediary and a corporate monitor, plays a key role in the capital market. China provides a special setting to examine the effect of the media on corporate decision making and performance, as most of the media is state-controlled. Amongst Tier 1 journals, You *et al.* (2017), for example, study how government control affects the role of the media on the corporate governance of publicly listed firms. Papers in Asia-Pacific regional journals, such as Huang (2018) and Zhu *et al.* (2017) examine how media sentiment impacts stock returns.

Future research in this area could examine the potential role played by government-owned media or private media in corporate governance settings. As summarized by Wong (2016), many research questions warrant further investigation. For instance, does increased news credibility reduce information asymmetry of listed firms or improve stock price efficiency? Do critical reports of listed firms perform a governance role in monitoring managers? Do newspapers serve as public channels providing policy directives to listed firms?

Household Finance

The field of household finance has grown rapidly in recent years (Badarinza *et al.*, 2016). With rich household-level data, household finance research is increasingly becoming prominent in China. For instance, Liao *et al.* (2017) show that consumers with higher levels of financial literacy are more likely to hold risky financial assets than those with lower levels of financial literacy, while Liu *et al.* (2017) examine Chinese households' decisions to buy or rent a primary residence from a risk-hedging perspective.

As Campbell (2006) argues, one main challenge of household finance research is the difficulty of measuring household behaviours. Given the recent progress on developing survey data at the household level in China,[6] there are numerous topics for future research. For example, how does household wealth affect capital market participation decisions? Does demography affect households' risk preferences? How diversified are the portfolios held by households? How do households make their mortgage decisions?

Corporate Social Responsibility

Another emerging stream of accounting and finance research in China is concerned with corporate social responsibility. Unlike disclosure requirements in other countries, CSR reporting has been required by the Chinese government since 2008 for a subset of firms (Chen *et al.*, 2018). This change in regulation contributes to the emerging literature in the area of CSR. In Tier 1 journals, Chen *et al.* (2018) examine how mandatory disclosure of CSR impacts firm performance and social externalities in China. Additionally, Marquis and Qian (2014) investigate how and why firms strategically respond to government signals on appropriate corporate activity in China. Furthermore, there are a relatively large number of publications on CSR in China in Asia-Pacific regional journals. For example, Xu *et al.* (2015) examine the market's reaction to CSR disclosure; Carey *et al.* (2017) document that voluntary CSR reporting and audit fees are positively associated in China, while Shafer *et al.* (2016) investigate the relation between social responsibility and tax fraud in China.

The mandatory disclosure of CSR activities in China provides an opportunity to study the impact of mandatory disclosure on the production of private information and market efficiency. Moreover, opportunities exist in this area to investigate the governance role of CSR in Chinese listed firms. It is interesting to understand how different types of investors (e.g., state ownership, institutional investors, and individual investors) react to firms' costly CSR activities; and what is the monitoring mechanism in relation to CSR activities.

[6] For instance, the Survey and Research Center for Household Finance has generated and provided survey data on Chinese household finance since 2013.

Political Connections

The final emerging research area we examine is concerned with the effects of political connections and how they impact the Chinese market. Specifically, most papers focus on examining the value of political connections in publicly listed firms. For example, in Tier 1 journals, Piotroski *et al.* (2015) examine the proposition that politicians and their affiliated firms temporarily suppress negative information in response to political incentives. Additionally, Piotroski and Zhang (2014) show that the incentives created by the impending turnover of local politicians can accelerate the pace of IPO activity in certain politicized environments. In a paper in an Asia-Pacific regional journal, Han and Zhang (2018) investigate the value of politically connected board members for Chinese listed firms, while Peng *et al.* (2017) explore whether the political connections of the board of directors facilitates credit financing. On the other hand, a growing strand of literature focuses on the risk of being politically connected in Chinese firms. For instance, Liu *et al.* (2017) examine the impact of political uncertainty on the asset prices of politically connected firms.

Most of the papers we examine find that political connections create value for Chinese listed firms. However, there are still many unanswered questions. As argued by Wong (2016), future research can focus on how social ties are used in developing political connections. How do politicians develop political networks with bureaucrats in SOEs, and with entrepreneurs in non-SOEs? Under what conditions do politicians have a positive effect on listed firms? Do political connections enable the government to administer certain polices that withstand macro shocks or reduce the risks and costs incurred by the reform itself? How do political incentives interact with the application of International Financial Reporting Standards (IFRS)?

Taken together, although there are many interesting studies and emerging research questions on the Chinese capital market, it remains unclear as to what extent these research findings provide information on some fundamental global accounting and finance questions (Fu and Lu, 2014). For instance, does the capital market in China stimulate economic growth and improve capital allocation efficiency or it is simply a side show? This remains an open question for both China and developed countries.[7] This limitation, however, creates an important long-term research opportunity. As argued by Allen *et al.* (2005), China is a significant counter-example to the findings in the literature. Therefore, China's capital market is a fertile setting for researchers to create new accounting and finance theories to address these questions.

CONCLUSION

This paper provides an overview of the accounting and finance literature on the Chinese capital market from 1998–2018. We review academic papers on China's

[7] Other important questions summarized by Fu and Lu (2014) include, what is the most appropriate measure of accounting qualities? Do accounting numbers and qualities have a first-order effect on firm value, and does it differ between China and the West?

capital market published in Tier 1 journals and Asia-Pacific regional journals. We also present the top-cited accounting and finance papers across Tier 1 journals and Asia-Pacific regional journals, respectively. Moreover, we identify the main accounting and finance research streams on the Chinese capital market, revealing that the financial accounting and corporate finance fields dominate the journals overall. The Chinese capital market has attracted increasing academic attention worldwide, which has led to the formulation of novel accounting and finance research questions, greatly advancing our understanding of accounting and finance research.

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Board characteristics and firm value for Indian companies

Rakesh Kumar Mishra
Indian Oil Corporation Limited, Noida, India, and
Sheeba Kapil
Department of Finance, Indian Institute of Foreign Trade, New Delhi, India

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Abstract

Purpose – This paper aims to explore the relationship between board characteristics and firm performance for Indian companies.

Design/methodology/approach – Corporate governance structures of 391 Indian companies out of CNX 500 companies listed on National Stock Exchange have been studied for their impact on performance of companies. Panel data regression methodology has been used on data for five financial years from 2010 to 2014 for the selected companies. Performance measures considered are market-based measure (Tobin's Q) and accounting-based measure (return on asset [ROA]).

Findings – The empirical findings indicate that the market-based measure (Tobin's Q) is more impacted by corporate governance than the accounting-based measure (ROA). There is a significant positive association between board size and firm performance. Board independence is found significantly related to firm performance. Number of board meetings is found to be sending positive signal to the market creating firm value. Separation of chief executive officer and chairman of the board is found to be value-creating, and overburdened directors affect firm performance adversely.

Research limitations/implications – Limitations of the study are in terms of methodology and possible omission of some variables. It is understood that the qualitative dynamics happening inside board meetings impact corporate performance. The strategic decision-making process adopted by the boards to fight competition or to increase market share is not easily available in public domain. The decision-making processes and monitoring for implementation of those decisions could impact corporate governance performance relationship. These parameters and their impact on corporate performance are not covered under the scope of the present study.

Originality/value – The paper adds to the emerging body of literature on corporate governance performance relationship in the Indian context by using a reasonably wider and newer data set.

Keywords India, Board structure, Corporate governance, Firm performance

Paper type Research paper

1. Introduction

Corporate governance is a system by which companies are directed and controlled (Cadbury Committee, 1992). Corporate governance is concerned with three aspects of decision-making process in a firm. First, who is empowered to take what decision; second, whose interest gets priority while taking a particular decision; and third, whether (and how) contextual factors such as social, political, economic and legal institutions are impacting the decision-making process and outcomes of these decisions.

In the context of emerging economies, corporate governance mechanisms have been found correlated with firm performance in various theoretical and empirical studies (Khanna and Palepu, 2000; Gibson, 2003; Klapper and Love, 2004; Young *et al.*, 2008; Ehikioya, 2009; Claessens and Yurtoglu, 2013). Well-functioning corporate governance mechanisms in emerging economies are of crucial importance for both local firms and foreign investors that

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are interested in pursuing such tremendous opportunities for investment and growth that emerging economies provide (Rajagopalan and Zhang, 2008). From the perspective of local firms, there is evidence that firms in emerging economies (compared with their counterparts in developed countries) are discounted in financial markets because of their weak governance (La Porta *et al.*, 2000). Improvements in corporate governance can enhance investor confidence in firms in emerging economies and increase these firms' access to capital (Rajagopalan and Zhang, 2008).

The Indian Government initiated market reforms in 1991. Major elements of these reforms resulted in the opening of the Indian economy to multinational companies and foreign investment. Increased foreign investment in India intensified interest in good corporate governance and in particular the application of western governance structure to Indian firms (Jackling and Johl, 2009). India needed capital to finance the expansion of market spaces created by liberalization and outsourcing opportunities. This need for capital amongst other requirements led to corporate governance reforms and major initiatives in this direction. The initial step in this direction was the introduction of Clause 49 in the listing agreement by Securities Exchange Board of India (SEBI) that contained prominence of independent directors amongst other things. Government of India has taken yet another major step in this direction through the introduction of Companies Act 2013 (effective from 1 April 2014); wherein provisions of corporate governance have been made mandatory for Indian companies.

Like other emerging economies, Indian organizations also face domination by family ownership and other forms of domination, such as government or a foreign group. These groups often exercise influence that is disproportionate to their actual shareholding (Pande and Ansari, 2013). In family-owned corporations that widely prevail in emerging economies (like India), boards are typically dominated by family members who enjoy substantial ownership and control and often hold top executive positions with an objective of controlling the firm (Carney and Gedajlovic, 2002). As an implication, board members of family-controlled firms may not be that much efficient in their monitoring role and may give benefit of doubt to incumbent mangers for low firm performance (Gomez-Mejia *et al.*, 2003). In case of Indian firms, families (founders) are present on the boards in 63.2 (65.5) percent, and on an average, founders own over 50 per cent of outstanding shares (Jameson *et al.*, 2014). This leads to different kind of corporate governance issues in India as compared to governance issue in the Anglo-Saxon economies, which is primarily disciplining management that may stop being accountable to the owners who usually are dispersed shareholders.

Denis and McConnell (2003) argued that to overcome problems in corporate governance, different internal or external mechanisms can be applied. Primary internal mechanisms are the board of directors and equity ownership structure of the firm, whereas primary external mechanisms are the external market for corporate control (the takeover market) and the legal system. External and internal governance mechanisms are complements, i.e. countries where market for corporate control are not that much prevalent and enforcement of corporate government regulations through legal system is weak, and provide a strong case for internal governance mechanisms to be at the forefront for improving corporate performance. Hence, considering the current stage of Indian economy where market for corporate control is still developing (Khanna and Palepu, 2000) and there exists a weak legal enforcement regime of corporate governance (Sarkar and Sarkar, 2000), it appears that internal governance mechanisms will have significant bearing on corporate performance.

This study attempts to investigate the impact of an internal governance mechanism, i.e. board of directors, on the firm value for Indian companies.

2. Objectives and methodology

This paper analyses data of CNX500 companies listed at National Stock exchange (NSE) for five financial years starting from financial year 31 March 2010 to 31 March 2014. We aim to find relationship of firm performance with different board characteristics such as:

- board independence;
- board leadership structure;
- board size;
- number of board meetings; and
- busyness of directors.

In this paper, we also propose to find out:

- whether factors such as firm size, age of firm, leverage used by firm and sales growth affect firm performance; and
- whether the relationship between firm performance and different board characteristics is the same for different types of performance measures, namely, an accounting-based measure such as return on asset (ROA) and a market-based measure such as Tobin's Q.

We used panel data methodology to analyze data across firms over the years. Panel data sets are able to identify the estimate effects that are not detectable in pure cross-sectional or pure time series analysis (Ahmed Sheikh and Wang, 2012). The regression has been carried out for complete set of data and also for data subsets to explore differential impacts of corporate governance variables on different types of companies, for example, small vs large companies, companies with small board vs those with large board.

The paper is organized as follows. In Section 3, we review theoretical arguments and empirical evidence with respect to the relationship between structure of board of directors and firm performance. In Section 4, we put forward our arguments for hypotheses development based on the review of previous findings. Section 5 provides description of model, variables and their measures. Section 6 presents data descriptive, followed by results and analysis. Finally, concluding remarks with discussion on limitations of our study and future directions is given in Section 7.

3. Literature review

3.1 The board of directors

As the relationship between board of directors and firm performance is substantially varied and complex, a single governance theory is not adequate to describe it (Nicholson and Kiel, 2007). Main theories developed to understand the relationship between structure of board, its role and firm performance are agency theory, resource dependence theory and stewardship theory. The relationship between board and firm performance has been studied in the context of different functions performed by the board. Board of directors serves two important functions for organizations:

(1) monitoring management on behalf of shareholders (agency theorists); and

(2) providing resources (resource dependence theorists) (Hillman and Dalziel, 2003).

Agency theory (Jensen and Meckling, 1976; Fama, 1980; Fama and Jensen, 1983) considers agency relationship as a contract under which the principal (s) (shareholders) engage the agents (managers) to perform some service on their behalf which involves delegating some decision-making authority to the agent. If both the parties are utility maximisers, there is a good reason to believe that the agent will not always act in the best interest of the principal necessitating monitoring of agents' behaviour by the principal (s). As the board monitors managers on behalf of principal, an independent board (comprising majority of outsiders) and separation of the post of chairman of the board and chief executive officer (CEO) would reduce agency cost, facilitating better performance.

Under the stewardship theory, objectives of both principals and agents are considered to be unidirectional, and hence, there is no conflict of interests. Managers are considered good stewards of resources entrusted to them (Donaldson, 1990; Donaldson and Davis, 1991, 1994). This theory considers managers trustworthy people (Donaldson and Preston, 1995). The agency cost will be minimal because, for fear of losing their reputation, managers will not act against interests of the shareholders (Donaldson and Davis, 1994). This theory indicates that to attain a superior performance by their corporations, CEOs should exercise complete authority over the corporation and that their role must be unambiguous and unchallenged (Donaldson and Davis, 1991). This situation is attained more readily if the CEO is also the chairman of the board. Hence, stewardship theory entails a better firm performance for companies with common role of CEO and chairperson of the board as a result of unidirectional strategic orientations provided by it.

The resource dependency theory provides a mechanism whereby firms have links to critical resources from the environment through affiliations of its directors and tends to emphasize on the economic nature of these resources (Barroso *et al.*, 2011). The board has a role in provision of resources that include providing legitimacy, administering advice and counselling, acting as a link to important stakeholders or other significant bodies, facilitating access to resources such as capital, building external relations, etc. (Barroso *et al.*, 2011). Board is a vital link between the company and the resources needed to maximize performance (Pfeffer and Salancik, 2003). Apart from this, the board itself is considered an important resource especially in relationship to its external environment as boards can manage environmental dependencies and would reflect the environmental needs (Hillman *et al.*, 2009). This enables the board to provide a sustainable competitive advantage over its competitors (Barney *et al.*, 2001). Thus, resource dependency theory would anticipate that board of directors with high level of external links would improve a company's access to various resources, thus improving firm performance (Jackling and Johl, 2009). The linkage between resources and performance provided by the board of directors would depend on the activity and busyness of directors. Hence, in line with the resource dependency theory, it can be assumed that size and diversity of the board, number of board meetings and association of directors with other companies either as directors or as committee members will have a positive association with the firm performance.

Primary function of board of directors in corporations is to ensure maximization of shareholder value through a mechanism that includes activities pertaining to hiring, firing, monitoring and compensating the managers (Shleifer and Vishny, 1997; Hermalin and Weisbach, 2001). Theoretically, the board is an effective corporate governance mechanism, but empirical results do not exactly support this. Some of the reasons for such results are as follows:

- Many a times, the board includes insiders whose monitoring is to be done by the board.
- Selection of outsiders on the board is decided or influenced by inside managers.
- Chairperson of the board is also the CEO of the firm.

Main issues highlighted in various empirical studies pertaining to the board have been certain specific variables and their impact on performance of the firm. These variables are size of the board, ratio of outside directors and inside directors, CEO duality, number of board meetings and internal and external busyness of directors.

3.1.1 Board composition. Board composition may affect corporate performance in two ways; one way is to have more number of outside directors that will lead to better evaluation and monitoring, whereas on the other hand, more number of internal directors will lead to better corporate performance because of alignment of interests (as per agency theorists). An optimal board composition depends upon the kind of firm and the environment in which it is operating (Mishra and Kapil, 2016). Coles *et al.* (2008) found that complex firms that have greater advising requirements than simple firms have larger boards with more outside directors.

Kamardin and Haron (2011), using factor analysis, extracted two dimensions of monitoring roles: management oversight and performance evaluation. Non-independent, non-executive directors and managerial ownership are positively related to both dimensions of monitoring roles, while multiple directorships of non-executive directors are negatively related to management oversight roles. Boards with a high representation of outside and foreign directors were associated with better performance compared to those boards that had a majority of insider executive and affiliated non-executive directors (Ameer *et al.*, 2010).

Petra (2006) explained that a dispersed nature of shareholding pattern results into a situation where an individual shareholder does not have either potential or incentive to monitor the behaviour of management directly. In such a situation, board of directors are entrusted to monitor the behaviour of management on behalf of shareholders. Majority of outside independent directors in the board would reduce conflict of interest and increase its monitoring potential. Reforms brought out in different countries indicate towards providing more independence to the board. As per Aguilera (2005), corporate governance reforms are increasingly focusing on non-executive directors/independent outside directors with a hope that they will bring greater transparency, accountability and efficiency to corporate governance.

In India, Clause 149(4), Chapter XI of Companies Act 2013, states that every listed public company shall have at least one-third of the total number of directors as independent directors, and the Central Government may prescribe minimum number of independent directors in case of any class or classes of public companies. Every company existing on or before the date of commencement of this Act (1 April 2014) shall, within one year, comply with the requirements of the provisions.

3.1.2 Chief executive officer duality. There are two different views on board leadership structure. Agency theorists argue that roles of CEO and chairperson combined into a single person (i.e. CEO duality) will lead to domination of board by that person making the board ineffective in monitoring managerial opportunism (Jensen, 1993). As a result, CEO duality enhances CEO entrenchment and reduces board independence (Rhoades *et al.*, 2001). Separating these two roles is desired so that the CEO is responsible for executing company's policies and running the company, and chairperson of the board is responsible for running the board and monitoring and evaluating managerial activities (Yan Lam and Kam Lee, 2008). Higgs (2003) recommends that separating these two roles, "avoids concentration of authority and power in one individual and differentiates leadership of the board from running of the business". The board is also responsible for the process of hiring, firing, evaluating and compensating the CEO, and thus, the chairperson should preferably not be the same person whose performance is being assessed (Jensen, 1993). CEO duality is expected to lower the performance because CEOs would gain much power to further their own interests rather than the interests of shareholders (Weisbach, 1988). On the other hand, steward theorists accept that managers are good stewards of company resources (Davis *et al.*, 1997). The supporters of stewardship theory advocate that there is no conflict of interest between the mangers and shareholders; hence, CEO duality would promote a unified and strong leadership with a clear sense of strategic direction.

3.1.3 Board size. Literature suggests that an increased board size has two competing effects: greater monitoring versus more rigid decision-making (Harford *et al.*, 2012). Impact of board size on corporate performance is a trade-off between two competing aspects; first, a large board leads to wide experience and more linkages to external environment (which may help in access to resources and stakeholders) and second, a large board slows down the decision-making process. Yermack (1996) found an inverse relationship between board size and firm value. In contrast, Harris and Raviv's (2008) model of boards trades off additional monitoring services with free-riding predicting larger boards to provide optimal monitoring when managers' opportunities to consume private benefits are high. Abor and Biekpe (2007) found that board size has significant positive impact on profitability. Empirical results indicate that board size is positively related to the ROA, earnings per share and market-to-book ratio. (Ahmed Sheikh *et al.*, 2013). Geraldes Alves (2011) predicted a non-linear relationship between board size and earnings management. Kumar and Singh (2013) found a negative relationship between board size and firm value in the Indian context. Kota and Tomar (2010) found that small boards are more effective in enhancing firm value.

Regarding board size in India, Clause 149(1), Chapter XI of Companies Act 2013, says that every company shall have a board of directors consisting of individuals as directors and shall have:

- a minimum number of three directors in the case of a public company, two directors in the case of a private company and one director in the case of a one-person company; and
- a maximum of 15 directors; a company may appoint more than 15 directors after passing a special resolution.

3.1.4 Board committees. Eberhart (2012) reported a significant increase in firm valuation (measured by Tobin's Q) for companies that adopted an alternative of the Anglo-American type committee system. This finding was attributed to "signal sending", as companies that adopted this system signal a choice towards transparency via monitoring by outsiders, suggesting a reduction of asymmetric agency costs. The above-mentioned paper finds that the committee corporate governance system produces higher corporate value than the traditional auditor governance, citing evidence that it is the signal provided by the adoption of the credible system, not the financial performance variables that account for this difference. Veronica and Bachtiar (2014) found that audit committee has a significant negative relation with discretionary accruals indicating effectiveness of audit committee in constraining the level of earnings management. Further, they found that proportion of independent directors on board and existence of audit committee increases the positive relationship between discretionary accruals and stock return, thereby indicating that earnings management conducted by firms have higher proportion of independent directors, and firms having audit committee will be valued higher by the market. Raja and Kumar (2007) found that committee component has statistically significant relationship with firm performance.

3.1.5 Board meetings and participation of directors. Directors on board discharge their responsibilities of monitoring and providing resource linkage through their active participation in the board meetings. Board effectiveness is dependent on behaviour of directors in board meetings. Active directors' behaviour – i.e. challenging, questioning, informing, encouraging, etc. – is an important driver of board effectiveness (Roberts *et al.*, 2005). Board members' commitment are far more important than board demographics for predicting board task performance (Minichilli *et al.*, 2009). The commitment of board members will depend upon their involvement in the meeting, which refers to their effort during discussions and in the follow-up of decisions taken during the board meetings (Judge and Zeithaml, 1992). Involvement also includes board members' willingness and ability to advance useful questions and to intervene constructively in the board decision-making process. Additionally, for increasing their involvement, the board members must be prepared for the board meeting, which refers to their willingness and ability to participate in board meetings with a deep knowledge of the topics to be discussed to actively contribute to the decision-making process. Preparation is related to the degree to which board members examine information prior to the meetings and take initiatives to collect further information (Forbes and Milliken, 1999). Hence, number of board meetings and an effective participation of directors in these meetings are expected to impact firm performance positively.

3.1.6 Outside busyness of directors. Number of directorship/chairmanship or committee positions in other companies held by directors of a company indicates degree of linkage with external environment and resources. Fama (1980) and Fama and Jensen (1983) note that the market for outside directorships provides an important source of incentives for outside directors to develop reputation as monitoring specialists. This reputation hypothesis tells that by sitting on many boards, an executive learns about different management styles or strategies used in other firms (Perry and Peyer, 2005). Because of their competence and extensive experience, they are more likely to serve on a larger number of board committees than those not holding multiple directorships. This hypothesis, thus, predicts a positive relation between the number of board seats and the number of board committees (Jiraporn *et al.*, 2009).

Ferris *et al.* (2003) has termed directors holding directorship position in multiple companies in terms of *busyness hypothesis*. Multiple directorships permit a firm to use its directors to form or solidify advantageous contracting relations with other firms, such as important suppliers or customers (Ferris *et al.*, 2003). However, individuals holding more outside board seats have less time to spend serving on board committees. At the cost of shareholders, executives may seek outside directorship because it improves their visibility and enhances their status. Large number of appointments can make directors over committed and consequently compromise their ability to monitor company management effectively on behalf of shareholders and adversely affect firm value (Fich and Shivdasani, 2006).

3.2 Uniqueness of Indian corporate governance system

Indian corporate governance system is unique because of certain specific issues as compared to much researched corporate governance system of developed economies. Although Indian corporate governance codes and systems are largely modelled on the developed economies, it is substantially different in terms of sources of corporate governance ills and structures to deal with those ills.

Corporate governance approach in developed economies is hinged on disciplining the management and making them accountable to the owners who are usually dispersed shareholders, whereas in India, it is the stronghold of the majority or dominant shareholder(s) who may use the majority of company resources to serve their own interests. Hence, the "agency cost", which arises out of difference in the interests of managers and shareholders in developed economies, arises out of difference in the interests of majority or dominant shareholders and minority shareholders in India. This applies across the Indian companies with dominant shareholders – public-sector undertakings (government as dominant shareholder), multinational companies (parent company incorporated abroad as dominant shareholder) and private-sector companies (family or business groups and sometimes non-listed holding companies as dominant shareholder).

Apart from this, there is one additional issue in the form of promoter-controlled companies. Promoter(s) in general is(are) person(s) who is(are) involved in incorporation and organization of a corporation. Promoters constitute an important part of companies in Indian context, as most of the companies are of family origin. Promoters (even though may not be the majority shareholders in many cases) are usually present on the board of Indian companies and exercise powers disproportionate to their shareholding.

In the case of developed economies, redressal of the corporate governance issues is addressed through boards and their committees, independent directors, managing CEO succession and the disclosures. In the Indian corporate culture, boards are not as empowered as their counterparts from developed economies, and often, functioning of the boards is fully controlled by the majority or dominant shareholders.

In India, corporate governance reforms started in 1990s with the formation of SEBI in 1992 and subsequent committees (K M Birla committee in 1999, Naresh Chandra Committee in 2002 and Narayan Murthty committee in 2003). Reforms recommended by these committees culminated into insertion of Clause 49 into the listing agreement in 2000 and subsequent insertion of penalty clause in 2004. These reforms called for prominence of independent directors and formation and functions of different board committees as measures to improve corporate governance.

Significant difference also exists in enforcement of corporate governance systems in India and developed economies. Chakrabarti *et al.* (2008) have noted that while on paper, the framework of the country's legal system provides some of the best investor protection in the world, enforcement is a major problem in view of the slow functioning of over-burdened courts and the widespread prevalence of corruption.

The following section considers the above unique aspects of Indian corporate governance system in understanding the hypothesized relationship between board structure and firm performance.

4. Hypotheses development

Impact of board composition on firm performance varies across different studies depending upon the theoretical bases considered by these studies. Agency theory, which is based on the inherent conflict between the firm's owners and its management (Fama and Jensen, 1983), indicates that a greater proportion of outside independent directors help boards to efficiently monitor in the situation of conflict.

Independent directors are invited on the board to oversee management on behalf of shareholders (Baysinger and Butler, 1985). Higher proportion of independent directors on the board may lead to superior financial performance (Baysinger and Butler, 1985) and greater firm value (Mak and Kusnadi, 2005). Hutchinson *et al.* (2008) found that board independence is associated with lower performance-adjusted discretionary accruals, a commonly used measure of earnings management. Outside directors were found impacting firm value positively (Black and Kim, 2012). Kumar and Singh (2012) found that independent director's proportion has an insignificant positive effect on firm value for Indian companies.

Ehikioya (2009) found no evidence to support the impact of board composition on performance. Yammeesri and Kanthi Herath (2010) reported that neither independent directors nor grey directors are significant determinants of firm value. Gill (2013), in an analysis of the central public-sector enterprises in India, has shown that non-compliance with the corporate governance provisions with regard to required number of independent directors on the board did not have any concomitant effect on their performance. Certain studies even indicate that outside directors are negatively related to ROA, earnings per share and market-to-book ratio (Ahmed Sheikh *et al.*, 2013). Kota and Tomar (2010) found that non-executive independent directors fail in their monitoring role.

Significant development has taken place in India for empowering boards through the introduction of Clause 49 of listing agreement in which independence of board has been emphasized. Companies Act 2013 also has provisions for specified number of independent directors ensuring independence of the board. However, true independence of the boards in India is yet to be fully ensured in spirit. This is because of two things, first, supply side constraint for qualified independent directors and second, appointment of directors based on kinship and social and family ties in India (Khanna and Rivkin, 2001).

In this study, monitoring role of the board has been considered of prominence. Agency theory has been taken as a base to analyze the monitoring role of the board and its impact on firm performance. Monitoring by independent directors is supposed to be efficient as it will not involve the clash of interest. Independent directors, because of their experience and to maintain their reputation, do better scrutiny of managerial behaviour, hence ensuring all shareholders' interests. This leads to better firm performance. Considering the above, we propose following hypothesis:

H1. Board independence is positively related to firm performance.

Prior studies have indicated that the leadership structure of the board, particularly role of the CEO, may influence the firm performance. This relationship is contingent upon the ability of a CEO to influence decisions (Adams *et al.*, 2005), which in fact is based on the power a CEO has (Finkelstein, 1992). Corporate governance reforms worldwide advocated separation of the role of CEO and chairman of the board. This was based on the premise that the one of the important tasks of the board is to evaluate and control the behaviour of top management including that of the CEO. In that case, if CEO himself/herself is the leader of the group responsible for evaluating and taking decisions in this regard, the process may get biased impacting firm performance negatively. Agency theory predicts that the separation of the chairman and CEO roles leads to a greater scrutiny of managerial behaviour, which further leads to a better performance (Lorsch and MacIver, 1989). On the other hand, stewardship theory predicts that decision-making under the unified leadership (having both the roles chairman and CEO) leads to better performance (Donaldson and Davis, 1991).

Empirical evidence suggests that the relationship between CEO duality and accounting performance is contingent on the presence of family control factor. CEO duality is good for non-family firms, and while non-duality is good for family-controlled firms. CEO duality has significant positive impacts on profitability (Abor and Biekpe, 2007). CEO duality is positively related to earnings per share (Ahmed Sheikh *et al.*, 2013; Kamal Hassan and Saadi Halbouni, 2013).

On the contrary, Ehikioya (2009) reported that there is significant evidence to support that CEO duality adversely impacts firm performance. CEO duality leads to a higher incidence of bad news disclosure, suggesting increased scrutiny works (Collett and Dedman, 2010). This may lead to lower market valuation and increased cost. Considering the Indian corporate scene with dominance of promoters and business groups having family-related CEOs possessing disproportionate power in the board, we arrive at our next hypothesis:

H2. Chief executive officer duality is negatively related to firm performance.

Prior studies have studied the relationship between board size and firm performance from two different theoretical perspectives; resource dependency theory and theory of group cohesiveness. Resource dependency theory predicted that a board of directors with high level of links to the external environment would improve company's access to various resources, thus improving corporate governance and firm performance (Jackling and Johl, 2009). However, theory of group cohesiveness indicates that with increased size, board faces problems of poor coordination and slow decision-making. Jensen (1993) indicated that when the board size is more than seven or eight, the board is less likely to function effectively.

There is an inverse relationship between board size and firm performance measured by Tobin's Q (Yermack, 1996; Eisenberg *et al.*, 1998), because of lack of coordination and communication associated with a large board. It becomes more difficult for all directors to express their ideas and opinions in limited time available when a board has more than ten members (Lipton and Lorsch, 1992). On the other hand, small boards augment monitoring capabilities (Yermack, 1996; Khanchel, 2007) and are more efficient (Garg, 2007).

As indicated in various studies, there is an optimum size of the board for maximum performance, so below the optimum size, it is expected that board size will have a positive relationship with performance, whereas above optimum size, board size will have a negative relationship. This is in line with earlier studies, for example, Cormier *et al.* (2010), Golden and Zajac (2001) and Vafeas (1999). Larger boards are likely to have higher coordination costs, which reduces their ability to effectively monitor management (Fauzi and Locke, 2012). Differences in findings of the relationship between board size and firm performance may be also due to firm-specific factors such as firm size and firm age (Bennedsen *et al.*, 2008).

In the Indian context, prominence of promoter-based and family-based companies generally restrict director's position to kinship and family members. So, more number of directors is expected to add more resource capability in line with resource dependency theory. However, inducting directors beyond kinship may not add value. First, because of lack of adequately qualified outside directors in sufficient numbers and second, the directors outside kinship may not gel with the internal directors leading to slow decision-making, resulting into inferior performance. Companies Act 2013 also specifies minimum and maximum number of directors, indicating that increasing the number of directors may not have a monotonically increasing effect on firm performance. This leads to following hypotheses:

H3. Board size is negatively related to firm performance.

H3a. Relation between board size and firm performance is different for smaller companies in comparison to larger companies.

H3b. Relation between board size and firm performance is different for smaller board companies in comparison to larger board companies.

Board of directors achieve monitoring through board meetings; hence, number of board meetings is a good proxy for the monitoring effects of directors (Vafeas, 1999). Vafeas (1999) demonstrated that boards meet more often during periods of turmoil, and that a board meeting more often shows improved financial performance. A board that meets more often should be able to devote more time to issues such as earnings management. A board that seldom meets may not focus on these issues and may perhaps only approve the management decisions. Lipton and Lorsch (1992) suggested that the greater frequency of meetings is likely to result in a superior performance. Hence, the following hypothesis is presented:

H4. Number of board meeting is positively related to firm performance.

Monitoring function and resource providing function of board would be established through board meetings. As indicated in various prior studies (Jackling and Johl, 2009; Minichilli *et al.*, 2009; Forbes and Milliken, 1999), the effectiveness of the board and subsequent firm performance depends on number of times the meeting happens and the "quality of meetings". When the directors attend at least 75 per cent of the meetings, it leads to an enhanced firm valuation (Brown and Caylor, 2004). Board activity has been found to positively impact firm value (Brick and Chidambaran, 2010). In the present study, internal busyness of directors has been measured in terms of average participation of board meetings, which is in line with earlier studies done in the Indian context (Mishra and Mohanty, 2014). This leads to our next hypothesis:

H5. Directors' internal busyness is positively related to firm performance.

Busyness hypothesis has been propounded to reflect the number of positions that directors accept on different company boards (Ferris *et al.*, 2003). In this paper, external busyness of directors has been measured in terms of average number of directorship and committee positions held in other companies by the directors of the company. Studies have found that directors with multiple appointments have a positive impact on firm performance (Harris and Shimizu, 2004; Ferris *et al.*, 2003). This is based on the presumption that they have networks and corporations and would benefit by accessing these resources (Booth and Deli, 1996).

In this regard, some studies (Fich and Shivdasani, 2006) view that a large number of appointments make directors over committed, which leads to a compromise over monitoring function affecting firm value adversely. In the studies done in the Indian context, it has been pointed out that multiple directorship is also because of supply constraint in directors market owing to lack of industrial leadership and adequacy of experience (Jackling and Johl, 2009). Family control of business groups leads to directorship position held under kinship and social ties (Khanna and Rivkin, 2001). Hence, outside directorship may not have a positive association with firm value, and this leads to our last hypothesis:

H6. Directors' external busyness is negatively related to firm performance.

5. Data, model and methodology

5.1 Data

Data for analysis has been obtained from the prowess database of Centre for Monitoring of Indian Economy (CMIE). The data starting set is CNX 500 companies which accounts for about 95.77 per cent of the free float market capitalization of the stocks listed on NSE as on 31 March 2015. Data for above companies have been selected for five financial years from 2010 to 2014 (ending on 31st March of respective year). Banks and financial companies (78 out of 500) were excluded from our sample because of their different accounting structure, which makes it difficult to calculate the financial ratios used in study and previous authors' example in this type of analysis (Yatim *et al.*, 2006; Yammeesri and Kanthi Herath, 2010; Jackling and Johl, 2009; Black *et al.*, 2010; Mustapha and Ahmad, 2011; Di Vito and Bozec, 2012; Kumar and Singh, 2013). Further, we deleted companies that did not have full data set for all variables under study for relevant five years. Hence, we were left with 391 companies with five-year data, resulting in 1955 data points. For some of the missing data, for example, data on number of board meetings, data on CEO duality for some companies for some years, we extracted data directly from the annual reports of respective companies.

5.2 Model and variables

To test the effect of board structure on firm performance we propose following models:

$$\begin{aligned}\text{Tobin's Q} = \text{f}\,(&\text{percentage of independent directors, CEO duality, board size,}\\ &\text{number of board meetings, internal busyness of directors,}\\ &\text{external busyness of directors as director in other companies,}\\ &\text{external busyness of directors as committee members in other}\\ &\text{companies, firm size, firm age, leverage, sales growth}) + e_{it}\end{aligned}$$

$$\begin{aligned}\text{ROA} = \text{f}\,(&\text{percentage of independent directors, CEO duality, board size,}\\ &\text{number of board meetings, internal busyness of directors,}\\ &\text{external busyness of directors as director in other companies,}\\ &\text{external busyness of directors as committee members in other}\\ &\text{companies, firm size, firm age, leverage, sales growth}) + e_{it}\end{aligned}$$

where i and i represent the firm and periods, respectively, and e_{it} is the error term.

Researchers have used different parameters to measure firm performance, namely, market-based and accounting-based. Tobin's Q as a performance measure is commonly used as a dependent variable (Perfect and Wiles, 1994; Agrawal and Knoeber, 1996; Loderer and Peyer, 2002; Reddy *et al.*, 2008; Kumar and Singh, 2013). Tobin's Q ratio, which is a marked-based performance measure, is calculated as the market value of common stock and preferred stock plus book value of debt divided by the book value of assets.

ROA has been used as an accounting-based performance measure by different studies, namely, Demsetz and Villalonga (2001), Fich and Shivdasani (2006) and Thomsen *et al.* (2006). ROA has been defined as the after tax net operating income divided by the total operating assets (Copeland *et al.*, 2000). Net operating income is computed as the operating earnings before income and taxes, before extra-ordinary items and prior adjustment. Prowess database of CMIE has an item called PBDITA (profit before depreciation interest and tax) prior to extra-ordinary items. It has been used as a proxy for net operating income.

Demsetz and Villalonga (2001) argue that although the numerator of Tobin's Q partly reflects the value that investors assign to a company's intangible assets, the denominator does not include the investment a company has in intangible assets, such as advertisement and research and development. These items are simply treated as expenses. To overcome this problem, some studies have used depreciated value of tangible assets. The accounting-based profit measure is criticised for being backward-looking and it estimates future events only partially in the form of depreciation and amortization. On the other hand, Tobin's Q is greatly influenced by a wide range of unstable factors, such as investors' psychology and market forecasts (Reddy *et al.*, 2010). For this reason, we have used both the performance measures in this study.

Control variables used in the study are size of firm, age of firm, financial leverage used by firm and sales growth of firm.

Size of the company in terms of total assets is used as the first control variable. This is in line with earlier studies in Indian context such as Sarkar and Sarkar (2000), Kumar (2004), Black and Khanna (2007), Dharmapala and Khanna (2013), Balasubramanian *et al.* (2010), Kota and Tomar (2010) and Kumar and Singh (2012). In above-mentioned studies, it is hypothesized that size has a positive influence on performance of the firm because of various reasons such as diversification, economies of scale and access to cheaper sources of funds. In this study, we have used natural logarithm of total assets as Fsize.

Another control variable considered in various studies in Indian Context (Sarkar and Sarkar, 2000; Kumar, 2004; Kota and Tomar, 2010; Kumar and Singh, 2012) is age of firm, which is calculated by difference between the year of study and the year of incorporation. It is hypothesized that older firms are more efficient than younger firms because of the learning curve and survival bias effects. In this study, natural logarithm of the number of years since the incorporation is considered as Fage.

Financial leverage of the firm has also been used as control variables in several studies (Sarkar and Sarkar, 2000; Kumar, 2004; Ehikioya, 2009; Kota and Tomar, 2010; Kumar and Singh, 2012). It is calculated by dividing total liabilities with total stockholders' equity. A high debt/equity ratio generally means that a company has been aggressive in financing its growth with debt. It is hypothesized that if a firm uses debt to finance increased operations, the firm could potentially generate more earnings than it would have without this outside financing.

Sales growth is used as control variable in the study and is calculated as total sales of the current year minus total sales in the previous year divided by total sales in the current year (Hermalin and Weisbach, 2012).

Independent variables used in the study are different parameters associated with board of directors. Variables used and their measures are indicated in Table I.

The data descriptive and Pearson correlations between variables have been presented in Table II. It indicates a significant relationship between dependent variables Tobin's Q and ROA with most of the independent variables (board characteristics) and also with control variables. In general, it is indicated that performance measures are positively related to duality and negatively related to board independence, busyness of directors, firm size, leverage and sales growth. For every data set, we have run two regressions each with Tobin's Q and ROA as dependent variable.

5.3 Methodology

When we are interested in analyzing the impact of variables that vary over time, fixed effects (FE) model is used. FE explores relationships between predictor and outcome variables within an entity (in present study, this entity is company). Each company may be having its own characteristics/culture that may or may not influence the predictor variables. While applying FE, it is assumed that something within the company may impact or bias the predictor or outcome variables and this is needed to be controlled. Hence, it is assumed that there is correlation between entity's error term and predictor variables. FE is expected to remove the effect of these time-invariant characteristics to enable estimation of net effect of predictor on the outcome variable. In random effects (RE) model, variation across entities (companies) is assumed to be random and uncorrelated with the predictor or independent variables included in the model. This allows time invariant variables to play a role as explanatory variables.

For checking the applicability of suitable model for the study, we applied Hausman test in which null hypothesis is that RE model is appropriate and alternate hypothesis is that the

Serial no.	Variable name	Description	Measurement
Dependent variable			
1	Tobin's Q	Market value of equity + book value of short-term and long-term debt divided by total assets (FA + INV + CA)	Ratio
2	ROA	Operating profit before depreciation and amortization divided by total assets	Ratio; considered as ratio of PBDITA to total assets
Independent variable			
3	Bsize	Number of directors on the board of a firm	Number
4	Bind	% of outside directors of total number of directors	%
5	Bmeet	Number of board meetings in a year	Number
6	Duality	A binary variable; if chairman of the board is also CEO of the company, its value is 0, otherwise 1	Binary number
7	OBUSYD	Average number of directorship/ chairmanship positions in outside companies held by the directors of a company	Number
8	OBUSYC	Average number of committee positions in outside companies held by the directors of a company	Number
9	IBUSY	Average number of board meeting attended by the directors of a company	Number
Control variable			
10	Fsize	Natural logarithm of total assets	Number
11	Fage	Natural logarithm of the number of years since the establishment	Number
12	Lev	Ratio of long-term debt to the total assets	Ratio
13	Sgrowth	Total sales of the current year minus total sales in the previous year divided by total sales in the current year	%

Table I.
Variables used in the model

FE model is appropriate. We obtain significant *p*-values for both the cases, i.e. when Tobin's Q is the dependent variable and when ROA is the dependent variable. Hence, we rejected the null hypothesis and accepted the alternate hypothesis. Thus, between FE and RE models, the FE model is more appropriate for the study.

Next, to check appropriateness between FE and pooled regression model, we conducted Wald test in which null hypothesis is that pooled ordinary list square regression technique (OLS) is acceptable, i.e. the dummies (for companies) have value equal to zero, and alternate hypothesis is that FE is appropriate. We obtain non-significant *p*-values for both the cases, i. e. when Tobin's Q is dependent variable and when ROA is dependent variable, thus failed to reject null hypothesis. Hence, between FE and pooled OLS, pooled OLS is more appropriate for the study.

The reason of the above result may be that in Indian environment, corporate governance and corporate performance are more affected by the general socio, economic and political factors than the company-specific factors. Hence, the intercept value in regression equation appears to be independent of the entity (i.e. company). Further, FE is taking away certain degree of freedom. Thus, pooled OLS regression may be considered more appropriate for the study.

Table II. Data descriptive and correlation coefficient between variables

		Statistical measures					Pearson correlations												
Variables	*N*	Minimum	Maximum	Mean	Median	SD	Tobin's Q	ROA	Bind	Duality	Bsize	Bmeet	OBUSYD	OBUSYC	Fsize	Fage	IBUSY	Lev	Sgrowth
Tobin's Q	1,955	0.18	28.98	1.9	1.22	2.06	1												
ROA	1,955	−0.67	1.33	0.15	0.14	0.1	0.360**	1											
Bind	1,955	0	100	46.78	46.15	11.85	−0.074**	−0.009	1										
Duality	1,955	0	1	0.58	1	0.49	0.099**	0.107**	−0.107**	1									
Bsize	1,955	2	26	11.59	11	3.56	−0.036	0.031	−0.094**	−0.142**	1								
Bmeet	1,955	1	14	4.66	4	1.11	0.016	−0.015	0.004	−0.100**	0.048*	1							
OBUSYD	1,955	0	19.8	4.39	4	1.69	−0.055*	−0.082**	0.154**	0.072**	−0.097**	−0.087**	1						
OBUSYC	1,955	0	21.33	4.29	3.91	2.7	−0.066**	−0.035	0.144**	0.090**	−0.191**	−0.085**	0.464**	1					
Fsize	1,955	0	11	2.09	2.1	1.42	−0.206**	−0.196**	0.023	−0.149**	0.495**	0.089**	0.053*	0.004**	1				
Fage	1,955	6.77	15.12	10.38	10.32	1.39	−0.072**	0.064**	0.052*	0.012	0.142**	0.019	−0.083**	−0.084**	0.119**	1			
IBUSY	1,955	1.1	5.02	3.45	3.37	0.63	−0.059**	−0.086**	−0.017	−0.117**	0.036	0.114**	−0.018	0.041**	0.263**	0.018	1		
Lev	1,955	0	1.59	0.22	0.21	0.18	−0.334**	−0.440**	0.128**	−0.116**	0.028	0.081**	0.043	−0.008**	0.218**	−0.060**	0.040**	1	
Sgrowth	1,955	−1.91	3193.22	3.19	0.13	85.34	−0.001	−0.019	−0.008	−0.008	−0.021	0.005	0.032	0.014	0.021	−0.067	−0.016	0.029	1
Total assets	1,955	872.3	3,677,440	101,188.45	30,199	267,110.5													

Notes: **correlation is significant at the 0.01 level (two-tailed); *correlation is significant at the 0.05 level (two-tailed)

6 Discussion and analysis

6.1 Data descriptive

Performance variable Tobin's Q has mean (SD) 1.90 (2.06), another performance variable ROA has mean (SD) 0.15 (0.10). It reflects the fact that the accounting-based performance measure (ROA) has lesser variability than the market-based performance measure (Tobin's Q). The size of firm in terms of total asset value varies between Rs 872m to Rs 3,677,440m with mean (SD) Rs 101,188m (267,110). The median value is Rs 30,199m. Board size measured by number of directors varies from 2 to 26 with mean (SD) 11.59 (3.56). Board independence measured by percentage of independent directors to the total number of directors varies from 0 to 100 with mean (SD) 46.78 (11.85). Leverage mean (SD) value is 0.22 (0.18), showing that Indian companies depend more on equity rather than debt.

For further analysis, the data are divided in different subsets. As the median value comes at Rs 30199m, companies with asset value of greater than and equal to Rs 30,199m has been termed as large companies and those with asset value less than Rs 30,199m has been termed as small companies. Median value of board size (Bsize) is 11, hence companies with Bsize less than 11 have been termed as small board companies and those with more than and equal to 11 have been termed as large board companies. We have run the regression models first for complete data set and then for each of the data subsets mentioned above.

We have checked the significance of statistical difference between characteristics of small companies and large companies (results are presented in Appendix). It has been found that large companies have significantly bigger board size compared to smaller companies. Bigger board size for larger companies indicates requirement of more number of directors to oversee the increased business size. It is also found that the board of bigger companies meet more often as compared to the board of smaller companies. Duality, i.e. the CEO holding the position of chairman of board of directors, is more in case of smaller companies than the larger companies. It may be because with increasing size of company, the perceived good practice of separating the two roles is being adopted by the companies more and more. Firm performance is also found to be significantly different between larger and smaller companies, with smaller companies exhibiting better performance on both kinds of performance measures, namely, market-based measure (Tobin's Q) and accounting-based measure (ROA).

It is observed that board meetings are happening more in case of bigger board size companies as compared to companies with smaller board. Duality, i.e. the CEO holding the position of chairman of board of directors, is more in case of smaller board companies than the larger board companies. Firm performance is also found to be significantly different between larger board and smaller board companies, with smaller board companies exhibiting better performance on market-based measure (Tobin's Q) and larger board companies exhibiting slightly better performance on accounting-based measure based (ROA).

Regression results: pooled OLS regression results for complete data set and for subsets are presented next.

6.2 Results and analysis

From the regression result presented in Tables III-VII, value of collinearity statistics, i.e. tolerance and variance inflation factor (VIF), is within their acceptable limits (i.e. VIF < 10 and tolerance > 0.1), indicating the absence of multicollinearity problem. Values of Durbin Watson statistic for all regressions are close to 2, indicating absence of auto correlation, which is expected in case of panel data if error terms are related with previous years data.

Variables and statistical measures	Tobin's Q Coefficients	Tobin's Q *t* value	Tobin's Q Collinearity statistics Tolerance	Tobin's Q Collinearity statistics VIF	ROA Coefficients	ROA *t* value	ROA Collinearity statistics Tolerance	ROA Collinearity statistics VIF
(Constant)	5.229	11.362**			0.227	10.835**		
Bind	−0.001	−0.281	0.925	1.082	0.001	3.429**	0.925	1.082
Duality	0.249	2.75**	0.927	1.079	0.013	3.149**	0.927	1.079
Bsize	0.029	2.012*	0.686	1.457	0.004	5.262**	0.686	1.457
Bmeet	0.1	2.515*	0.964	1.038	0.003	1.486	0.964	1.038
IBUSY	−0.006	−0.237	0.897	1.115	−0.002	−1.386	0.897	1.115
OBUSYD	−0.006	−0.304	0.762	1.312	−0.002	−2.45*	0.762	1.312
OBUSYC	−0.09	−2.545*	0.746	1.341	0	0.110	0.746	1.341
Fsize	−0.218	−5.63**	0.637	1.571	−0.011	−6.318**	0.637	1.571
Fage	−0.282	−4.019**	0.95	1.053	0.005	1.546	0.95	1.053
Lev	−3.405	−13.929**	0.912	1.097	−0.217	−19.522**	0.912	1.097
Sgrowth	0	0.345	0.992	1.008	3.045E-06	0.132	0.992	1.008
R	0.386				0.478			
R^2	0.149				0.229			
Adjusted R^2	0.144				0.224			
F	30.862**				52.399**			
Durbin–Watson statistic	1.901				2.052			

Notes: *significant at 5% level; **significant at 1% level

Table III. Regression results with all data

Variables and statistical measures	Tobin's Q Coefficients	Tobin's Q *t* value	Tobin's Q Collinearity statistics Tolerance	Tobin's Q Collinearity statistics VIF	ROA Coefficients	ROA *t* value	ROA Collinearity statistics Tolerance	ROA Collinearity statistics VIF
(Constant)	9.41	8.520**			0.233	5.581**		
Bind	−0.010	−1.540	0.921	1.086	0.001	2.651**	0.921	1.086
Duality	0.278	1.760	0.942	1.062	0.022	3.678**	0.942	1.062
Bsize	−0.002	−0.061	0.836	1.196	0.005	4.551**	0.836	1.196
Bmeet	0.158	2.136*	0.966	1.035	0.006	2.004*	0.966	1.035
IBUSY	−0.003	−0.049	0.921	1.085	−0.003	−1.444	0.921	1.085
OBUSYD	0.026	0.797	0.738	1.355	−0.003	−2.758**	0.738	1.355
OBUSYC	−0.168	−2.991**	0.732	1.367	0.001	0.260	0.732	1.367
Fsize	−0.620	−5.419**	0.810	1.235	−0.019	−4.462**	0.810	1.235
Fage	−0.338	−2.678**	0.915	1.093	0.016	3.434**	0.915	1.093
Lev	−3.079	−7.063**	0.928	1.077	−0.225	−13.672**	0.928	1.077
Sgrowth	0.849	3.200**	0.98	1.02	0.039	3.904**	0.980	1.020
R	0.374				0.499			
R^2	0.140				0.249			
Adjusted R^2	0.130				0.240			
F	14.237**				29.015**			
Durbin–Watson statistic	1.762				1.980			

Notes: *significant at 5% level; **significant at 1% level

Table IV. Regression results for small companies

For all data regression (Table III) and for small companies (Table IV), value of coefficient of board independence is negative but non-significant when Tobin's Q is the dependent variable and positive and significant when ROA is the dependent variable. In case of large companies (Table V) and small board companies (Table VI), value of coefficient of board independence is positive but non-significant with Tobin's Q as the dependent variable and positive and significant with ROA (0.001) as the dependent variable. For large board companies (Table VII), value of coefficient of board independence is negative but non-significant when Tobin's Q is the dependent variable.

So, *H1* is supported when performance measure is accounting-based. It indicates that although board independence is affecting the performance of the company, market does not attach value to it. This is giving credence to the theoretical aspect that independent boards do better monitoring function, leading to better firm performance.

For all data regression (Table III), coefficient of number of CEO duality is positive and significant for both the performance measures, Tobin's Q (0.249) and ROA (0.013). In case of small companies (Table IV) and small board companies (Table VI), coefficient of CEO duality is positive and non-significant when Tobin's Q is the dependent variable and positive and significant when ROA is the dependent variable. In case of large companies (Table V) it is reverse, i.e. coefficient of CEO duality is positive and significant (0.194) when Tobin's Q is the dependent variable and positive and non-significant when ROA is the dependent variable. In case of large board companies (Table VII), coefficient of number of CEO duality is positive and significant for both the performance measures, Tobin's Q (0.266) and ROA (0.010).

So, *H2* is validated for all data and for large board companies. It indicates that for large board, it is desired that chief executive officer and chairman positions are separated for better firm performance.

Variables and statistical measures	Tobin's Q Coefficients	Tobin's Q *t* value	Tobin's Q Collinearity statistics Tolerance	Tobin's Q Collinearity statistics VIF	ROA Coefficients	ROA *t* value	ROA Collinearity statistics Tolerance	ROA Collinearity statistics VIF
(Constant)	2.711	4.411**			0.166	4.189**		
Bind	0.006	1.688	0.905	1.105	0.001	2.398*	0.905	1.105
Duality	0.194	2.208*	0.919	1.088	0.004	0.649	0.919	1.088
Bsize	0.048	3.672**	0.714	1.400	0.003	3.198**	0.714	1.400
Bmeet	0.049	1.356	0.964	1.037	0.000	0.091	0.964	1.037
IBUSY	−0.033	−1.421	0.86	1.163	−0.002	−1.218	0.86	1.163
OBUSYD	−0.009	−0.492	0.76	1.315	0.000	−0.43	0.760	1.315
OBUSYC	0.029	0.775	0.739	1.353	0.001	0.341	0.739	1.353
Fsize	−0.089	−1.787	0.726	1.377	−0.002	−0.766	0.726	1.377
Fage	−0.086	−1.282	0.940	1.064	−0.002	−0.387	0.940	1.064
Lev	−3.513	−14.973**	0.952	1.051	−0.203	−13.465**	0.952	1.051
Sgrowth	0	0.768	0.988	1.012	0.000	−0.105	0.988	1.012
R	0.466				0.424			
R^2	0.217				0.180			
Adjusted R^2	0.208				0.170			
F	24.318**				19.222**			
Durbin–Watson statistic	1.928				1.955			

Notes: *significant at 5% level; **significant at 1% level

Table V.
Regression results for large companies

Variables and statistical measures	Tobin's Q Coefficients	Tobin's Q *t* value	Tobin's Q Collinearity statistics Tolerance	Tobin's Q Collinearity statistics VIF	ROA Coefficients	ROA *t* value	ROA Collinearity statistics Tolerance	ROA Collinearity statistics VIF
(Constant)	9.758	10.852**			0.153	3.836**		
Bind	0.006	0.926	0.953	1.049	0.001	2.585*	0.953	1.049
Duality	0.317	2.019	0.936	1.069	0.019	2.671**	0.936	1.069
Bsize	−0.124	−2.194*	0.915	1.093	0.012	4.708**	0.915	1.093
Bmeet	0.06	0.850	0.977	1.024	0.003	1.048	0.977	1.024
IBUSY	−0.074	−1.623	0.925	1.081	−0.002	−0.833	0.925	1.081
OBUSYD	0.000	0.007	0.771	1.297	−0.003	−1.894	0.771	1.297
OBUSYC	−0.198	−3.827**	0.765	1.308	0.000	−0.185	0.765	1.308
Fsize	−0.431	−6.376**	0.849	1.178	−0.016	−5.402**	0.849	1.178
Fage	−0.555	−4.519**	0.922	1.085	0.017	3.127**	0.922	1.085
Lev	−2.795	−6.698**	0.869	1.151	−0.202	−10.904**	0.869	1.151
Sgrowth	0.000	0.345	0.980	1.021	0.000	0.313	0.980	1.021
R	0.436				0.503			
R^2	0.190				0.253			
Adjusted R^2	0.179				0.242			
F	17.277**				24.915**			

Notes: *significant at 5% level; **significant at 1% level

Table VI. Regression results for small board companies

Variables and statistical measures	Tobin's Q Coefficients	Tobin's Q *t* value	Tobin's Q Collinearity statistics Tolerance	Tobin's Q Collinearity statistics VIF	ROA Coefficients	ROA *t* value	ROA Collinearity statistics Tolerance	ROA Collinearity statistics VIF
(Constant)	2.335	4.015**			0.252	9.032**		
Bind	−0.007	−1.666	0.897	1.115	0.000	2.273*	0.897	1.115
Duality	0.266	2.543*	0.902	1.108	0.010	1.992*	0.902	1.108
Bsize	0.041	2.082*	0.733	1.364	0.002	1.730	0.733	1.364
Bmeet	0.161	3.608**	0.941	1.063	0.002	0.785	0.941	1.063
IBUSY	−0.027	−0.837	0.796	1.256	0.000	−0.171	0.796	1.256
OBUSYD	−0.001	−0.050	0.717	1.395	−0.002	−2.278*	0.717	1.395
OBUSYC	0.054	1.136	0.724	1.382	0.003	1.274	0.724	1.382
Fsize	−0.077	−1.711	0.647	1.546	−0.008	−3.795**	0.647	1.546
Fage	0.004	0.048	0.942	1.061	−0.004	−0.999	0.942	1.061
Lev	−3.835	−13.422**	0.919	1.088	−0.225	−16.420**	0.919	1.088
Sgrowth	0.524	2.968**	0.965	1.037	0.020	2.415*	0.965	1.037
R	0.424				0.490			
R^2	0.179				0.240			
Adjusted R^2	0.171				0.232			
F	22.254**				32.122**			
Durbin–Watson statistic	1.976				1.873			

Notes: *significant at 5% level; **significant at 1% level

Table VII. Regression results for large board companies

From the regression result of all data presented in Table III, *H3* is not validated as board size is having statistically significant positive coefficient (0.029) in regression equation with Tobin's Q as the dependent variable and significant positive coefficient (0.004) in regression equation with ROA as the dependent variable. Further, it is indicated that board size impacts market-based performance measure (Tobin's Q) more as compared to accounting-based performance measure (ROA). This is in line with results reported by Dwivedi and Jain (2005), who found a positive relationship between board size and Tobin's Q; however, it contradicts the negative relationship observed by Kumar and Singh (2013).

When the regression is run for data subsets (Tables IV Table V), the value of coefficient of board size for smaller companies is negative but non-significant when Tobin's Q is the dependent variable and positive and significant when ROA is the dependent variable. In case of large companies, value of coefficient of board size is positive and significant with both Tobin's Q (0.048) and ROA (0.003) as dependent variables. Thus, *H3a* is not validated.

In case of small board companies (Table VI), the value of coefficient of board size is negative (−0.124) and significant when Tobin's Q is the dependent variable and positive (0.012) and significant when ROA is the dependent variable. In case of large board companies (Table VII) values of coefficient of board size are positive and significant with both Tobin's Q (0.041) and ROA (0.002) as dependent variables. So, *H3b* is supported when the dependent variable is Tobin's Q and not validated when the dependent variable is ROA, i.e. companies with small board and companies with large board show different relationship between board size and performance when the performance measure is market-based, whereas they show similar relationship when the performance measure is accounting-based.

The value of coefficient is positive and significant when ROA is the dependent variable for all cases, i.e. board size is positively related to accounting-based performance measure, and for market-based performance measure, it varies from significantly positive to insignificant to significantly negative under different cases. This is in line with results reported by Kamal Hassan and Saadi Halbouni (2013), who found that board size significantly influences accounting-based performance measure, while none of the governance variables significantly affect firms' market performance. This may be because of the reason that for small companies, market might not attach positive value to the resource dependency theory of having more number of directors, leading to more contact to the outside world. For complete data and for large companies, market-based performance measure is positively associated with the board size, indicating that the resource linkage requirement is being fulfilled by the increased size of the board, thus validating that resource dependency theory.

For all data regression (Table III), coefficient of number of board meeting is positive and significant (0.1) when Tobin's Q is the dependent variable and positive and non-significant when ROA is the dependent variable. In case of small companies (Table IV), coefficient of number of board meeting is positive and significant for both the performance measures of Tobin's Q (0.158) and ROA (0.006), whereas in case of large companies (Table V) and small board companies (Table VI), it is non-significant in both the cases. In case of large board companies (Table VII), the result is similar to all data regression.

So, *H4* is broadly validated in case of Tobin's Q as performance measure, whereas it is only validated in case of small companies when performance measure is ROA. It indicates that number of board meetings send a positive signal to the market and is found to be value-creating.

For all data regression and data subsets, coefficient of internal busyness (IBUSY) is found to be statistically non-significant. So, *H5* is not validated.

For all data (Table III), value of coefficient of external busyness of directors as directors in other companies (OBUSYD) is negative but non-significant when Tobin's Q is the dependent variable and negative and significant when ROA is the dependent variable. For small companies (Table IV), value of coefficient of is positive but non-significant when Tobin's Q is the dependent variable and negative and significant when ROA is the dependent variable. In case of large companies (Table V) and small board companies (Table VI), values of coefficient of OBUSYD are non-significant with both Tobin's Q and ROA as dependent variables. For large board companies (Table VII), value of coefficient of board independence is non-significant when Tobin's Q is the dependent variable and is negative and significant when ROA is the dependent variable.

So, *H6* is supported when ROA is the dependent variable and external busyness of directors is measured in terms of number of directorship positions held in other companies.

For all data (Table III), small companies (Table IV) and small board companies (Table VI), values of coefficient of external busyness of directors as committee members in other companies (OBUSYC) are negative and significant when Tobin's Q is the dependent variable and non-significant when ROA is the dependent variable. In case of large companies (Table V) and large board companies (Table VII), values of coefficient of OBUSYC are non-significant with both Tobin's Q and ROA as dependent variables.

So, *H6* is supported when Tobin's Q is the dependent variable and external busyness of directors is measured in terms of number of committee positions held in other companies. Hence, external busyness of directors perceived by the market is the committee position held by directors in other companies. Thus, it is indicated that when directors held too many outside committee positions, they become overburdened and their involvement in board functions such as monitoring decreases, which leads to decreased firm performance. This is in line with reports by Sarkar and Sarkar (2009), who found that multiple directorships is negatively related to firm performance.

For all data regression (Table III), small companies (Table IV) and small board companies (Table VI), values of coefficient of firm size are negative and significant with both Tobin's Q and ROA as dependent variables. This indicates that for bigger size firms, it is difficult to manage performance. In case of large companies (Table V), value of coefficient of firm size is non-significant with both Tobin's Q and ROA as dependent variables. For large board companies (Table VII), value of coefficient of firm size is non-significant when Tobin's Q is the dependent variable and is negative and significant when ROA is the dependent variable.

For all data regression (Table III), firm age is having significant negative coefficient with Tobin's Q as the dependent variable and non-significant coefficient with ROA as the dependent variable. In case of small companies (Table IV) and small board companies (Table VI), value of coefficient of firm age is negative and significant when Tobin's Q is the dependent variable and positive and significant when ROA is the dependent variable. Negative coefficient in case of regression with Tobin's Q indicates that market is not attaching value to the cumulative learning compared to expected gain from agility of new firm. In case of large companies (Table V) and large board companies (Table VII), the value of the coefficient is non-significant for both ROA and Tobin's Q as dependent variables.

Coefficients of leverage in regression equations is negative and significant for all data and for all the data subsets for both Tobin' Q and ROA as dependent variables, indicating that for Indian companies, cost associated with debt is more compared to the value created by it. It may be because of the reason that for Indian companies, capital is available through internal resources easily compared to external source of capital, particularly debt.

Sales growth as control variable does not seem to impact any of the performance variables Tobin's Q or ROA, as it is not having any of the coefficients significant in regression with either all data (Table III) or in regression with most of the data sets (Table V and Table VI). However, in case of data subsets for small companies (Table IV) and for large board companies (Table VII), values of coefficient of sales growth are significantly positive in the regression with both Tobin's Q and ROA as dependent variables. This may be because smaller companies on growth path show firm value positively related to sales growth. In case of large boards, it may be explained in terms of more monitoring by the board, leading to further value-creation based on the background of previous growth.

7. Conclusions

This paper examines the hypothesized relationship between board structure and firm performance measured by Tobin's Q and ROA for a sample of Indian firms listed at NSE. The results broadly indicate that corporate governance variables affect market-based performance measures (Tobin's Q) more in comparison to accounting-based performance measure (ROA).

H1 states that the board independence would be positively associated with firm performance. From the results, board independence is found positively and significantly related to accounting-based performance measure (ROA) and not related to the market-based performance measure (Tobin's Q). This is in line with earlier studies (Kumar and Singh, 2012; Dey and Chauhan, 2009) that used Tobin's Q as performance measure and found board independence not impacting firm performance significantly. Above finding is a result of the fact that the board independence in India is heavily influenced by the incumbent promoter owners, family owners or private individuals, who are actually responsible for the appointment of independent directors. These independent directors usually go with the management's decision and are not so strong a force to do efficient monitoring.

The finding is also directionally similar to the findings of Jackling and Johl (2009), who found a positive association between firm performance and board independence. However, it contradicts with the findings of Jackling and Johl (2009), when the result is interpreted for different performance measures, namely, Tobin's Q and ROA. Jackling and Johl (2009) found this relationship positive and significant in case of Tobin's Q and not significant in case of ROA. The difference may be ascribed to difference in sample size (180 companies against 391 companies for the present study) and period of analysis (one year, 2005-06, for Jackling and Johl and five years, 2009-2014, for current study). The requirement of compliance to Clause 49 of listing agreement was made mandatory from 1 April 2005. So, the positive effect of corporate governance provisions on firm performance would have reflected in the performance of later years.

H2 states that CEO duality (i.e. role of CEO and chairman of the board of directors vested into one person) would be affecting firm performance negatively. Results indicate that the separation of the position of CEO and chairman of the board is creating value. This is in line with earlier studies in Indian context (Kota and Tomar, 2010; Jackling and Johl, 2009; Ghosh, 2006). This finding supports the importance of monitoring role of the board of directors. Separation of the two roles would avoid the conflict of interest, and consequently, the board of directors would be more efficient in its role of monitoring the behaviour of management including the CEO.

Regarding the relationship between board size and firm performance, different studies have contrasting views. Resource access theory predicted larger boards providing greater access to resources, thereby leading to superior performance; however, it also indicates that if the board size becomes too large, decision-making and working as a group towards strategic goal becomes difficult, leading to inferior performance. Because of difference in monitoring as well as resource requirements amongst different type of companies, board size and performance relationship is also contingent upon size of the company itself. This paper hypothesized that the board size is negatively related to firm performance, and the relation between board size and firm performance is different for different type of companies. Results of this study found that board size is positively and significantly related to ROA, adding credence to "resource access" theory. This finding may be due to the contextual aspect of Indian business environment, where directors are providing linkage to the external resources. We also observed a significant difference between board sizes of smaller and larger companies which may be due to increased monitoring requirements as the company size grows. In case of bigger companies, board meetings were found more frequent compared to smaller companies, confirming increased monitoring requirements.

Board meetings are platforms for discussing the performance and behaviour of management apart from deciding on the strategic directions for the company. Keeping this in view, this paper hypothesized that the number of board meetings is positively related to firm performance. Results indicate that the number of board meeting is positively and significantly related to market-based performance measure, i.e. Tobin's Q. Hence, an increased number of board meetings is found to send a positive signal to market, thus creating value for the firm.

Board of directors perform their monitoring function through their participation in board meetings. This study has defined busyness of directors in terms of their participation in board meetings. So, it is hypothesized that the directors' internal busyness is positively related to firm performance. However, results indicate that the performance is not significantly related to any of the performance measure in all regressions. This may be because of possible complex relationships between number of board meetings and performance in place of assumed linear relationship, thereby making it difficult to estimate. There may also be a possibility of lag effect in this relationship, i.e. the response of board of directors towards poor performance may yield result in the following year (Vafeas, 1999).

Resource dependency theory predicted that multiple positions held by directors would create more resource linkage for firms, leading to superior performance. However, on the contrary, it also predicts that directors with too many outside positions would reduce their effectiveness as far as the monitoring role is concerned. With this view, this paper hypothesized that the directors' external busyness is negatively related to firm performance. The results indicate that the external busyness when measured in terms of number of directorship position held in other companies affects market based-performance measure negatively, and when measured in terms of number of committee positions held in other companies, it affects the accounting-based measure adversely. Thus, overall overburdened directors affect firm performance negatively. This result also indicates that busy directors may not have necessary reputation and networking contacts that are necessary to generate benefits to the company (Jackling and Johl, 2009).

Among control variables, both firm size and firm age are found to have a negative relationship with firm performance, indicating that newer firm with newer technologies and up to a certain optimal size are better able to manage performance. The negative relationship of leverage with firm performance indicates that for Indian firms, it is less costly to manage resources through internal sources than through the debt market. Sales growth has generally been found not related to firm performance.

This study has implications for investors, academicians and policy makers as the findings indicate impact of specific corporate governance variables on corporate financial performance. The study is important for both domestic and foreign investors as it gives an indication to the type of companies (from corporate governance point of view) in Indian context that may give better financial results. Findings also indicate that investors should look for companies with an optimal and diversified board. Relatively smaller companies based on newer technologies may also be chosen by investors for a better return. As an implication, this indicates that if foreign investors in developed economies come with their newer technologies and improved corporate governance practices, it may result into good corporate performance. The literature review done under the study suggests that governance reforms that encourage firms to adopt better governance practices reduce the likelihood of earnings management. The evidences from emerging market enhance our understanding of corporate governance in those economies.

In this study, board independence is found to have a positive relationship with firm performance. Hence, agency theory has been supported by findings of this study. Next finding of the study, i.e. separate positions of CEO and chairperson of the board positively associated with firm performance, is contrary to the stewardship theory. Positive association between size of the board and firm performance indicates support for resource dependency theory. Hence, the study supports agency theory and resource dependency theory.

Few limitations of this study are in terms of methodology and possible omission of some variables. Concerns have been raised about the kind of relationship between board structure and firm performance in various theoretical and empirical studies. It has been indicated that board structure is endogenously determined by firm-specific factors such as scale economies, regulation and the stability of the environment in which they operate (Hermalin and Weisbach, 1991, 2001, Linck *et al.*, 2008). Existence of reverse causality between board structure and firm performance has also been considered by some of the studies, for example, Adams and Mehran (2012). The existence of reverse causality could have been explored using a simultaneous equation framework.

In future, researchers may try to explore governance performance relationship using a wider set of data in terms of number of companies and number of years. Reverse causality may also be studied using simultaneous equation approach. Even study around introduction of major changes in corporate governance regime in India, namely, 2000 (introduction of Clause 49 in the listing agreement), 2004 (introduction of penal provisions in Clause 49), 2010 (recommendations of Murthy committee on audit committee and whistle blower policy) and 2014 (enforcement of new companies act with specific provisions on corporate governance), may give insights into impact of specific governance mechanism on corporate performance in Indian context.

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Appendix

Variables	Total assets	N	Mean	SD	Mean difference	F value
Bsize	≥30,199.00	978	12.810	3.832	2.446**	72.854
	<30,199.00	977	10.370	2.763		
TobinsQ	≥30,199.00	978	1.574	1.478	−0.651**	44.502
	<30,199.00	977	2.225	2.467		
ROA	≥30,199.00	978	0.133	0.093	−0.040*	5.042
	<30,199.00	977	0.173	0.100		
Bmeet	≥30,199.00	978	4.750	1.189	0.182*	4.623
	<30,199.00	977	4.570	1.015		
Duality	≥30,199.00	978	0.530	0.500	−0.111**	70.762
	<30,199.00	977	0.640	0.481		

Notes *significant at 5% level; **significant at 1% level

Table AI. Independent samples test for small and large companies

Variables	Bsize	N	Mean	SD	Mean difference	F value
TobinsQ	≥11	1,132	1.826	1.822	−0.176**	11.663
	<11	823	2.002	2.342		
ROA	≥11	1,132	0.154	0.091	0.002*	6.122
	<11	823	0.151	0.108		
Bmeet	≥11	1,132	4.670	1.140	0.019	0.605
	<11	823	4.650	1.065		
Duality	≥11	1,132	0.560	0.497	−0.056**	24.99
	<11	823	0.610	0.487		

Notes: *significant at 5% level; **significant at 1% level

Table AII. Independent samples test for small and large board

About the authors

Rakesh Kumar Mishra is pursuing Doctoral Programme of Indian Institute of Foreign Trade, New Delhi, in the area of business strategy. The author is holding PGDM from Indian Institute of Management Lucknow in Finance and Strategy and MTech from Indian Institute of Technology Kharagpur in Industrial Engineering and Management. He also holds a BE degree in Mechanical Engineering. He has more than 18 years of experience in the areas of human resource management, project management, design and engineering and operation and maintenance of petroleum pipelines. The author has been working with Indian Oil Corporation Limited, a top rank company from India in Fortune 500 list. He has got papers published in the area of business strategy in peer reviewed journals. Rakesh Kumar Mishra is the corresponding author and can be contacted at: mishrarakeshk@indianoil.in

Dr Sheeba Kapil is an Associate Professor at Indian Institute of Foreign Trade, New Delhi, since July 2007. She handles courses on corporate finance, mergers and acquisition, business valuation and investment analysis. She has teaching experience of around 20 years along with several international and national publications of research papers and books. She has conducted several Management development programmes (MDPs) for corporate sector and Faculty development programmes (FDPs).

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The relationship between corporate governance and financial performance

Evidence from Jordanian family and nonfamily firms

Zaid Saidat, Mauricio Silva and Claire Seaman
Department of Business, Enterprise and Management, Queen Margaret University, Musselburgh, UK

Abstract

Purpose – The purpose of this paper is to attempt to fill a research gap in the relationship between corporate governance mechanisms and financial performance of family and non-family firms' by using a sample of non-financial firms listed on Amman Stock Exchange (ASE) for the period 2009–2015.

Design/methodology/approach – This research employs a quantitative method using data that include corporate governance mechanisms, firm characteristics and financial ratios of a sample of Jordanian listed firms in the ASE over the period 2009–2015. The sample covers all companies that have been part of the ASE during the period including both family and non-family firms, part of total of 228 companies listed on the ASE as of 31 December 2015. The study used accounting-based measures such as return on asset (ROA) and market-based measures such as Tobin's *Q* as proxies for corporate financial performance.

Findings – The study found that board size both in term of Tobin's *Q* and ROA has a negative relationship with the performance of family firms. In non-family firms, there is no systematic relationship with corporate performance. There is a strong relationship between corporate performance and independent directors in non-family firms. In addition, the authors found some evidence for a relationship between performance and independent directors in family firms. Also, results indicated that ownership concentration has an insignificant correlation with corporate performance and in family firms has a negative and significant correlation with Tobin's *Q*. There is a significant relationship between local investors' ownership and corporate performance as measured by Tobin's *Q* in family and non-family firms.

Originality/value – Studies concerned with the effect of corporate governance on firm performance remains comparatively under-researched in Middle East countries and Jordan in particular (Najib, 2007; Omet, 2004; Marashdeh, 2014). Moreover, studies investigating whether the practice of corporate governance has the same impact on family firm performance are still relatively less well known than those when ownership is distributed widely (non-family firms) (Jaggi, Leung and Gul, 2009; Prencipe and Bar-Yosef, 2011). This research is seeking to fill this current gap in Jordan, which is one of the developing countries with an emerging economics that are very poorly represented in the literature.

Keywords Family business, Corporate governance, Financial performance, Amman Stock Exchange

Paper type Research paper

1. Introduction

There is a growing body of corporate finance literature that supports a relationship between corporate governance mechanisms and financial performance. In particular, in the USA and the Asian experience, there exists a large body of empirical studies with some reporting positive relationship (see e.g. Bebchuk *et al.*, 2004, in the USA; Haniffa and Hudaib, 2006, in Malaysia; Black *et al.*, 2007, in India), and others reported no positive relationship (see e.g. Chidambaran *et al.*, 2008, in the USA; Aksu and Kosedag, 2006, in Turkey; Rui *et al.*, 2002, in China).

The issues of corporate governance and firm's ownership structure are not new, especially publicly traded company usually owned by many shareholders. Since the early work of Berle and Means (1932), corporate governance has focussed on corporations characterised by diffused ownership that results in the shareholder-managers' problem

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arising from the separation of ownership and control. Mayer (1997) stated that corporate governance "is concerned with ways of bringing the interests of investors and manager into line and ensuring that firms are run for the benefit of investors". These companies commonly found in developed countries such as the UK and the USA (Gugler *et al.*, 2008).

La Porta *et al.* (1998) argued that the primary conflict in a firm owned by relatively few large shareholders is between the majority and minority shareholders because of the potential for the former to expropriate wealth from the latter. This is especially the case in Arab countries where ownership and control is mostly in the hands of individuals or families. However, Klapper and Love (2004) stated that it is essential for emerging markets to strengthen their corporate governance standards. Singh (2003) suggested that these markets should inspire companies to practice good corporate governance. In addition, according to Saidi (2005) and Najib (2007), the need to understand corporate governance has become more urgent in developing countries, particularly in the Arab region (Saidi, 2005; Najib, 2007).

In Jordan, as in many Arab countries, most companies are concentrated ownership, dominated by the family, where the founder and/or family members usually possess a great many shares of the company and often have a significant impact on the management of the company's operations. Family members usually participate in the management of a firm by holding positions such as chairman of the board of directors and/or senior executive. Previous studies indicate that family firms have different corporate governance from their non-family counterparts (Setia-Atmaja *et al.*, 2009; Navarro and Ansón, 2009). However, studies investigating whether the practice of corporate governance has the same impact on family firm performance are still less well known. Jordan in particular, where the empirical part of this study takes place, the family firms has forms a considerable part of its economy. In fact, most of the literature on corporate governance in Jordan the family firm has received almost no attention (e.g. Al-haddad *et al.*, 2011; Al-Fayoumi *et al.*, 2010; Abed *et al.*, 2012). Taking into the account the significant differences in the characteristics of family firms, the impact of corporate governance on family firms may not be the same as on non-family firms. For instance, according to Carney (2005), family firms are owned and controlled by family members and, therefore, are more able to make independent decisions than non-family firms where ownership is typically more dispersed. Further, the family's control rights influence a firm's assets by providing a source of advantage in scarce environments, the possibility of creating and using social capital and the possibility of generating more opportunistic investment processes (Carney, 2005).

This paper aims to answer the following question: does corporate governance have an impact on the financial performance of companies in Jordan? This paper investigates the effect of corporate governance on financial performance of family and non-family firms in the Jordanian context through descriptive data, *t*-test, correlation and regression analysis.

2. Defining family firms

According to Ang *et al.* (2000), the idea of a family firm is a single family owning at least 50 per cent of the company's stocks. While Faccio and Lang (2002) propose at least 20 per cent of voting rights held by one family, Barth *et al.* (2005) consider control of more than 33 per cent of the company's shares an appropriate definition. On the other hand, Fahlenbrach (2009) and McConaughy *et al.* (1998) classify a firm as family firm if the founder and/or descendants are CEO of the company. Differently again, Claessens *et al.* (2000) and Morck *et al.* (1988) define family businesses as those firms where top positions are held by a family member or direct family related by blood or marriage or indirect family relationship. Lastly, Björnberg and Nicholson (2012) confirms that if the family members own the largest shareholding of the business, and more than one family member holds a top leading position, "the firm identifies itself as a family business".

In this study, the criterion to define a firm as family firm based on "10% cut-off level" was adopted, in line with two important research that are often cited in corporate finance studies (La Porta *et al.*, 1999; Claessens *et al.*, 2000). One of La Porta's (1999) explanations for using the 10 per cent cut-off level is "to provides a significant threshold of votes; and most countries mandate disclosure of 10 per cent, and usually even lower, ownership stakes" (pp. 475-476).

3. Literature review and hypothesis development

3.1 Board structure

One of the most important governance mechanisms is board size as it indicates the participation of a board in company affairs and activities. The number of members on the board indicates the effectiveness in controlling and directing the company (Maztoul, 2014). Florackis (2008) claimed that small board size is likely to be better for coordination and communication. These views are opposed by Epstein *et al.* (2002) and Goshi (2002). who suggested that a board of 16 directors is an optimal number for large companies. Pearce and Zahra (1992) argue that larger boards are more beneficial because they can provide a broader perspective and a better route as of strategic options for the company. With respect to family businesses, Navarro and Ansón (2009) suggests that families may be reluctant to increase the size of the board so as to maintain control, and facilitate communication when making decisions, and thus reduce the problem of free-riding. On the other hand, Ibrahim and Samad (2011) found that larger board size has a significant effect as a device in mitigating agency costs. Hansson *et al.* (2011) pointed out that a large board is a less effective governance mechanism, and thus has an adverse effect on firm performance.

In Jordan, the board of company, whether family or public company should not be more than thirteen and not less than three as specified by the Company of the Assembly, presented at the Companies Law number 22 of 1997.

A further corporate governance mechanism that might improve or reduce firm performance is CEO duality; the same person holds both the CEO and chairman in an organisation. Advocates of separation of the chairman and CEO base their view on the agency theory and argue that the combination of the two positions in the hands of one person can lead to greater agency problems result from an ineffective monitoring of the CEO by the board (Jensen, 1993). Ehikioya (2009) argued that to guarantee the independence of the board, it is strongly recommended to divide the two positions in order to obtain effective checks and balances over the top management behaviour.

CEO duality is more likely within family firms, as the families have the largest shareholding (Bartholomeusz and Tanewski, 2006; Chen *et al.*, 2005). However, Navarro and Ansón (2009) stated that the main role of the board in the family business is to support managers, not to observe them, and therefore CEO duality might not necessarily harmful. In other words, when the CEO and chairman of the board is a family member, it might reduce the severity of conflict of interests, and duality may facilitate family businesses governance. In terms of performance, Cabrera-Suárez and Martín-Santana (2015) found that duality itself does not have any influence on the performance of family businesses, but when there is duality, and a board with a majority of outside directors would be preferable. This means that family commitment, unity of command and unique business knowledge must be accompanied by external advice and a wider range of perspectives. The study confirms the argument of Carney (2005), who stated that management in family business may be at a disadvantage when it comes to general business knowledge, owing to nepotism and difficulties in attracting high-quality, non-family managers. In Jordan, the Jordan Corporate Governance Code (JCGC) was released in 2006 and recommended the separation of the two positions from each other.

One of the main debates in corporate governance concerns independent directors and its ability to control top management and reduce agency problems, in particular the problem of information asymmetry. Monks and Minow (2004) argue that the independent directors are very important in influencing corporate performance. From the agency theory perspective, independent directors are more likely to protect shareholders against any self-serving behaviour by management and act in shareholder interest in a better way compared to non-independent directors thus preventing the eventual expropriation of shareholder wealth (Arosa *et al.*, 2010). Belkhir (2009) argue that the independent directors can help reduce the risk of moral hazard through the oversight role on the managers, and also alleviate the problem of information asymmetries by ensuring disclosure of a wide range of risks and related information to shareholders.

Also, it is suggested that independent directors should function to mediate conflict between majority and minority shareholders and make managers more active through better monitoring, thus improving firm performance (De Andres *et al.*, 2005). Although families may seek to minimise the presence of independent directors, Anderson and Reeb (2004) document that minority shareholders in family firms desire them to be on the board to protect their interests. This can be understandable when, as Bartholomeusz and Tanewski (2006) and Setia-Atmaja *et al.* (2009) all suggest, family firms have less levels of board independence compared to non-family firms. However, Kudlats and McDowell (2015) find that having independent directors would be positively associated with performance in family firms.

According to the Companies Law number 22 of 1997, "at least one third of the board members must be non-executive, to comply with the board committees requirements". Also, JCGC (2006) defined independent directors as "an employee of the Company or receiving a salary there from".

However, only a few studies have examined the impact of the board structure on Jordanian corporate performance. For instance, Al-Manaseer *et al.* (2012) state that board structure such as board size and independent directors have a positive association with Jordanian corporate performance, while Marashdeh (2014) and Alabdullah *et al.* (2014) argue that board structure (including, board size and CEO duality, respectively) have insignificant impact on performance. Marashdeh (2014) further reveals a positive significant relationship between independent board and corporate performance. Based on the above discussion, the following hypothesis is proposed to be tested:

H1. There is a relationship between the size of boardroom and corporate performance.

H2. There is a relationship between the CEO duality and corporate performance.

H3. There is a relationship between the independent directors and corporate performance.

3.2 Ownership structure

Ownership structure is one of the most important factors that may contribute to reducing the severity of agency problems in the company. The unification of ownership and control lead to managers being subjected to less pressure from external investors and other observers who demand accountability and strategic renovation (Carney, 2005). Alchian and Demsetz (1972) stated that ownership concentration has been proposed as an internal mechanism to monitor the behaviour of managers by shareholders to ease intra-company conflict problems. They also argued that this mechanism is important in determining the company's objectives and the extent to which managers are disciplined. Thus, an increase in the equity of ownership gives shareholders a greater incentive to monitor and control managers, which, in turn, increases attention onto raising the financial returns (Holderness, 2003).

Miller and Le-Breton Miller (2006) indicated that the reduction of agency costs incurred due to ownership concentration will lead to more benefits (i.e. savings and extra resources) for a firm and increase value. In such a context, better monitoring of managers translates into lower agency costs (Chen and Yur-Austin, 2007), thus contributing to performance and value creation.

With respect to family businesses as a distinctive type of concentration ownership, the family business and corporate finance literature shows a different impact of concentration ownership on firm performance as compared to non-family firms, whereas some studies suggested several points in a favour of a positive relation between concentration ownership and firm performance in family businesses. According to Aguilera and Jackson (2003), family controlling shareholders seeking the strategic interest of their corporation (e.g. securing a new market or protecting administrative independence) are able to make difficult decisions more effectively. Moreover, families are more concerned with their reputation; family reputation can reduce self-management interests when family members are employed in top management positions, thus facilitating the survival of the company (Denis and Denis, 1994), strengthening the long-term relationship with other stakeholders such as capital providers, customers and suppliers (McVey and Draho, 2005). Generally, reputation can lead to a better firm performance (Zellweger *et al.*, 2012). Thus, the performance of a company is likely to improve in a way that is sustainable in the long term.

In family firms, the importance of concentrated ownership has been examined. For example, Lins (2003) using a sample of family firms drawn from 18 emerging economies, found that ownership concentration positively impacted on firm value. He argued that companies with majority shareholders increase the effectiveness of corporate governance of companies in emerging economies. Al-Ghamdi and Rhodes (2015) studied and tested a sample of 792 firm-years among from 11 industrial groups for the years 2006–2013 and compared family and non-family firms in Saudi Arabia and found that ownership concentration in family firms has a significant positive relationship with the performance. Additionally, the findings revealed that the relationship between ownership concentration and performance in non-family firms was positive although not statistically significant. In case of Jordan, most companies have a higher concentration of ownership (OECD, 2003). In this context, this study will investigate the effect of the concentrated ownership on the performance of family and non-family firms.

Institutional investors are considered as one of the most important external corporate governance mechanisms affecting corporate performance. This is because institutions have different investment goals and decision-making opportunities, as well as the power to monitor manipulations by managers and improve firm performance (Shleifer and Vishny, 1997; Bowen *et al.*, 2008). According to Dong and Ozkan (2008), greater expertise and power of institutional investors leads to more rational decision making by management directly through its ownership or indirectly through the trading of its shares (Gillan and Starks, 2003).

In the context of listed family firms, Le Breton-Miller and Miller (2013) find that institutional investors have a positive effect on the financial performance of family firms. They argue that there is a conformity in several aspects of strategy interests between family firms and those investors, which is related to higher returns on assets. Sacristan-Navarro *et al.* (2011) suggest that increasing institutional ownership can benefit family businesses, as these investors may compete for control, thereby reducing the expropriation of minority shares. However, some papers reveal that the combination of family shareholders and other types of shareholders may not necessarily positively affect the performance of family businesses. For example, Fernando *et al.* (2014) identify that principal-principal problems are more prevalent in family firms. They argue that institutional investors are better able to recognise this problem in family businesses. This can imply that family firms are less attractive to institutional investors which are an increasingly important source of capital. In other words, the conflict problems are harmful to non-family shareholders, so family businesses may not be able to access new sources of capital, especially when they need to expand their investments.

In the case of Jordan, most of the major domestic institutional investors are banks, insurance companies and pension funds such as the Social Security Corporation Investment Unit. Thus, they are a good example of "pressure-sensitive" institutional investors. However, it is suggested that such investors are not capable of playing an effective monitoring role and commonly have significant business relationships with companies. In addition, most companies in Jordan have a higher concentration of ownership (OECD, 2003) and lower degree of investor protection (La Porta *et al.*, 1999). Thus, pressure-sensitive investors are less likely to act as effective monitors than pressure-resistant investors.

In addition, the presence of foreign investors is also important, especially in developing countries, the increased expansion of foreign investors is one of the most important factors in emerging markets. This is due to limited domestic resources to finance investment (Leuz *et al.*, 2009), which leads many emerging countries to liberalise their stock markets, and allowing foreign financiers to invest in domestic firms (Kim and Yi, 2015). As confirmed by the international finance literature, this type of investor contributes to enhancing local investments (Henry, 2000) and boosting financial market development and liquidity (Bekaert *et al.*, 2007). Young *et al.* (2008) stated that the presence of foreign investors is an effective part of governance improvement in emerging economies. They also argued that foreign investors are able to monitor the corporations in a better way than domestic ones because they are "outside the domestic social networks from which the institutional norms of behaviour are generated, and they are therefore more likely to push for transparent deals" (Young *et al.*, 2008, p. 212).

In the context of listed family firms, foreign investors would also avoid family firms with poor profitability and poor corporate governance because investing in such firms is not likely to reach their return on investment benchmark. Specifically, in emerging markets, where law enforcement may be weak, and thus an indication of the presence of several risks such as accounting risks, asset risk and strategic policy risk (Clayman *et al.*, 2011) associated with poor corporate governance. For example, strategy risk refers to the risk that owner-managers may exercise their powers in transactions such as acquisitions and mergers that may not be in the best interests of other shareholders, but that may result in large benefits for the directors/managers, whereas asset risk refers to the risk that the company's assets will be misappropriated by the controlling manager-owners (Clayman *et al.*, 2011).

According to the OECD (2006), Jordan is considered to have one of the highest levels of foreign investment of market capital in the world. In 1995, Jordan has liberalised the Amman stock market, allowing international investors to invest directly in the equity securities of Jordanian firms. This resulted in raising the percentage of non-Jordanian ownership from 38.51 in 2001 to 49.50 in 2016. This increase indicates a positive sign of an effective control and good profitability that foreign investors prefer. Therefore, considering the significant influence of the foreign investors on firm performance, especially in emerging markets, this study will examine the effect of non-Jordanian investors on the non-financial firms that listed in Amman Stock Market for the period 2009–2015.

Based on the above discussion, the following hypotheses are proposed to be tested:

H4. There is a relationship between ownership concentration and corporate performance.

H5. There is no relationship between local investors' ownership and corporate performance.

H6. There is a relationship between foreign ownership and corporate performance.

3.3 Control variables

Firm size. This variable has been used in several previous studies (such as, Cassar and Holmes, 2003; Al-Matari *et al.*, 2012). It has been argued that the firm size variable is likely to have a positive correlation to corporate performance. Joh (2003) suggests that large firms are more likely to have a better opportunity than smaller firms in term of accessing external fund at cheap cost and increase firm value, due to their size. On the other hand, many studies (see e.g. Agrawal and Knoeber, 1996) suggest that small firms are better than large firms because of growth opportunities. The explanation for that is because the small firms are more likely to comply with a strict corporate governance rules in order to a attract investors, and thus more external funds to invest these opportunities and increase profitability (Klapper and Love, 2004).

Empirical studies have found inconclusive results on the impact of company size on the financial performance, but they still agree on linkages between the company's size and performance. Many previous studies have measured this variable by the log of total assets (see e.g. Cassar and Holmes, 2003; Elsayed, 2007). The reason behind using the logarithm is to mitigate heteroscedasticity problems (Aliani and Zarai, 2012). Based on the above discussion, the following hypothesis is proposed to be tested:

H7. There is a relationship between firm size and corporate performance.

Leverage. The relationship between the leverage and corporate performance reached mixed results. A positive impact on corporate performance might take place as a consequence for monitoring performed by lenders. Stiglitz (1985) argue that efficient control over management behaviour is carried out primarily by lenders rather than principals. Jensen and Meckling (1976) state that leverage as an internal corporate governance mechanism can play a vital role in reducing agency problem particularly free cash problems. Leverage was related positively to corporate performance, as observed by Agrawal and Knoeber (1996). Moreover, Ross (1977) point out that highly leveraged firms might be a good signal for the firm to meet large amounts of debt.

Conversely, Stulz (1988) reports that highly leveraged for firms will influence the market value of equities and lead to increase the financial risk. Furthermore, Stulz argue that high level of leakage will slow down the performance of the firm by increasing attention and monitoring of creditors on the firm activities. In addition to that, Myers (1977) argues that the high levels of leverage may adversely affect the performance of the firm in accordance with the problem of lack of investment. This is due to the increase in financial leverage, which would hamper the company’s ability to raise new debt. Similarly, Andrade and Kaplan (1998) expect a negative association between leverage and performance. They argue that firm with higher leverage tend to perform worse than firms with lower leverage.

Based on the above discussion, the current study assumes either a positive or negative association between leverage and corporate performance as is shown in the following hypothesis:

H8. There is a relationship between leverage and corporate performance.

4. Data and methodology

This research employs data that includes corporate governance mechanisms, ownership structure, and firm characteristics and financial ratios of a sample of Jordanian listed firms in the ASE for the period 2009 to 2015. The sample covers all companies that have been part of the ASE during this period. Both family and non-family firms have been included in the sample of Jordanian companies listed on the Amman Stock Exchange (2018). Initially, a total of 228 companies were listed on the ASE as of 31 December 2015. Consistent with previous studies in the area of corporate governance and firm performance (see e.g. Anderson and Reeb, 2003; Al-Fayoumi *et al.*, 2010; Estrin *et al.*, 2009), financial companies have been dropped from the sample because they are subject to a strict set of regulations which are different from companies in other sectors (Chen *et al.*, 2009), and the distinctive features of financial statement and reporting rules make these firms incomparable with those of other companies (Abed *et al.*, 2012).

After the exclusion of financial companies, the data used in this study are subjected to the following criteria: first, we exclude companies from the sample if any of the independent variables needed for the analysis are missing from annual reports that are obtained either through the ASE official website, the SDC archives, the companies' websites or Thomson One database. Second, companies that did not survive on ASE for less than the study period (2009 to 2015) were dropped from the sample. This study used the same criteria used by previous studies (Yermack, 1996; Cheng *et al.*, 2008) to drop the firms that did not survive during the study period (2009–2015), which are not selected firms that have been liquidated, whether voluntary or committed, and not selected firms that acquired or merged with another firm.

This selection procedure reduced the sample from 228 to 103 firms during the period 2009–2015 (representing 85.12 per cent of sample to non-financial firms). Table I presents a description of the study sample after excluding items such as financial companies, missing data, and provides 721 firm-year observations. To conduct our investigation, the criterion to define a firm as family firm based on "10% cut-off level" was adopted. Based on this definition, 56 family firms and 47 non-family firms were selected for this study, providing 392 family firm year observations and 329 non-family firm-year observations.

The data were collected from various secondary sources. First, data related to the corporate governance mechanisms and corporate characteristic (firm age) were manually collected from the annual reports of each firm for the relevant years. Second, data related to the ownership structure (large shareholders and local investors' ownership) were manually collected from the annual reports and the companies' websites, while foreign ownership was obtained from Thomson One database and the ASE Annual Company Guide. Third, firm financial performance variables and data related to firm size and leverage variables were obtained from firms' financial statements obtained from the Securities Depository Centre (SDC).

In this study, the accounting-based measure (return on asset, ROA) has been chosen as a measure for financial corporate performance. The ratio for each year is calculated by dividing the net income by the total assets of the company. In addition, market-based measures Tobin's Q which is calculated as the ratio of the book value of total assets minus

Total number of listed companies on Amman Stock Exchange as in December 2015	228
Less no. of financial firms[a]	107
No. of non-financial firms[b]	121
Less no. of companies with missing data	18
Final sample	103
% of sample to non-financial firms	85.12%
Observations	721

Notes: [a]Financial companies include the following segments: Banks, Insurance, diversified financial services and Real Estate Source: Amman Stock Exchange Annual Reports; [b]non-financial companies include the following segments: Health Care Services, Educational Services, Hotels & Tourism, Transportation, Technology & Communication, Media, Utilities & Energy, and Commercial Services, Pharmaceutical & Medical Industries, Chemical Industries, Paper & Carton, Printing & Packing, Food & Beverage, Mining & Extracting, Tobacco & Cigarettes, Engineering & Construction, Electrical Industries, Textiles, Leather & Clothing, and Glass & Ceramics
Source: Amman Stock Exchange Annual Reports

Table I. Sample selection producer

the book value of equity, plus the market value of equity to the book value of assets. Prior studies have used Tobin's *Q* and ROA as proxies for corporate financial performance (Anderson and Reeb, 2003; Denis and Denis, 1994). Moreover, the study employs pooled regression with panel data for the model of the study.

Thus, based on the previous discussion, the following model has been developed to analyse the relationship between corporate governance mechanisms and financial performance for both family and non-family firms (Table II):

$$\text{Financial Performance} \sim f\,(\text{Board size, CEO Duality, Independent directors, Ownership concentration, Local investors' ownership, Foreign ownership, Firm size, Leverage}).$$

5. Data analysis

This section shows the analysis of data including; descriptive statistics analysis, independent *t*-test and correlation coefficients matrix among the independent and dependent variables, while the final hypothesis test is based on the analysis of data using multiple regression.

5.1 Descriptive statistics

Table III reports that the minimum value of ROA is −17.3 per cent, while the highest value is close to 14 per cent with an average of 2.92 per cent for the overall sample. As regards to Tobin's *Q*, the figures show that the minimum value of Tobin's *Q* is −0.0128, while the highest value is 0.058, with an average of 0.017 for the overall sample firms.

The statistics reveal that the mean board size for the whole sample of the 103 listed Jordanian companies is 8.14, with a minimum of 5 and a maximum of 13 members on the board. In terms of CEO duality, the mean percentage of CEO duality is 18.1 per cent, which means that 81.9 per cent of Jordanian companies separate the position of the chairman of the board of directors from the CEO lessening the effect of the CEO/Chairman on the board. Regarding the independent directors, we can see in Table III an average of 91 per cent of

Variable	Symbol	Definition
Independent variables		
Board Size	*BOSIZE*	The total number of directors that shape the board
CEO Duality	*CEODUALITY*	A dummy variable takes the value of one if the CEO being chairman, and zero otherwise
Independent Directors	*INDTDIR*	The percentage of independent directors by dividing the number of independent directors by the total number of directors
Concentrated Ownership	*OWNCON*	The total of shares that are owned by shareholders who own 5% or more
Local Investors' Ownership	*OWNLOC*	Total percentage of shares owned by institutional shareholders who have been classified as top-5 largest shareholders
Foreign Ownership	*OWNFOR*	The total percentage of shares (capital) that owned by foreign shareholders
Dependent variables		
Return on Assets	*ROA*	(Net income divided by total assets) multiplied by 100
Tobin's *Q*	*TOBIN'S Q*	This ratio calculated by dividing the equity market value by equity book value
Control variables		
Firm Size	*FSIZE*	Natural logarithm of total assets
Leverage	*LEVERAGE*	Total debt divided by total assets

Table II.
Variables definitions and explanations

Variables	Mean	Min.	Max.	SD	Skewness	Kurtosis
ROA (%)	2.92	−17.3	13.6	5.29	−0.807	6.44
Tobin's *Q*	0.017	−0.0128	0.058	0.033	0.212	1.055
BOSIZE	8.14	5	13	2.201	0.376	2.570
CEODUA	0.181	0	1	0.385	1.651	3.725
INDTDIR	0.914	0.6	1	0.084	−1.600	6.801
OWNCON	0.638	0.168	0.988	0.217	−0.418	2.370
OWNLOC	0.388	0	0.952	0.292	0.306	1.952
OWNFOR	0.167	0	0.904	0.220	1.802	5.691
TA ($ millions)	69,260,717	4,698,481	17,657,843	8,758,538	5.623	37.44
LEVERAGE (%)	0.327	0.017	0.906	0.223	0.854	3.150

Table III. Descriptive statistics for all variables

boards are categorised as "highly independent board of directors". This proportion is above the one third independent non-executive directors' requirement suggested by the JCGC.

The statistics reveal that the ownership of firms in Jordan is highly concentrated with an average of 63.8 per cent. This result is comparable to the 61.96 per cent average concentrated ownership in Saudi Arabian firms reported by Al-Bassam *et al.* (2015) with their sample size of 80 listed firms in the Tadawul Stock Exchange. Furthermore, on average, share ownership by local institutional investors accounts for about 39 per cent of Jordanian firms. Foreign ownership, on average, accounts for only a small fraction (17 per cent) of the shares of the 103 firms in the sample, with a maximum of 90.4 per cent.

5.2 Comparing the means between family and non-family firms

A step to be taken before regression analysis is an independent *t*-test to ascertain whether the differences of means for all variables used in the analysis between family and non-family firms are statistically significant. Table IV presents the means for all selected variables for family and non-family firms. It also presents the mean difference for all data observations, standard error, *t*-test and the *p*-value for the mean differences between family and non-family firms.

Basically, the outcomes of an independent *t*-test inform us of the strength of the association of any two variables. Where the correlation value is closer to 1 or (−1), the two

Variables	Family mean	Non-family mean	Diff-mean	SE	*t*	Sig (two-tailed)
Panel A						
BOSIZE	7.949	8.379	0.431	0.164	2.628	*0.008****
CEODUA	0.232	0.121	−0.110	0.028	−3.869	*0.000****
INDTDIR	0.916	0.911	−0.004	0.006	−0.784	*0.043***
Panel B						
OWNCON	0.654	0.618	−0.035	0.016	−2.196	*0.028***
OWNLOC	0.276	0.521	0.244	0.019	12.33	*0.000****
OWNFOR	0.112	0.233	0.120	0.015	7.604	*0.000****
Panel C						
FSIZE	7.224	7.514	0.290	0.041	6.916	*0.000****
LVEGE	0.293	0.367	0.075	0.160	4.529	*0.000****
Panel D						
ROA (%)	0.049	0.582	0.533	0.395	0.348	0.178
Tobin's *Q*	−0.012	0.532	0.0659	0.003	213.5	*0.000****

Notes: Italics means that the variables are statistically significant based on the differences between variable means, except for ROA (not in italics). *,**,***Significant at 10, 5 and 1 per cent, respectively

Table IV. Comparing the means between family and non-family firms variables are more relevant. The mean difference is calculated by subtracting the mean for the variable in the family firms from the mean for the same variable in non-family firms.

As indicated above in Table IV, all variables are statistically significant based on the differences between variable means except ROA. However, there is statistically significant difference between the means in family firms and the means in non-family firms in these variables. Thus, the null hypothesis is rejected.

The following sections offer a descriptive statistical analysis of these variables in family and non-family firms based on the results in Table IV.

Board of directors. In Panel A, a statistical comparison of board of directors' variables means is made between family firms and non-family firms. The mean for the board size (BOSIZE) for family firms is slightly different from non-family firms, i.e. 7.94 and 8.37, respectively. The reason behind the small size of the board of family firms, suggests Ward (1991), is that family firms prefer smaller boards since the individual commitments are subject to dispersion in larger boards. Navarro and Ansón (2009) states that families may be reluctant to increase the size of the board in order to maintain control, and facilitate communication when making decisions, and thus reduce the problem of free-riding.

Also, CEO duality in family firms can improve firm performance by having the same person hold both the CEO and chairman in an organisation. The table shows that the mean of CEO duality for family firms is 23 per cent, compared to 12 per cent for non-family firms, and the difference is statistically significant at the 1 per cent level. The comparison is consistent with the findings by Bartholomeusz and Tanewski (2006) and Chen *et al.* (2005) that CEO duality is more likely in family firms than in non-family firms.

Regarding independent directors, both family and non-family firms have roughly the same mean percentage, i.e. 91.6 and 91.1 per cent, respectively. The differences are statistically significant at the 5 per cent level, which means that Jordanian firms have a higher percentage of independent directors. Thus, the mean composition of boards having 91 per cent of independent directors' means that Jordanian firms whether family firms or non-family firms tend to have at least seven independent non-executive directors on their board. Hence, the board of directors with more executive directors is more likely to approve board decisions without challenging each other at the expense of shareholder interests, as argued by Fama (1980).

Ownership structure. The data in Panel B of the table refer the differences in ownership structure between family firms and non-family firms. We can note that the average of concentrated ownership in family firms is 65.4 per cent, which is higher than the average concentrated ownership of 61.8 per cent for non-family firms. This is logically acceptable because most equity in family firms is owned by one family. The mean differences are statistically significant at the 5 per cent level.

In contrast, non-family firms have a higher proportion of shareholdings by OWNLOC (local companies and government ownership). On average, 52 per cent of shares in non-family firms are owned by domestic institutional investors compared to an average of 27.6 in family firms and the mean differences is statistically significant at the 1 per cent level. Furthermore, we can notice that in our sample, the mean of foreign ownership in non-family firms is 23.3 per cent, which is higher than family firms, where it is only 11.2 per cent. This implies that institutional investors regardless of whether foreigners or locals prefer non-family firms to family firms when investing their money in Jordanian firms. As explained by Fernando *et al.* (2014), principal–principal problems are more prevalent in family firms. They argue that institutional investors are better able to recognise this problem in family businesses implying that family firms are less attractive to institutional investors who are now an increasingly important source of capital.

Control variables. Panel C reveals that non-family firms on average are slight larger in size, as measured by the logarithm of the total assets, compared to family firms. The natural logarithm transformation is applied to obtain the normality distribution. The mean difference for non-family firms and family firms is statistically significant at the 1 per cent level. According to Al-Haddad *et al.*'s (2011) study, a sample of 44 Jordanian firms listed in ASE over the period 2000–2007. They found that the firm size means reached (7.01). It is indicated from the means of firm size in our sample, where non-family firms are larger than family firms that the size of the firms in general increased through the study period; this means that overall Jordanian firms are growing slowly.

Non-family firms are also comparatively older than family firms with an average age of 22.1 years, compared to 19.3 for family firms. The means of firm size and age suggest that family firms need more time to expand their business from a small independent firm to a business group. The table also reveals the means difference of leverage between family firms and non-family firms. In this study, we measure leverage by the long term debt to total assets proxy. The finding reveals that non-family firms have a higher mean leverage than family firms, i.e. 36.7 and 29.3 per cent, respectively. Hence, we expect higher debts for non-family firms in order to monitor and enhance corporate performance through limiting individual consumption, as Jensen (1986) claimed. While, in family firms, we expect lower debts in order to prevent debt default risk.

Financial performance. Contrary to the findings of significant differences as reported in Table IV, we can see that there is a lack of significant differences in the accounting performance (ROA) of family and non-family firms. In Panel E, the averages of ROA for family firms are 4.90 and 5.82 per cent for non-family firms, respectively, indicating that non-family firms are more gainful than non-family firms. Except for the mean differences in the ROA, the differences in the mean of Tobin's between these two types of firms are statistically significant. However, Tobin's Q for family firms at −0.012 is lower than of 0.532 for non-family firms. Further, we can note that the Tobin's Q mean value is less than 1, in both types of firms, suggesting that the market failed to create good shareholder value. This result largely reflects that the performance measurement correlates with the firm size variable.

5.3 Correlation coefficient matrices

This section presents the correlation between the corporate governance mechanisms and financial performance variables by using the Pearson correlation test (see Tables V–VII). Before regression analysis, the correlation coefficient analysis is conducted to test the relationships between the dependent and independent variables (Rahman and Ali, 2006). Further, it is important in order to check for possible multicollinearity "one-to-one relationship" between corporate performance and the explanatory variables in empirical models. Table VI presents the Pearson correlation coefficients for non-family firms, and Table VII presents the Pearson correlation coefficients for family firms in the study.

The tables state the correlation matrix between the explanatory variables for the full sample, family firms and non-family firms. In general, no multicollinearity is observed between them. Only a few variables reveal relatively higher correlations, but still, do not correlate more than 0.8 or 0.9. In all tables, the findings are jointly significant at a 1 and 5 per cent levels of significance, respectively.

Using the analysis above, Tables VI and VII reveal that the concentration ownership has a significant and positive correlation with ROA, in family and non-family firms, at the 1 per cent significance level. The coefficient indicates that if a family or a small number of shareholders continues to own and keep the firm shares, this will adversely affect the performance of the firm, perhaps because one of the most effective ways to reduce conflicts of interests and maximise value in firms is to increase the proportion of concentrated ownership of the firm's shares, as argued by Ke and Isaac (2007). Local institutional investors are significantly negatively related to performance (Tobin's Q), suggesting that

Table V.
Pearson correlation coefficients for all firm variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) BOSIZE	*1*									
(2) CEODUA	0.011 0.761	*1*								
(3) INDTDIR	−0.064 0.085	*−0.331** 0.000*	*1*							
(4) OWNCON	*−0.197** 0.000*	*−0.142** 0.000*	*0.105** 0.005*	*1*						
(5) OWNLOC	*0.084* 0.024*	*−0.207** 0.000*	*0.172** 0.000*	*0.397** 0.000*	*1*					
(6) OWNFOR	−0.011 0.749	−0.053 0.154	0.051 0.169	*0.160** 0.000*	*0.380** 0.000*	*1*				
(7) FSIZE	*0.305** 0.000*	*−0.0832* 0.025*	−0.026 0.483	0.066 0.076	*0.238** 0.000*	*0.252** 0.000*	*1*			
(8) LEVERAGE	−0.213 0.567	−0.072 0.051	*0.073* 0.046*	*−0.107** 0.004*	*0.105** 0.004*	0.054 0.146	*0.365** 0.000*	*1*		
(9) ROA	0.052 0.156	−0.046 0.215	0.009 0.798	*0.151** 0.000*	*0.123** 0.000*	−0.024 0.509	*0.156** 0.000*	*−0.199** 0.000*	*1*	
(10) TQ	*0.094* 0.011*	*−0.133** 0.000*	*0.023* 0.044*	*−0.108** 0.003*	*0.391** 0.000*	*0.275** 0.000*	*0.238** 0.000*	*0.175** 0.000*	0.039 0.288	*1*

Notes: *,**Significant at 5 and 1 per cent, respectively

Table VI. Pearson correlation coefficients for non-family firm variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) BOSIZE	*1*									
(2) CEODUA	−0.048 0.384	*1*								
(3) INDTDIR	−0.022 0.681	*−0.363** 0.000*	*1*							
(4) OWNCON	−0.094 0.086	*−0.149** 0.006*	−0.060 0.277	*1*						
(5) OWNLOC	−0.043 0.435	*−0.167** 0.002*	*0.197** 0.000*	*0.745** 0.000*	*1*					
(6) OWNFOR	*−0.141** 0.010*	0.083 0.129	−0.089 0.104	*0.285** 0.000*	*0.345** 0.000*	*1*				
(7) FSIZE	*0.297** 0.000*	−0.102 0.062	0.079 0.150	−0.030 0.584	*0.144** 0.008*	*0.234** 0.00*	*1*			
(8) LEVERAGE	*0.218** 0.000*	*−0.152** 0.005*	*0.109* 0.046*	*−0.241** 0.000*	−0.052 0.342	0.054 0.326	*0.505** 0.000*	*1*		
(9) ROA	0.092 0.093	−0.065 0.239	*−0.016** 0.008*	*0.203** 0.002*	*0.161** 0.003*	−0.040 0.468	*0.186** 0.000*	*−0.273** 0.000*	*1*	
(10) TQ	0.071 0.196	0.097 0.079	0.059 0.288	*−0.935** 0.000*	*−0.71** 0.000*	*−0.26** 0.000*	0.020 0.718	*0.172** 0.001*	*−0.161** 0.003*	*1*

Notes: *,**Significant at 5 and 1 per cent, respectively

Table VII.
Pearson correlation coefficients for family firm variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) BOSIZE	1									
(2) CEODUA	0.071 0.160	1								
(3) INDTDIR	−0.134** 0.007	−0.381** 0.000	1							
(4) OWNCON	−0.271** 0.000	−0.173** 0.000	0.276** 0.000	1						
(5) OWNLOC	0.116* 0.021	−0.166** 0.001	0.238** 0.000	0.213** 0.000	1					
(6) OWNFOR	0.101* 0.045	−0.132* 0.012	0.364** 0.000	−0.007 0.880	0.186** 0.000	1				
(7) FSIZE	0.342** 0.000	−0.016 0.742	−0.165* 0.000	0.226** 0.000	0.164** 0.001	0.138** 0.009	1			
(8) LEVERAGE	−0.243** 0.000	0.021 0.674	0.054 0.286	0.057 0.256	0.122* 0.015	−0.098 0.050	0.142** 0.003	1		
(9) ROA	−0.013 0.789	0.157** 0.001	−0.13** 0.008	0.137** 0.006	0.009 0.855	0.114* 0.023	0.322** 0.000	−0.173** 0.000	1	
(10) TQ	0.184** 0.000	0.187** 0.000	−0.30** 0.000	−0.908** 0.000	−0.26** 0.000	−0.057 0.256	−0.226** 0.000	−0.055 0.275	−0.098 0.051	1

Notes: *,**Significant at 5 and 1 per cent, respectively

their ability to control and contribute to strengthening corporate governance is not effective, in family and non-family firms. As for foreign ownership, it is significantly negatively related to Tobin's, in non-family firms. While, there are significant positive correlations between foreign investors' and ROA in family firms, with a value of 0.114. This means that foreign investors have an impact on firm performance.

Tables VI and VII also show that there is a positive correlation between CEO duality and ROA and Tobin's *Q*, in family firms, suggesting that when the positions of CEO and chairperson are in the hands of one person, and that person is likely to participate and assist in the decision-making process. Conversely, the analysis reveals that CEO duality does not influence financial performance of non-family firms. For independent non-executive directors, the correlation analysis further suggests a significant and negative relationship between independent directors and ROA, in family and non-family firms, with correlations of −0.133 and −0.016, respectively, which means that independent directors have a negative influence on performance, which is not expected. However, these results do not reflect the full results of the study, which need to include more comprehensive statistical analyses. On the other hand, these results can be used as a comparator with the conclusion of a collective analysis of all the results of the statistical methods used. These relationships need to be tested again in the multivariate analysis, as many other factors need to be accounted for into.

We can see clearly that there is a negative correlation between leverage and ROA, in family and non-family firms, that shows how efficiently the firm is using its current assets. The correlation values are −0.178 and −0.273, respectively. The tables also reveal that firm size was positively and significantly correlated to performance, at the 1 per cent significant level, in both family and non-family firms.

6. Discussion of regression analysis results

This section explains the main results which were drawn from pooled-OLS regression analysis of the relationship between financial performance as a dependent variable measured by ROA, Tobin's *Q* and corporate governance mechanisms as independent variables comparing family and non-family firms.

The following table presents the overall results for the effect of corporate governance (namely; board of directors, ownership structure and control variables) on financial performance measured by ROA as an independent variable comparing family and non-family firms. The results are jointly significant at 1, 5 and 10 per cent of significance. It should be noted that R^2s for the ROA range from 5 to 38 per cent for family and non-family firms. For table Tobin's *Q*, the R^2s are in the same range, i.e. 9 and 19 per cent for family and non-family firms, respectively.

6.1 Board of directors

As shown in Tables VIII and IX, in family firms, the board size has a negative and significant impact on the performance measured by the ROA, which supports the first hypothesis that there is a negative relationship between board size and corporate performance. This negative relationship indicates that when the board size increases, the performance of the family firms will decrease. This is consistent with previous studies such as Bennedsen, Kongsted and Nielsen (2008) and Ibrahim and Samad (2011). Similarly, however, when financial performance is measured by Tobin's *Q*, the table shows a negative and significant association of the board size with corporate performance. Regarding non-family firms, the results show an insignificant relationship between the size of the board and corporate performance (as measured by the ROA or Tobin's *Q*). Based on this finding, the hypothesis (*H1*) for non-family firms, which stated that there is a negative relationship

Table VIII. The relation between corporate governance mechanism and Tobin's Q

	Tobin's Q					
	All firms		Family firms		Non-family firms	
Variables	Coef.	p (Sig)	Coef.	p (Sig)	Coef.	p (Sig)
BOSIZE	0.050	0.320	−0.075	0.034**	0.350	0.234
CEODUA	0.013	0.431	0.014	0.044**	0.100	0.323
INDTDIR	0.028	0.084*	−0.014	0.070*	0.941	0.088*
OWNCON	−0.030	0.482	−0.063	0.000***	−0.304	0.286
OWNLOC	0.044	0.167	−0.027	0.040**	0.457	0.045**
OWNFOR	0.064	0.001***	0.012	0.057*	0.491	0.009***
FSIZE	0.027	0.022**	0.087	0.891	−0.096	0.102
LEVERAGE	0.046	0.044**	−0.091	0.540	0.154	0.322
R-squared	0.2723		0.0984		0.1944	
Prob > F, χ^2	0.000		0.000		0.000	
Observations	721		392		329	

Notes: Regressions with robust standard errors. *,**,***Significant at 10, 5 and 1 per cent, respectively

Table IX. The relation between corporate governance mechanism and ROA

	ROA					
	All Firms		Family firms		Non-family firms	
Variables	Coef.	p (Sig)	Coef.	p (Sig)	Coef.	p (Sig)
BOSIZE	−0.321	0.050**	−0.024	0.021**	0.121	0.786
CEODUA	−0.048	0.274	0.000	0.803	−0.325	0.010***
INDTDIR	0.021	0.094*	0.073	0.283	0.291	0.067*
OWNCON	0.215	0.022**	−0.036	0.353	−0.262	0.511
OWNLOC	0.120	0.137	−0.001	0.708	0.534	0.157
OWNFOR	0.233	0.034**	0.030	0.024**	0.257	0.018**
FSIZE	0.215	0.000***	0.018	0.121	0.382	0.000***
LEVERAGE	−0.656	0.000***	−0.014	0.015**	−1.46	0.000***
R^2	0.1853		0.0559		0.3811	
Prob > F, χ^2	0.000		0.000		0.000	
Observations	721		392		329	

Notes: *,**,***Significant at 10, 5 and 1 per cent, respectively

between board size and financial performance as measured by ROA or Tobin's Q, is rejected. For family firms, it is partially supported in this study.

Furthermore, Table VIII clearly shows a positive significant relationship between CEO duality and Tobin's Q in the family firms. This finding is consistent with the view that firms in which the CEO and Chairperson roles are combined. Such firms are more likely to have better efficient governance mechanisms, which should contribute to improved performance. Conversely, however, when performance is measured by ROA, the result shows an insignificant relationship between CEO duality and corporate performance. Again, based on our findings, *H2* for family firms, which stated that there is a negative relationship between CEO duality and firm performance ROA or Tobin's Q, is not supported.

The result for independent non-executive directors' percentage shows a negative and significant impact on Tobin's Q in family firms. The possible explanation for this result may be that firms with higher proportions of independent directors are more likely to experience lower performance because independent directors are unfamiliar with the operations of company business, are not full-time workers in the firm, and are unable to understand the complexities and difficulties facing the company. Another possible explanation may be that the appointees may not have the relevant skills and experience as they are appointed because of a prior relationship with family shareholders, and therefore feel obliged to work for them. Furthermore, based on the accounting-based measure, there is an insignificant relationship between independent directors and ROA in family firms. Based on our findings, *H3* for family firms, which stated that there is a positive relationship between independent non-executive directors' and firm performance, is rejected.

In Arab countries including Jordan, the board of directors in family firms are generally controlled by family members. Consequently, the board of directors of such firms are likely to influence firm performance. Regarding non-family firms, the results show a highly positive and significant relationship between independent directors and corporate performance (as measured by the ROA or Tobin's *Q*). Based on this finding, *H3* for non-family firms, which stated that there is a positive relationship between independent directors' and corporate performance as measured by ROA or Tobin's *Q*, is supported.

6.2 Ownership structure

In this sub-section, with respect to family firms, it can be observed from Table VIII that the OWNCON coefficient is negative and highly significant in relation to the Tobin's *Q* performance measure. This shows that when the level of ownership concentration increases, the value of the Jordanian family firms decreases. However, a similar relationship is not significant when corporate performance is measured by ROA. This might be explained by DeAngelo and DeAngelo (2000), who argued that when most of firm shares are owned by family, it motivates them to pursuit their own interests rather than the interest of the firm, at the expense of minority shareholders, and thus the poor performance of these firms. Further, large shareholders (concentrated ownership) also negatively affect the corporate performance by choosing less effective governance mechanisms. For example, where the CEO and the chairperson roles are not split, family shareholders have the motivation to continue with poor internal controls to ease their expropriation of the company resources (Lasfer, 2006). Regarding non-family firms, the coefficient on the variable ownership concentration is always negative but has an insignificant influence on the performance (measured by Tobin's and ROA). The result is consistent with the evidence of Demsetz and Villalonga (2001) and Al-Ghamdi and Rhodes (2015) that ownership concentration has no systematic relationship with corporate performance. In conclusion, *H4* is partially supported in this study and, for that, is failing to reject.

Furthermore, Table VIII also shows that local investors' ownership has a statistically significant at 5 per cent and a negative relationship with corporate performance measured by Tobin's *Q*. This finding does not provide any evidence of the effective role of local investors in Jordan, which is in line with Khanna and Palepu's (2000) suggestion on weak domestic institutional monitoring in emerging markets. Also, the result for local ownership and ROA in family firms is consistent with our expectations, as we find the coefficient is negative and statistically insignificant. Regarding non-family firms, the coefficient on the variable local ownership is always positive and has a significant influence on the performance (measured by Tobin's *Q*). The possible explanation of this positive relationship can be attributed to the investment decisions that taken by some types of companies such as insurance companies and pension funds that may affect the conduct of management. In the case of Jordan, most of the major domestic institutional investors are banks, insurance companies and pension funds, such as the Social Security Corporation Investment Unit. Thus, they are a good example of "pressure-sensitive" institutional investors. However, it is suggested that such investors are not capable of playing an effective monitoring role and commonly have significant business relationships with companies. Thus, pressure-sensitive investors are less likely to act as effective monitors than pressure-resistant investors.

In sum, this study suggests that both family and non-family firms with higher level of local investors' ownership have higher performance. This is shown in the relationship between of local investors' ownership and Tobin's Q in Table VIII. This result suggests that, as local ownership increases, the motivated and efficient to monitor management by domestic institutions increases, which leading to higher performance (McConnell and Servaes, 1990; Shleifer and Vishny, 1997).

Foreign ownership in family and non-family firms indeed has a positive and significant impact on ROA and Tobin's Q in Jordan. This is seen in the positive and statistically significant coefficient on OWNFOR. In this case, there is a relationship between foreign ownership and corporate performance, supporting *H6*. This can be interpreting as: an increase of 1 percentage of the foreign ownership results in a 3 per cent increase in the ROA. A similar relationship is found in family firms when financial performance is measured by Tobin's Q.

6.3 Control variables

Our results as shown above in Table IX, the firm size has a positive and significant relationship with ROA in non-family firms. This variable has been used by many empirical studies (such as Boone *et al.*, 2007; Segarra and Teruel, 2007). These studies confirm that firm performance can vary depending on the size of the firm. For the firm size, an increase in firm's asset base should lead to improved performance and this should be the case if the firm make maximum use of its assets. This positive relationship suggests that larger firms can benefit from economies of scale and scope than those small one (Joh, 2003). Regarding family firms, the firm size has an insignificant relationship with ROA and Tobin's Q.

Tables VIII and IX show that the leverage variable has a negative and significant impact on the performance of firm as measured by ROA in family and non-family firms. Myers (1977) argues that the high levels of leverage may adversely affect the performance of the firm in accordance with the problem of lack of investment. This is due to the increase in financial leverage would hamper the company's ability to raise new debt. This result is consistent with studies. For instance, Tong and Ning (2004) found that that highly leveraged for firms reflect a negative indication that the firm do not have the ability to face future financial risks.

7. Conclusion

The main objective of the study was to examine the relationship between corporate governance mechanisms and financial performance of family and non-family firms in Jordan. The study found that board size both in term of Tobin's Q and ROA has a negative relationship with the performance of family firms. Conversely, the board size in non-family firms has no systematic relationship with corporate performance. There is a strong relationship between corporate performance and independent directors in non-family firms whether corporate performance is measured as Tobin's Q or ROA. In addition, we found some evidence for a relationship between performance and independent directors in family firms. The results support the view that CEO duality is important for family firm performance.

Our results also show that ownership concentration has an insignificant correlation with corporate performance as measured by Tobin's Q and ROA. On the contrary, ownership concentration in family firms has a negative and significant correlation with Tobin's Q. There is a significant relationship between local investors' ownership and corporate performance as measured by Tobin's Q in family and non-family firms. This is in contrast to the findings for ROA in family and non-family firms. However, the findings strongly support the view that foreign investors are positively impact the performance of family and non-family firms.

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Corresponding author
Mauricio Silva can be contacted at: murosilva@hotmail.com

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Increased market response to earnings announcements in the 21st century: An Empirical Investigation

William H. Beaver [a], Maureen F. McNichols [a,*], Zach Z. Wang [b]

[a] Graduate School of Business, Stanford University, Stanford, CA, 94305, USA
[b] Gies College of Business, University of Illinois at Urbana-Champaign, Champaign, IL, 61821, USA

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A B S T R A C T

We examine the role of concurrent information in the striking increase in investor response to earnings announcements from 2001 to 2016, as measured by return variability and volume following Beaver (1968). We find management guidance, analyst forecasts, and disaggregated financial statement line items are more frequently bundled with earnings announcements, and each of these items explains part of the increase in market response. Furthermore, collectively, these concurrent information releases explain a substantial fraction of the increase in market response to earnings announcements since 2001. This is in contrast to the decline in market response to management guidance issued separately from earnings and the much smaller increase in market response to analyst forecasts issued separately from earnings over this time. The findings indicate that information arrival at earnings announcement dates has increased significantly over the past two decades, and that key components of this are increased disclosures by management of guidance and financial statement line items and forecasts by analysts.

1. Introduction

Beginning with Ball and Brown (1968) and Beaver (1968), a large literature documents that earnings announcements have significant information content for investors. Subsequent literature explores whether and how the information content of earnings announcements varies across time and across firms.[1] These studies report an increase in market response to earnings announcements through the 1990's and early 2000's. More recently, Beaver, McNichols and Wang (2018a) document

* Corresponding author.
E-mail addresses: fbeaver@stanford.edu (W.H. Beaver), fmcnich@stanford.edu (M.F. McNichols), zgwang@illinois.edu (Z.Z. Wang).

[1] Studies examining information content of earnings announcements in the 1990's include Francis, Schipper and Vincent (2002a, 2002b), Collins et al. (2009), and Landsman and Maydew (2002). These studies measure information content as the ratio of the squared or absolute value of residual return during the three days around the announcement to the variance or standard deviation of residual returns during the non-announcement period. Ball and Shivakumar (2008) document an increase in their measure of new information at earnings announcements, *Adjusted* R^2, especially for 2004–2006, the last three years in their data.

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a striking increase in the market response to earnings announcements between 2001 and 2011, measured as the variability of stock returns at earnings announcements relative to the variability of stock returns at other times.[2]

This paper examines two questions concerning the surprising increase in relative return variability after 2001: First, is the increase in relative return variability due to more information being released to investors at earnings announcements, and if yes, what is the nature of the information? Second, how does the magnitude of investors' response to earnings announcements over time compare to the magnitude of the response to disclosures on non-earnings announcement days, specifically management guidance and analyst forecasts? If the pattern of increase in relative price response is observed for other significant information events, it could reflect changes in investors' trading behavior or other factors influencing investor response to information rather than changes in the information released at earnings announcements.

Our primary measure of investor response to earnings announcements is a one-day *U*-statistic, hereafter referred to as *USTAT*, which allows us to pinpoint the single-day market reaction to the earnings announcement. This measure reflects the price response to all information released at the earnings date, potentially including information about the income statement, balance sheet and statement of cash flows, as well as management guidance and information released by analysts or others outside the firm. This analysis is motivated by the theory that price revision is increasing in the precision of contemporaneous signals or disclosures, for example as modeled in Holthausen and Verrecchia (1988) and McNichols and Trueman (1994).

Our second measure of investor response to earnings announcements is a one-day abnormal volume statistic, referred to as *AVOL*. This measure reflects the volume response at the earnings announcement date, relative to the volume in the non-earnings report period. As Beaver (1968) notes, price-based tests reflect revisions in expectations of the market as a whole, whereas volume can reflect revisions in individual investors' expectations. The *AVOL* measure can reflect information that affects the investment decisions of individual investors even in the absence of significant price revision, whereas the *USTAT* measure can reflect significant price revision, even if it does not generate substantial trade. Thus, price and volume measures capture different dimensions of the effect of information on investors' equity holdings.

We document a dramatic increase in price revision at earnings dates after 2001, with the mean *USTAT* climbing from 3.42 in 2001 to a peak of 11.70 in our final sample year 2016. This increase is more than twice the magnitude documented in Beaver, McNichols and Wang (2018a) for three-day price reactions, and an order of magnitude greater than the increase documented for three-day price reactions by earlier studies focused on the 1990s. The mean *AVOL* also increases significantly over this period, climbing from 0.85 in 2001 to 1.96 in 2016.

To address our first research question, we examine the relation between our dependent variables, relative return variability and abnormal volume at earnings announcements, and disclosures included in the earnings press release and analyst forecasts released the same day as the earnings press release. Specifically, we examine whether trends in concurrent management guidance, analyst forecasts, and financial statement line item disclosures explain the increase in *USTAT* and *AVOL* over time. These firm-quarter specific measures contain information about expected future earnings, which valuation theory and evidence indicate will affect equity prices and investor trading decisions. Furthermore, substantial prior research documents these are important sources of information to investors.[3]

Our examination of concurrent information establishes several significant findings. First, management guidance, analyst forecasts and financial statement line items are each increasingly disclosed on the day quarterly earnings are announced from 1999 to 2016. The percentage of earnings announcements with concurrent management forecasts increases from 3% to 36%, the percentage of earnings announcements with concurrent analyst forecasts increases from 33% to 70%, and the percentage of financial statement line items disclosed at earnings announcements increases from 23% to 57%. Second, we observe a positive and significant association between our price- and volume-based measures of investor response at earnings announcements and each of these concurrent information items. Third, our multivariate analysis establishes that concurrent management guidance, analyst forecasts, and disclosed financial statement items each have significant incremental explanatory power to each other and to control variables motivated by prior literature, for the magnitude of price and volume response to earnings announcements. Controlling for these information items reduces the magnitude of the time trend by 42%–75% in different specifications, and renders it insignificant in some. Taking the findings as a whole, they indicate that increased disclosure and concurrent analyst forecasts are very substantial factors in the observed increase in investor response to earnings announcements.

To address our second research question, we examine whether the increased investor response to earnings announcements is observed in earnings-related disclosures made by key actors in a firm's information environment, namely management and analysts. Specifically, we examine whether the market response to management guidance and analyst forecasts issued separately from earnings announcements displays an over-time increase similar to earnings announcements. We compare these disclosures to stand-alone earnings announcements to avoid the confounding effects of simultaneous guidance or analysts' forecasts. The market reaction to stand-alone earnings announcements is of smaller magnitude than the average of all earnings announcements, but exhibits the same increasing pattern over time. In contrast, the market reaction to

[2] Due to availability of time stamp data, the sample period for our study begins in 1999. We replicate Beaver McNichols and Wang (2018a)'s finding of a significant increase in information content from 2001 to 2011, and find it continues in 2012–2016. We will refer to the increase over our sample period or after 2001, though we note that information content of earnings is essentially flat in years 1999, 2000 and 2001, increases in 2002–2006, decreases in 2007–2009 and then increases through 2016.

[3] See Beyer, Cohen, Lys and Walther (2010) for a review of the literature on factors influencing the informational role of these disclosures.

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stand-alone management guidance declines over the sample period, and the market reaction to stand-alone analyst forecasts increases only slightly. Thus, the considerable increase in *USTAT* at earnings announcements is not observed for earnings information released by management and analysts separately from earnings announcements.

Our paper makes several contributions to the literature. First, we propose and find that concurrent information plays a substantial role in explaining the increase in investor response to earnings announcements after 2001. Understanding the cause of the increase in price revision and volume at earnings announcements is of considerable importance given the sizable increase over this period, and relative to prior years. The concurrent disclosures and forecasts we examine explain from 42% to all of the time trend in increased investor response, depending on the measure of market response. In addition, financial statement line items alone contribute half of this explanatory power. Thus earnings announcements are increasingly significant to investors as a source of information and a significant fraction of the increase is associated with greater disclosure of financial statement information.

Second, in contrast to earlier research, we are able to examine the effect of financial statement line item disclosures in the earnings press release for a comprehensive sample. We document that income statement and balance sheet line item disclosures have explanatory power for the increase in all our market response measures, and statement of cash flow line items have explanatory power for the increase in several. These findings suggest that the financial statement disclosures are an important source of new information to investors, even after controlling for the earnings surprise, guidance by management, and forecasts by analysts.

Third, we document a decline in the market response to management guidance over time and relatively little increase in the market response to analyst forecasts disclosed outside of earnings announcements. These findings affirm that the increase in market response at earnings dates is distinct relative to the response to two prominent disclosures of earnings-related information.[4]

Fourth, our study documents a number of empirical regularities related to the increase in market response to earnings announcements we expect are of interest to accounting researchers. We document the behavior of the numerator and denominator of the *USTAT* and *AVOL* ratios, and find the increase in the ratio reflects response at earnings announcements that has changed disproportionately to the response in non-earnings announcement periods. We conduct extensive specification tests and find that our primary results are upheld. These tests include generalizing the relation between the numerator and denominator of the *USTAT* and *AVOL* ratios to allow for a slope different from 1, and examining two alternative measures of market response, adjusted R^2 and a 3-day rather than 1-day *USTAT*. These results provide assurance that our overall findings are not sensitive to the choice of empirical measure. Collectively, our findings indicate that the marked pattern of increased relative price revision at earnings announcements since 2001 reflects increased information content of earnings press releases and concurrent analyst forecasts, and suggest new avenues for exploration.

The remainder of the paper proceeds as follows. Section 2 discusses relevant literature and the motivation for the questions we address. Section 3 discusses the research design and our measures of market response and concurrent information. Section 4 presents descriptive statistics for our sample. Section 5 presents and interprets our findings and Section 6 concludes.

2. Related research

2.1. Prior literature

2.1.1. Changes in the information content of earnings

As noted in the introduction, Landsman and Maydew (2002), Francis, Schipper and Vincent (2002a), Collins et al. (2009), and Ball and Shivakumar (2008) examine whether the information content of earnings announcements has increased over time and explore potential explanations for this trend. These studies were motivated by the concern that financial statement information was largely preempted by other information sources and increasingly irrelevant due to measurement concerns. Each of these studies innovated in the questions asked and the design of their tests. In the Internet Appendix, we discuss key features of these studies and their primary inferences, which motivate some of our research design choices. Given the substantially greater current availability of data and computing power, none of our comments are intended as criticism of these earlier studies.

In the spirit of this earlier literature, Beaver, McNichols and Wang (2018a) examine the time trend of price response to earnings announcements from 1971 to 2011. Our earlier study finds that the three-day *U*-statistic at earnings announcements after 2001 is significantly greater than before 2000, and increases substantially from 2002 to 2011. Our earlier study further explores the cross-sectional relation between *U*-statistic and firm-specific factors, and documents significant positive associations with firm profitability, size, and analyst coverage. After controlling for these factors and variables suggested by prior literature, the coefficient on the time trend decreases only slightly, indicating these firm-specific attributes have very little power to explain the increase in stock price revision at earnings announcements.

[4] We believe researchers interested in voluntary disclosure will want to take account of these patterns in future research. Research on disclosure often assumes behavior is consistent over time, and analyzes samples pooled over many years. Future research on voluntary disclosure may further explore the causes for pattern we document, and at a minimum, design tests that take the decline in market response to management guidance into account.

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2.1.2. Management guidance, analyst forecasts and financial statement disclosure

Our study extends these prior studies by examining the role of three concurrent information releases in the increase in investor response to earnings announcements after 2001: management guidance, analyst forecasts and financial statement line items.[5]

An extensive literature documents that management forecasts are a significant source of information to investors. Furthermore, Anilowski et al. (2007) and Rogers and Van Buskirk (2013) find that firms are more likely to issue management guidance concurrent with earnings post-Reg FD than pre-Reg FD. They hypothesize that the Reg FD restriction against selective disclosure motivated managers to bundle guidance with earnings announcement conference calls so as to communicate with analysts in public venues (Rogers and Van Buskirk, 2013). It is therefore plausible that the increase in bundling of management forecasts at least partially explains the post-2001 increase in investor response to earnings announcements.

The second concurrent information source we examine is analyst forecasts. Analysts serve as information intermediaries and play an important role in acquiring and disclosing information, leading to its incorporation into price. Lang and Lundholm (1996), Francis, Schipper and Vincent (2002b) and Frankel et al. (2006) each provide evidence of a positive association between the informativeness of earnings and analyst coverage and forecasting behavior. The positive relation could occur because analysts' demand for information causes firms' financial reporting and disclosure to be more informative, or because analysts choose to issue forecasts for firms whose financial reporting is more informative. It could also occur because analyst forecasts facilitate more rapid dissemination or processing of earnings information, or because analysts augment the information provided by management. For each of the above reasons, we expect that analyst forecasts issued concurrent with earnings could be associated with greater price response on earnings announcement dates.[6]

The third form of disclosure we examine is concurrently disclosed financial statement line items. Prior studies by Hoskins, Hughes, and Ricks (1986), Livnat and Zarowin (1990), Chen et al. (2002) and D'Souza et al. (2010) find that line item disclosures in earnings press releases contain value-relevant information. However, the studies of Francis, Schipper and Vincent (2002a) and Collins et al. (2009) leave open the question of how these disclosures relate to the increase in market response to earnings announcements over time, and particularly in the post-2001 period. With the benefit of a large sample and comprehensive data on financial statement line item disclosures in earnings press releases, we have the opportunity to examine the informational role of these disclosures in the current information environment. Furthermore, we can assess this after controlling for contemporaneous management guidance, analyst forecasts and a number of control variables earlier studies did not include.

Our second research question explores whether investor response to management guidance and analyst forecasts issued separately from earnings announcements exhibits the increase we observe for earnings announcements. Prior literature establishes that management and analysts' forecasts issued outside of earnings announcements are key sources of accounting-related information. To the extent the pattern we observe at earnings announcements is common to these information events, the increase in *USTAT* and *AVOL* at earnings announcements may reflect market-wide changes in how investors respond to information, rather than an increase in relative informativeness of earnings announcements.

2.2. Recent literature

Several recent papers examine the informativeness of accounting disclosures after 2001. Barth Li and McClure (2018) examine the value relevance of accounting information over the last five decades, and document that the ability of earnings to explain price levels has declined but that this decline is offset by increased explanatory power of balance sheet, cash flow and other financial statement information. Nallareddy, Sethuraman and Venkatachalam (2018) provide complementary findings, documenting that the ability of cash flows to predict future earnings has increased over the 1989–2015 period.

Three recent studies are motivated by the increase in information content documented by Beaver, McNichols and Wang (2018a). Hand, Laurion, Lawrence and Martin (2018) propose and conclude that increased availability of analyst forecast data feeds explains the increase in price revision activity at earnings. They examine the explanatory power of a substantial array of line item forecast errors, and find in some specifications that the time trend in information content is fully explained.

Thomas et al. (2018) draw on the patterns we document in this paper for the *USTAT* and its numerator and denominator. They relate the decline in return variability in the denominator of *USTAT* to recent literature in finance (e.g. Brandt et al., 2009; Bartram et al., 2018) that aims to explain the decline in return variability overall. Thomas, Zhang and Zhu (2018) characterize the role of trading noise in each component and its effect on the *USTAT* ratio. They also derive conditions for changes in normal information arrival and trading noise to increase the *USTAT*.

Drawing on the findings of Beaver, McNichols and Wang (2018a, 2018b), Shao et al. (2018) apply the Ball and Shivakumar (2008) adjusted R^2 measure to explore the increase in information content, and the role of regulation, information leaks, sample composition, preemption of earnings from other disclosures and concurrent disclosures. They argue that regulatory

[5] For ease of exposition, we will refer to these concurrent items as concurrent disclosures or concurrent information. While disclosure often connotes communication from management, our use of concurrent disclosures will include forecast releases from analysts as well as management guidance.

[6] A countervailing force could prevail if the issuance of analyst forecasts at earnings dates is associated with greater preemption by analysts of earnings information in the pre-announcement period.

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changes implemented around 2004 are a primary factor in the increase in information content. We believe these papers are complementary to ours, applying a variety of different research designs to further explore the patterns documented in our earlier study. We further discuss how these studies compare to ours in methods and conclusions in the Internet Appendix.

3. Empirical methodology

3.1. Measures of the information content of earnings announcements

Our main measure of the information content of earnings announcements, the 1-day U-statistic (*USTAT*) captures the magnitude of the squared residual return on the date of the earnings announcement, hereafter the testing period TP, to the variance of residual returns during the non-announcement period, hereafter the estimation period EP. A key advantage of the 1-day window is that it allows us to align the return response to earnings with time-stamped disclosures that are released in the 1-day window.[7] We are thus able to identify the disclosures occurring as prices are responding with a high degree of accuracy.

For each quarterly earnings announcement for firm *i* (day 0), the estimation period, EP, is defined as the period from 130 to 10 days prior to the earnings announcements and days 10–130 days after the announcement. We estimate the market model with daily stock returns in EP, obtain estimates of the intercept and slope coefficient, a_i and b_i, and calculate the residual returns and variance $Var\mu_i$. We then use a_i and b_i to calculate the residual return $\mu_{i,t}$ in TP, and construct *USTAT* as follows:

$$USTAT_{i,t} = \frac{{\mu_{i,t}}^2}{Var\,\mu_i}$$

We utilize time stamps of earnings announcements from Bloomberg, *IBES*, and RavenPack. If earnings are released after normal trading hours, we define the earnings announcement day to be the next trading day. In a procedure to be explained shortly, we also apply the same estimation approach for each “as if” earnings announcement randomly selected from the non-report period. Following Landsman and Maydew (2002) and Beaver, McNichols and Wang (2018a), we aggregate quarterly earnings announcements into calendar years based on the dates of earnings release, and then calculate the mean of *USTAT* for each calendar year.

3.1.1. Development of the nonparametric distribution for USTAT

To generate a sampling distribution under the null hypothesis that earnings announcements do not have incremental information content, for each quarterly earnings announcement, we randomly select a day during its non-report or estimation period. That day is treated as if it were an announcement day. We then calculate *USTAT* in the same manner as the actual earnings announcement, and obtain the mean and median of *USTAT* for that sample of randomly chosen announcement dates. Repeating the procedure 1000 times produces a sampling distribution, which is then compared with the values obtained for the actual earnings announcements.[8]

3.1.2. Ball and Shivakumar (2008) R^2 measure

We also explore the sensitivity of our findings to the Ball and Shivakumar (2008) measure of information content. For each calendar year, we run regressions of calendar-quarter stock returns on quarterly earnings announcement-window returns, and the adjusted R^2 measures the proportion of information incorporated in quarterly returns that arrives on the quarterly earnings announcement day. Similar to *USTAT*, the adjusted R^2 does not require a specific earnings expectation model. We define the earnings announcement window as the one-day window based on Bloomberg, *IBES*, and RavenPack earnings time stamps. Following Ball and Shivakumar (2008), we remove firm-quarter observations with fewer than 60 trading days in a calendar quarter. Under the null hypothesis that earnings announcements do not have incremental information, the R^2 is expected to be 1.67% (100%/60) for the one-day announcement window.

3.1.3. Abnormal trading volume (“AVOL”)

Following Beaver (1968), Cready and Hurtt (2002) and Landsman and Maydew (2002), we create a volume-based measure *AVOL* to capture the information content of earnings announcements. The numerator is the difference between shares outstanding-scaled trading volume on the earnings announcement day (day 0) and average shares-outstanding scaled trading volume in the non-announcement period (day-130 to day-10, day+10 to day+130). The denominator is the standard deviation of shares-outstanding scaled volume in the non-announcement period. Under the null hypothesis that earnings

[7] Because the response to earnings announcements largely occurs in the first day following the announcement, 3-day measures include returns for two days that are largely noise.

[8] Drawing the randomly chosen announcement date from the estimation period for each earnings announcement ensures that the randomly chosen date is from approximately the same calendar period as the actual earnings announcement date. Given that our sample is drawn over 18 calendar years, this procedure seems preferable to allowing the randomly chosen announcement date to occur at any time in the firm's history.

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announcements do not have incremental information, *AVOL* should be zero. Similar to our price-based measures, we adjust our volume measures for after-hours earnings announcements.

3.2. Components of USTAT and AVOL

To analyze the intertemporal change of *USTAT* and *AVOL*, we first decompose the measures into the numerator and the denominator. The *USTAT* numerator, *USTAT_NM*, is the squared residual return on the date of the earnings announcement, and the denominator, *USTAT_DN*, is the variance of residual returns during the non-announcement period. The *AVOL* numerator, *AVOL_NM*, is the shares outstanding-scaled trading volume on the date of the earnings announcement less the shares outstanding-scaled trading volume in the non-announcement period, and the denominator, *AVOL_DN*, is the standard deviation of shares outstanding-scaled trading volume during the non-announcement period.

3.3. The relation between USTAT, AVOL and other variables

We examine the association between our dependent variables, *USTAT* and *AVOL,* and several variables, including time, management guidance, analyst forecasts, and financial statement line items. *T* is a trend variable that takes values from 1 to 18 for calendar years from 1999 to 2016. *GUIDANCE* is an indicator variable that is equal to one when management guidance is issued on the earnings announcement date and zero otherwise. *AF* is an indicator variable that is equal to one when any analyst forecast is issued on the earnings announcement date and zero otherwise. Following D'Souza et al. (2010), we collect financial statement line items disclosed in earnings press releases from Compustat Snapshot. *FS* is the percentage of financial statement items disclosed in the earnings announcement. *IS [BS] {SCF}* is the percentage of income statement [balance sheet] {cash flow statement} items disclosed in the earnings announcement. Appendix 2 provides further details.

Following prior literature, we also include several control variables.[9] *LOSS* is an indicator variable that is equal to one when *PTEBS* is negative and zero otherwise, where *PTEBS* is the sum of Net Income before Extraordinary Items, Tax Expenses, and Minority Interest before Special Items. *CV* is the market capitalization value of the firm's common stock at fiscal quarter end from Compustat. Following Atiase (1985), we take the natural log of *CV*, *LCV*, as a proxy for size. Our measure of analyst following, *NUMESTQ,* is the number of analysts making forecasts of the upcoming quarterly earnings at fiscal quarter end, and is drawn from the *IBES* analyst forecast database. For firm-quarters that are not in the *IBES* database, we assume zero analyst coverage. *FIN* is an indicator variable that is equal to 1 when the four-digit SIC code is between 6000 and 6999 and 0 otherwise. *LAG* is the number of days after the end of the fiscal quarter that earnings are announced. *NONDEC31* is an indicator variable that is equal to 1 for firm-quarters with Non-Dec 31 fiscal year-ends and 0 otherwise. Following Collins et al. (2009), *ABSFE_ST* is the absolute value of *Unexpected Earnings*. *Unexpected Earnings* is measured as the difference between IBES realized street earnings and IBES median consensus earnings forecast at fiscal quarter end, scaled by price (IBES).

3.4. The market response to earnings announcements and other information events

To compare the information content of earnings announcements to that of management guidance and analyst forecasts, we obtain the time stamps of management guidance and analyst forecasts from *IBES*, adjust for after-hours announcements, and create one-day *USTAT* measures. For multiple analyst forecasts issued on the same day, we count them as a single analyst-forecast event. We then separate the management guidance (analyst forecast) events into three portfolios based on their time stamps: Guidance (Forecast) Bundled with Earnings, Stand-Alone Guidance (Forecast), and Stand-Alone Earnings. The Bundled with Earnings (Stand-Alone) portfolios includes disclosures issued (not issued) on the same day as earnings announcements. The Stand-Alone Earnings portfolio includes earnings announcements without either concurrent management guidance or analyst forecasts. We calculate the mean and median *USTAT* of the above portfolios to compare how prices respond to earnings announcements, management guidance and analyst forecasts over time.

4. Sample properties

We start with the universe of firms listed on the NYSE, AMEX, and NASDAQ markets for which quarterly reporting dates are available from Compustat for calendar years 1999–2016. This results in an initial sample of 407,718 firm-quarter observations. We next match this sample with Bloomberg, *IBES*, and RavenPack to obtain a list of firm-quarter observations with earnings announcement time stamps. We include observations for which there is agreement across sources.[10] For after-hours earnings announcements, we use day +1 as the earnings announcement date. For each quarterly earnings announcement included, we require that return data are available for the earnings announcement date, and that there are at least 40 trading

[9] Relevant studies motivating our choice of control variables include Landsman and Maydew (2002); Francis, Schipper and Vincent (2002a); Collins et al. (2009) and Beaver, McNichols and Wang (2018a).

[10] We provide further details on the time stamp data and its effect on our sample in Internet Appendix Table IA 1.

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Table 1
Sample summary.

Compustat Observations from 1999 to 2016	407,718
Less observations for which no time stamps are available	83,733
Less Observations with fewer than 40 days in the non-announcement period	835
Number of observations for which *USTAT* can be measured	323,060
Less observations missing data on:	
Analyst forecasts	73,575
Financial statement line items	46,173
All other variables	185
Number of observations for multivariate regression analyses	203,127

Our initial sample includes all 407,718 Compustat earnings announcements (EA) issued in calendar years 1999–2016. We then intersect Compustat data with three sources that have both dates and time stamps: IBES (1999–2016), Bloomberg (hand-collected from 1999 to mid-2013) and Ravenpack (2000–2016). We require that the earnings announcement day be corroborated by each source when multiple sources of time stamps are available. For further details about the sources used to identify the time of the earnings release, see Internet Appendix Table IA.1. For earnings announcements issued after-hours, we use the next trading day as the earnings announcement day. After excluding 83,733 observations without time stamp data and 835 observations with fewer than 40 trading days in the non-announcement period, our data set includes 323,060 observations with data for *USTAT*. The final sample with data on analyst forecasts, management guidance, financial statement line items and control variables for multivariate regression analyses includes 203,127 firm-quarter observations.

days with nonzero returns in the estimation period. We have the same requirements for each simulated non-report earnings announcement. These steps result in a sample of 323,060 quarterly earnings announcements for which we can calculate *USTAT,* as detailed in Table 1. For the additional hypotheses, we impose additional restrictions on the sample to ensure each firm-quarter observation has data for the required variables.[11]

5. Empirical results

5.1. Initial evidence

This section presents initial descriptive evidence on the behavior of our measures of investor response to earnings announcements, and their association with concurrently issued guidance, financial statement line items, and analyst forecasts. To minimize the potential effect of selection due to database coverage, management disclosure and analyst coverage decisions, we present this descriptive evidence using all observations with the required data for each comparison. Our multivariate tests follow, using the sample for which all variables can be measured.

5.1.1. USTAT as a measure of investor response to earnings announcements

Fig. 1 Panel A provides evidence concerning the impact of adjusting for after-hours earnings announcements. The figure shows the mean of abnormal return volatility before and after adjustment for after-hours earnings announcements. The mean day 0 *Unadjusted USTAT* is 4.08, which is slightly less than the mean day +1 *Unadjusted USTAT* of 5.05; after adjustment, the mean day 0 *USTAT* is 7.59, which is four times greater than the mean day +1 *USTAT* of 1.72. By adjusting for after-hours earnings announcements and thus measuring returns over the period in which the earnings are announced, the average *USTAT* increases by 86%. Consistent with Berkman and Truong (2009), the findings document the importance of incorporating time stamp information when measuring investor response to information, and establish that the response to earnings information occurs primarily on day 0. For this reason, we base our tests on one day announcement measures.[12] We note also that both the adjusted and unadjusted *USTAT* measures lie substantially above the hypothetical value of *USTAT* under the null hypothesis that earnings announcements do not convey incremental information content.

[11] For our analysis using the Ball and Shivakumar (2008) adjusted R^2 measure, we require each firm-quarter have at least 60 daily return observations in the calendar quarter; the resulting sample size is 319,385 firm-quarter observations. For our analysis on the volume-based measure *AVOL*, we require each firm-quarter to have at least 40 days with nonzero volume data in the estimation period; the resulting sample size is 322,981. For our analysis on financial statement items, Compustat Snapshot coverage is required, and the resulting sample size is 248,412 firm-quarter observations. For our multivariate regression models, we require included firm-quarters to have all required variables, resulting in a sample size of 203,127 observations. For the analyses of management guidance and analyst forecasts, we require the observations included to have non-missing time stamps from IBES, non-missing return data from CRSP, and at least 40 trading days with nonzero return data in the estimation period. The subsamples of Guidance Bundled with Earnings, Stand-Alone Guidance, Forecast Bundled with Earnings, Stand-Alone Analyst Forecast, and Stand-Alone Earnings have 102,591, 87,091, 179,004, 1,944,828, and 124,791 observations, respectively.

[12] We assess the robustness of our findings to measuring the *USTAT* over 3-day windows, and find none of our conclusions about explanatory factors are affected (Table IA 6). We also assess whether our findings of elevated day +1 *USTAT* occurred in earlier years, in Internet Appendix Figure IA 1. In analysis looking back to 1970, we find an elevated day +1 unadjusted *USTAT* began in the 1990's, consistent with greater after hours earnings announcements around that time.

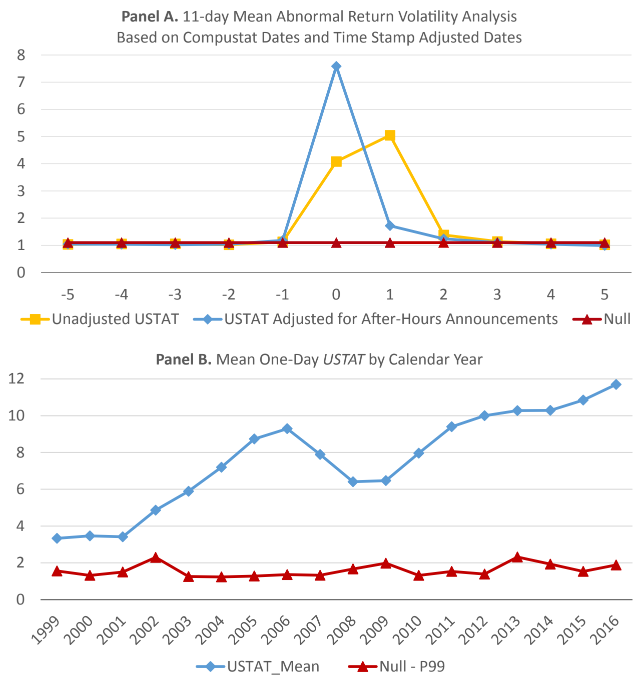

Fig. 1. The figure in Panel A plots mean abnormal return volatility over the 11-day window centered around the earnings announcement day as indicated by Compustat dates ("*Unadjusted USTAT*") and dates adjusted for after-hours earnings announcements ("*USTAT*"). The event sample includes 323,060 quarterly earnings announcements. The figure also plots the mean abnormal return volatility under the null hypothesis that earnings do not have information content. The figure in Panel B plots the mean one-day and three-day information content. *USTAT* is the one-day U-statistic based on announcement dates adjusted for after hours announcements using time stamps. *Null - P99* is the 99th percentile of the mean of *USTAT* for dates randomly drawn from the non-announcement period. Table 1 describes the adjustment for after-hours announcements using time stamps.

Fig. 1 Panel B shows the relative price response to earnings announcements from 1999 to 2016. To allow an assessment of statistical significance of the earnings date *USTAT* measures, it presents the mean 1-day *USTAT* and the 99th percentile of the sampling mean distribution for the 1-day non-announcement period each year, labeled *NULL-P99.*[13] The mean *USTAT* values are above the 99th percentile in each of our 18 sample years. There is a marked increase in the mean *USTAT* as was seen for the 3-day *USTAT* in Beaver, McNichols and Wang (2018a) in 1999 through 2011; this increase is followed by further increases in 2012 through 2016.

Table 2 presents evidence of the increasing information content numerically. It reports the mean *USTAT* by year for each event period, along with the 99th percentile of the sampling distribution for the non-announcement period. Regarding the time trend in the *USTAT*, an increase is evident from 1999 to 2016. The mean *USTAT* is 3.33 in 1999 and climbs to 11.70 in 2016. It is also clear from Table 2 and Fig. 1 Panel B that the increase is not monotonic: from 2006 to 2009, the mean *USTAT* declines from 9.29 to 6.41.

Fig. 2 displays the adjusted R^2 from regressions of calendar-quarter returns on one-day announcement returns, pooled by calendar year. The figure compares these values with the benchmark R^2 of 1.67%, under the null hypothesis that earnings announcements do not have incremental information content. Similar to our *USTAT* findings, the figures display evidence that earnings announcements convey more information than would be expected under the null in each of the years from 1999 through 2016. The intertemporal trend of adjusted R^2 is generally similar to that of *USTAT* in Fig. 1 Panel B. As Table 2 indicates, the adjusted R^2 increases from 4.30% in 1999 to 13% in 2016, and decreases from 15.63% in 2007 to 8.33% in 2008. Our findings parallel those of Ball and Shivakumar (2008), who note the increase in adjusted R^2 for years 2004–2006. Our findings for the subsequent 10 years document the decline in the adjusted R^2 measure during the financial crisis and the subsequent increase to substantially greater levels than 1999–2003. Shao, Stoumbos and Zhang (2018) document a similar pattern using annual

[13] The 1-day *USTAT* is substantially greater than a 3-day *USTAT* we present in the Internet Appendix, Figure IA 2 and Table IA6, consistent with the evidence in Panel A that the price response to earnings announcements largely occurs during the trading day immediately following the earnings announcement.

Table 2
The information content of earnings announcements by year.

Year	*Nobs*	*USTAT*	*Null-P99*	*USTAT_NM*	*USTAT_DN*	*ADJ R^2*	*AVOL*	*AVOL_NM*	*AVOL_DN*
1999	17,304	3.33	1.56	0.0061	0.0021	4.30%	0.88	7.82	10.47
2000	19,975	3.47	1.32	0.0085	0.0031	4.58%	0.80	7.31	10.33
2001	17,962	3.42	1.50	0.0079	0.0026	4.57%	0.85	6.81	7.86
2002	17,720	4.86	2.30	0.0082	0.0021	7.97%	1.06	7.62	7.42
2003	17,349	5.89	1.26	0.0063	0.0013	8.26%	1.35	10.85	8.06
2004	17,960	7.20	1.24	0.0057	0.0009	12.01%	1.62	13.96	10.10
2005	18,063	8.73	1.28	0.0059	0.0008	15.08%	1.75	14.99	9.34
2006	18,667	9.29	1.36	0.0056	0.0007	13.81%	1.89	16.17	8.69
2007	18,981	7.89	1.33	0.0061	0.0009	15.63%	1.79	16.00	9.38
2008	19,348	6.41	1.67	0.0101	0.0030	8.33%	1.46	12.86	8.50
2009	18,212	6.47	1.98	0.0118	0.0031	7.52%	1.48	12.72	9.75
2010	18,058	7.96	1.32	0.0057	0.0010	12.06%	1.71	13.81	9.75
2011	17,575	9.40	1.54	0.0062	0.0009	12.45%	1.80	14.03	9.00
2012	17,063	10.00	1.39	0.0061	0.0009	13.92%	1.79	13.41	8.17
2013	16,809	10.28	2.32	0.0059	0.0007	14.79%	1.86	14.79	9.98
2014	16,730	10.29	1.93	0.0052	0.0008	14.13%	1.89	15.18	12.95
2015	17,794	10.85	1.53	0.0083	0.0011	13.29%	1.87	15.04	15.22
2016	17,490	11.70	1.89	0.0100	0.0012	13.01%	1.94	15.31	11.68
All Years	323,060	7.59	1.56	0.0072	0.0015	10.82%	1.54	12.68	9.80

Nobs is the number of observations with data for *USTAT*. *USTAT* is the mean one-day U-statistic using dates adjusted for after-hours announcements based on time stamps. *Null - P99* is the 99th percentile of the mean of *USTAT* drawn from the non-announcement period. *USTAT_NM* and *USTAT_DN* are the numerator and denominator of *USTAT* respectively. *ADJ R^2* is the estimated adjusted R^2 from the quarterly regression of calendar-quarter returns on one-day quarterly earnings announcement returns. The number of observations for *ADJ R^2* is 319,385. *AVOL* is the mean one-day abnormal trading volume using dates adjusted for after-hours announcements based on time stamps. The number of observations for *AVOL* is 322,981. *AVOL_NM* and *AVOL_DN* are the numerator and denominator of *AVOL* respectively.

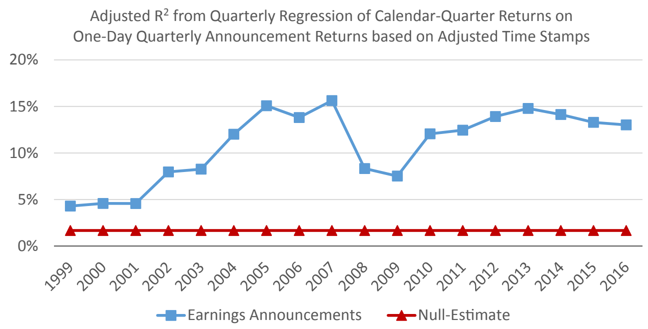

Fig. 2. The Adjusted R^2 values ("*ADJR*^{2}") from quarterly regressions of calendar-quarter returns on one-day quarterly announcement returns (adjusted for after-hours announcements) are plotted on the Y-axis. Firm-quarters with daily return data available for fewer than 60 trading days are excluded. The event sample includes 319,385 actual quarterly earnings announcements. The *Null -Estimate* for the Adjusted R^2 value is 1.67%, assuming every day in the quarter is equally like to explain variation in the quarterly return. Table 1 describes the adjustment for after-hours announcements using time stamps.

returns and three-day announcement returns. Interestingly, the adjusted R^2 measure declines slightly in 2013–2016, in contrast to the increase in *USTAT* over those years.[14]

5.1.2. Abnormal volume

Panel A of Fig. 3 shows the behavior of abnormal trading volume at earnings announcements in event time. Most notably, there is a significant day 0 impact after the adjustment of after-hours earnings announcements. Panel B of Fig. 3 shows the behavior of abnormal trading volume at earnings announcements by calendar year. The figure in Panel B displays evidence that earnings announcements convey more information than would be expected under the null in each of the years from 1999 through 2016. Furthermore, the intertemporal trend of *AVOL* is generally similar to that of *USTAT*, exhibiting a substantial increase beginning in 2002, a decrease in 2008 and 2009, and an increase in 2010 through 2016.

[14] We have no explanation for why the adjusted R^2 declines in 2013–2016 when the USTAT increases.

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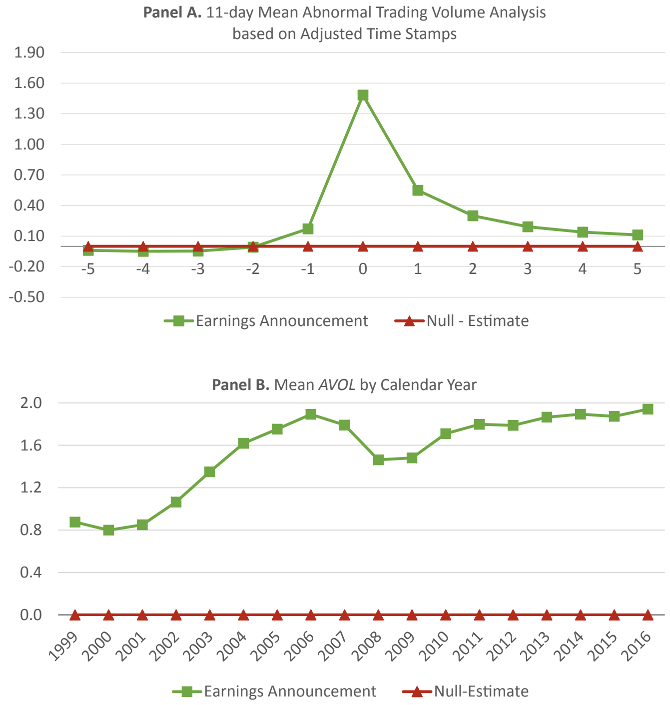

Fig. 3. The graph in Panel A plots the mean of abnormal trading volume over the 11-day window centered around earnings announcement days (adjusted for after-hours announcements). The earnings announcement sample includes 322,981 actual quarterly earnings announcements. The *Null-Estimate* sample is the mean of abnormal trading volume if earnings do not have information content. The graph in Panel B plots the mean information content of earnings announcements, the abnormal trading volume on earnings announcement dates adjusted for after-hours announcements ("*AVOL*"), by calendar year. The *Null-Estimate* is the expected value of *AVOL* if earnings announcements do not have information content. Table 1 describes the adjustment for after-hours announcements using time stamps.

5.2. Components of USTAT and AVOL

To provide insight into the factors contributing to the intertemporal change in the *USTAT* ratio, we decompose *USTAT* into its numerator, *USTAT_NM*, and denominator, *USTAT_DN*.[15] Table 2 and Fig. 4 Panel A present the mean of the numerator and the denominator by calendar year. The figure illustrates general co-movement between the numerator and denominator, with the most significant exception in years 2015–2016 as *USTAT_NM* ticks up more rapidly than *USTAT_DN*. The substantial increase in the *USTAT* ratio over 1999–2016 occurs with a number of different patterns in the components, including a decline in the numerator and denominator from 2000 to 2006, a relatively flat numerator along with decline in the denominator in 2010–2013 and a proportionately greater increase in the numerator than denominator in 2014–2016.

Table 2 and Fig. 4 Panel B present the mean of the numerator and the denominator of *AVOL* by calendar year. In contrast to the general decline we observe for *USTAT_DN*, we observe a decline in *AVOL_DN* from 1999 to 2002, a relatively flat pattern until it increases in 2013, followed by a decline in 2016. The numerator *AVOL_NM* exhibits a substantial increase after 2001, dips in 2008–2009 and then shows a more moderate increase for the rest of the sample period. Hence, the general increase in *AVOL* is not driven solely by a decline in *AVOL_DN*. For both *USTAT* and *AVOL*, the analysis of components underscores that we are conducting a relative comparison, and that the general increase over the sample period reflects changes in return variability and volume at earnings announcements that are proportionately greater than the changes in return variability and volume in non-announcement windows.

[15] We present the average of *USTAT_NM* and *USTAT_DN* for descriptive purposes, and note that the average of a ratio is not equal to the ratio of the averages.

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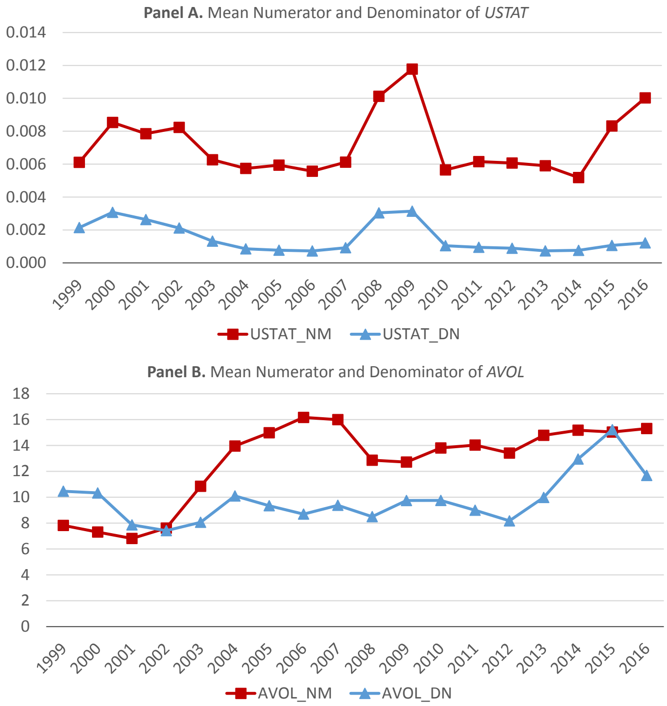

Fig. 4. The graph in Panel A plots the mean *USTAT_NM* and *USTAT_DN* of 323,060 quarterly earnings announcements. *USTAT_NM* is the squared residual return on the date of earnings announcement and the numerator of *USTAT. USTAT_DN* is the variance of residual returns during the non-announcement period and the denominator of *USTAT.* The graph in Panel A plots the mean *AVOL_NM* and *AVOL_DN* of 322,981 quarterly earnings announcements. *AVOL_NM* is the standardized shares-outstanding scaled trading volume on the date of earnings announcement and the numerator of *AVOL. AVOL_DN* is the standard deviation of shares-outstanding scaled volume in the non-announcement period and the denominator of *AVOL.*

5.3. Concurrent disclosure variables

In this section, we examine the ability of management guidance, analyst forecasts and disclosed financial statement items to explain the differences in *USTAT.* We present a series of figures that illustrate the differences over time. This form of presentation permits us to examine cross-sectional differences, holding time constant, and time series differences holding the cross-sectional variable constant. The subsequent section reports the findings of multivariate analysis that includes all of the disclosure variables along with additional control variables.

5.3.1. Management guidance

Consistent with findings by Anilowski et al. (2007) and Rogers and Van Buskirk (2013) for earlier sample periods, the percentage of earnings announcements with concurrent management forecasts increases from less than 3% in 1999 to 36% in 2016, as reported in Fig. 5 Panel A. Fig. 5 Panel B shows that the mean *USTAT* for earnings announcements with bundled management guidance is greater than the mean *USTAT* for earnings announcements without concurrent management guidance in each of the 18 years. These findings indicate that guidance either adds to the informativeness of earnings announcements, is issued selectively with more informative earnings announcements, or affects investors' inferences through some other mechanism. We note that the relative market response to stand-alone earnings announcements without guidance exhibits the same pattern of increases and decreases as earnings announcements with guidance. The increase in guidance over the sample period is thus not the sole factor contributing to the increase in *USTAT* at earnings announcements.

5.3.2. Analyst forecasts

The percentage of concurrent analyst forecasts increases over time from 34% in 1999 to 70% in 2016 as shown in Fig. 6 Panel A. Fig. 6 Panel B shows that the mean *USTAT* values for earnings announcements bundled with analyst forecasts are greater than those for stand-alone earnings announcements in each of the 18 years. However, similar to our findings for guidance, the mean *USTAT* of stand-alone earnings announcements also exhibits an increasing pattern, indicating the increased frequency of analyst forecasts is not the sole explanation for this pattern.

5.3.3. Financial statement line items

Fig. 7 Panel A displays the percentage of financial statement items disclosed in earnings announcements over time. The percentage of total financial statement items ("*FS*") increases from 22% in 1999 to 57% in 2016. The percentages of income statement items ("*IS*"), balance sheet items ("*BS*"), and cash flow statement items ("*SCF*") increase from 58%, 26%, and 0.5% in

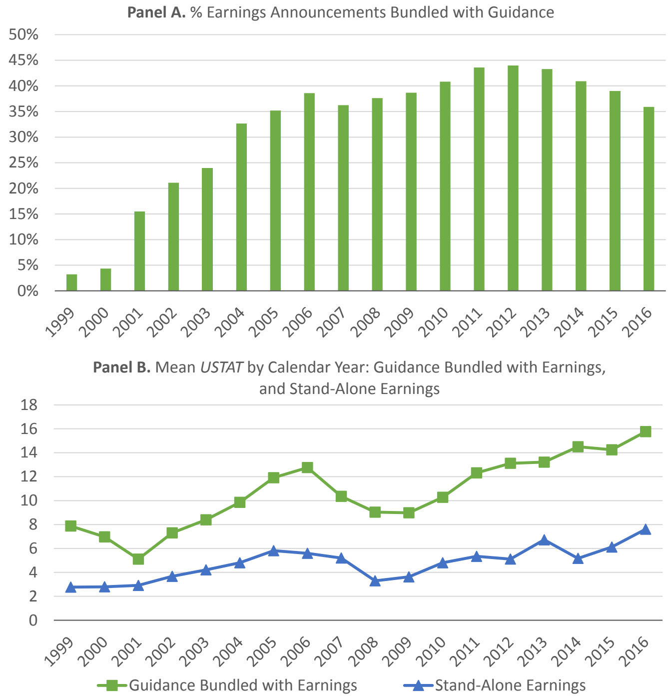

Fig. 5. The graph in Panel A plots the % of earnings announcements that are bundled with management guidance. The graph in Panel B plots the mean information content of two portfolios: the Guidance Bundled with Earnings portfolio includes management guidance issued on the same day as earnings announcements; the Stand-Alone Earnings portfolio includes earnings announcements without concurrent management guidance or analyst forecasts. The underlying numbers are reported in Table 7 Panel A.

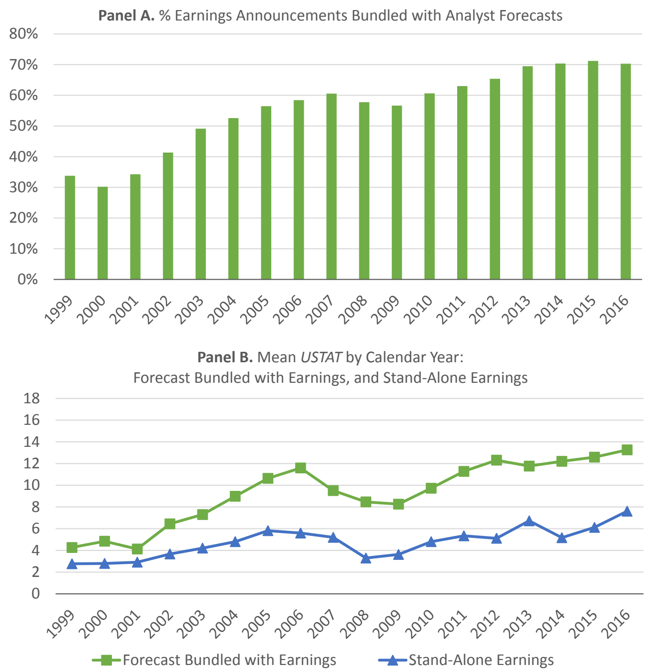

Fig. 6. The graph in Panel A plots the % of earnings announcements that are bundled with analyst forecasts. The graph in Panel B plots the mean information content of two portfolios: the Forecasts Bundled with Earnings portfolio includes all analyst forecasts issued concurrent with earnings; the Stand-Alone Earnings portfolio includes earnings announcements without concurrent management guidance or analyst forecasts. The underlying numbers are reported in Table 7 Panel B.

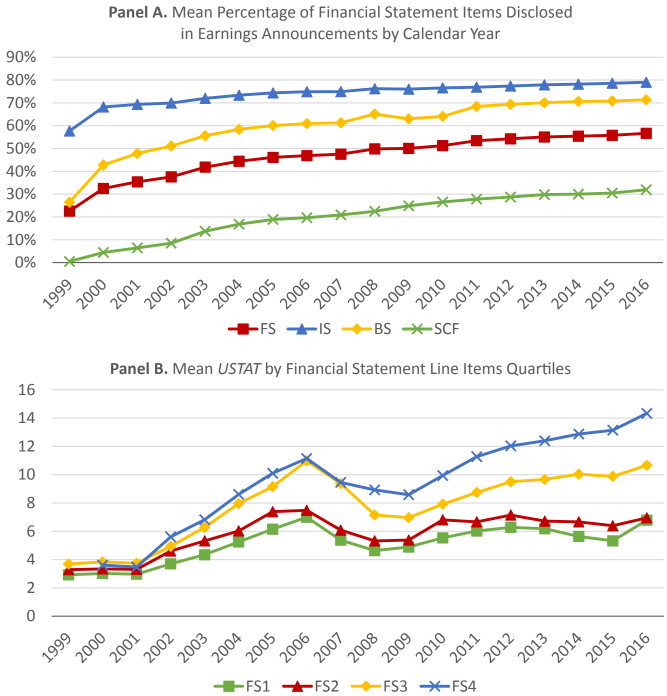

Fig. 7. The graph in Panel A plots the percentage of Financial Statement Line Items (FS), Income Statement line items (IS), Balance Sheet line items (BS), and Statement of Cash Flow line items (SCF) released in 248,412 earnings announcements with available data from Compustat Snapshot. The graph in Panel B plots the mean information content of earnings announcements, ***USTAT,*** by FS Quartiles. For the pooled sample, we assign firm-quarters with the lowest percentage of Financial Statement line items to quartile 1 (FS1) and firm-quarters with the highest percentage of Financial Statement line items to quartile 4 (FS4). No observation is assigned to FS4 in 1999. Appendix 2 provides details on the Financial Statement line items included.

1999 to 79%, 71%, and 32% in 2016, respectively. The data indicate firms are disclosing more financial statement line items in earnings announcements over time.

Fig. 7 Panel B presents a description of mean *USTAT* values by *FS* quartiles and calendar year. For the pooled sample, we assign firm-quarters with the lowest *FS* to quartile 1 and firm-quarters with the highest *FS* to quartile 4. The figures show that firm-quarters with greater *FS* have greater mean *USTAT* values than firm-quarters with lower *FS* in each of the 18 years. The findings indicate greater disclosure of financial statement items is a factor in the increase in market response to earnings over time. However, given the lowest quartile exhibits a similar though less pronounced pattern of increase and decline, the findings suggest these disclosures are at most a partial explanation for the increase in *USTAT.* Furthermore, the percentage of financial statement items is only slightly increasing between 2006 and 2011, whereas the *USTAT* shows a significant decline and then increase in these years.

5.4. Multivariate regression results

We next assess the incremental association of these variables to each other and to control variables using multivariate analysis. Table 3 reports the descriptive statistics on variables included in the multivariate model, and Pearson and Spearman correlations for the variables in the regressions. The descriptive statistics in Panel A document that the mean 1-day *USTAT* is 7.73, and the median is 1.77; both the mean and median are greater than the hypothetical null value of 1 and the 99th percentile of the null distribution, 1.56. Concurrent management guidance and analyst forecasts are released in 41% and 70% of the firm-quarters, respectively, and 47% of financial statement line items are disclosed.

The correlations in Panel B reveal several interesting patterns. The Pearson correlation between *USTAT* and *AVOL* is 0.649, indicating significant association between our primary measures of market response. The association between *USTAT* and $ADJR^2$ is significantly positive but weaker, reflecting the fact that $ADJR^2$ is measured at the quarterly level.[16] The Pearson correlation of 0.666 between *USTAT* and *USTAT_NM* is substantially greater in magnitude than the −0.117 correlation with *USTAT_DN*. This pattern is even more striking for *AVOL*, where the correlation with *AVOL_NM* is *0.737* and the correlation with *AVOL_DN* is −0.018. *USTAT* is positively associated with *T* (0.164), *GUIDANCE* (0.167), *AF* (0.154), *FS* (0.158), *IS* (0.118), *BS* (0.124), and *SCF* (0.136). In addition, *GUIDANCE* is positively associated with *AF* (0.273) and with *FS* (0.286), which indicates that

[16] The Pearson correlation between the mean quarterly *USTAT* and $ADJR^2$ is 0.703.

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Table 3
Panel A: Descriptive statistics.

Variable Name	Nobs	P1	P25	Mean	Median	P75	P99	Standard Deviation
USTAT	203,127	0.00	0.31	7.73	1.77	7.35	92.43	15.29
USTAT_DN	203,127	0.00	0.00	0.00	0.00	0.00	0.01	0.00
USTAT_NM	203,127	0.00	0.00	0.01	0.00	0.00	0.08	0.01
AVOL	203,127	−0.75	0.02	1.69	0.86	2.43	13.33	2.52
AVOL_DN	203,127	−8.58	0.07	13.55	4.21	15.46	155.66	25.86
AVOL_NM	203,127	0.68	2.98	8.40	5.44	10.13	55.07	9.07
ADJR^2	203,127	0.03	0.10	0.14	0.16	0.19	0.27	0.06
T	203,127	1.00	4.00	9.00	9.00	13.00	18.00	5.23
GUIDANCE	203,127	0.00	0.00	0.41	0.00	1.00	1.00	0.49
AF	203,127	0.00	0.00	0.70	1.00	1.00	1.00	0.46
FS	203,127	0.05	0.30	0.47	0.44	0.64	0.91	0.24
IS	203,127	0.18	0.71	0.75	0.76	0.88	0.94	0.16
BS	203,127	0.00	0.36	0.60	0.71	0.89	0.96	0.32
SCF	203,127	0.00	0.00	0.21	0.00	0.53	0.91	0.34
ABSFE_ST	203,127	0.00	0.00	0.01	0.00	0.01	0.16	0.02

Panel B: Correlation Matrix

Variable Name	*USTAT*	*USTAT_DN*	*USTAT_NM*	*AVOL*	*AVOL_DN*	*AVOL_NM*	*ADJR*^{2}	*T*	*GUIDANCE*	*AF*	*FS*	*IS*	*BS*	*SCF*	*ABSFE_ST*
USTAT	1.000	**−0.117**	**0.666**	**0.649**	−0.003	**0.500**	**0.154**	**0.164**	**0.167**	**0.155**	**0.158**	**0.118**	**0.124**	**0.136**	**−0.029**
USTAT_DN	**−0.137**	1.000	**0.256**	**−0.134**	**0.404**	0.016	**−0.371**	**−0.295**	**−0.212**	**−0.166**	**−0.109**	**−0.049**	**−0.037**	**−0.143**	**0.424**
USTAT_NM	**0.866**	**0.334**	1.000	**0.468**	**0.186**	**0.537**	**−0.050**	−0.012	**0.033**	**0.053**	**0.072**	**0.073**	**0.089**	**0.031**	**0.151**
AVOL	**0.579**	**−0.161**	**0.456**	1.000	**−0.018**	**0.737**	**0.155**	**0.159**	**0.226**	**0.216**	**0.184**	**0.142**	**0.143**	**0.159**	**−0.049**
AVOL_DN	**0.061**	**0.447**	**0.272**	**0.080**	1.000	**0.355**	**−0.019**	**−0.020**	0.003	**0.085**	**0.047**	**0.071**	**0.072**	0.002	**0.119**
AVOL_NM	**0.539**	**−0.025**	**0.488**	**0.910**	**0.323**	1.000	**0.107**	**0.102**	**0.179**	**0.193**	**0.161**	**0.135**	**0.147**	**0.118**	−0.005
ADJR^2	**0.171**	**−0.424**	**−0.041**	**0.185**	**0.001**	**0.168**	1.000	**0.749**	**0.290**	**0.304**	**0.328**	**0.260**	**0.287**	**0.254**	**−0.073**
T	**0.197**	**−0.370**	0.009	**0.219**	0.008	**0.199**	**0.704**	1.000	**0.301**	**0.319**	**0.384**	**0.294**	**0.333**	**0.303**	**−0.012**
GUIDANCE	**0.207**	**−0.224**	**0.085**	**0.294**	**0.076**	**0.291**	**0.264**	**0.306**	1.000	**0.273**	**0.286**	**0.231**	**0.194**	**0.268**	**−0.106**
AF	**0.208**	**−0.172**	**0.109**	**0.295**	**0.150**	**0.306**	**0.282**	**0.323**	**0.273**	1.000	**0.246**	**0.218**	**0.204**	**0.194**	**−0.130**
FS	**0.183**	**−0.070**	**0.136**	**0.233**	**0.128**	**0.245**	**0.298**	**0.385**	**0.284**	**0.248**	1.000	**0.619**	**0.827**	**0.861**	**−0.034**
IS	**0.142**	−0.006	**0.127**	**0.187**	**0.142**	**0.204**	**0.218**	**0.278**	**0.245**	**0.196**	**0.620**	1.000	**0.512**	**0.381**	−0.010
BS	**0.151**	−0.002	**0.140**	**0.185**	**0.140**	**0.207**	**0.255**	**0.342**	**0.206**	**0.205**	**0.900**	**0.483**	1.000	**0.448**	−0.008
SCF	**0.160**	**−0.150**	**0.075**	**0.212**	**0.047**	**0.203**	**0.259**	**0.340**	**0.285**	**0.205**	**0.755**	**0.467**	**0.485**	1.000	**−0.048**
ABSFE_ST	**−0.020**	**0.332**	**0.141**	**−0.051**	**0.112**	**−0.027**	**−0.025**	**0.042**	**−0.114**	**−0.128**	−0.003	0.017	**0.023**	**−0.034**	1.000

The sample comprises 203,127 firm-quarters in the COMPUSTAT North America database with time stamps from Bloomberg, IBES, or RavenPack and variables available for our multivariate regression analysis. See Table 1 for sample summary. Panel A presents distributional statistics for the primary variables in our analyses. Panel B presents the Pearson and Spearman correlations among these variables.

concurrent management guidance is more likely to be associated with concurrent analyst forecasts and greater reporting of disaggregated financial statement line items.

Table 4 presents the main results for the multivariate *USTAT* regressions, and shows that the relationships reported for the bivariate analyses are preserved. For each of the models, the coefficients on control variables are as expected: the coefficients on *NUMESTQ*, *NONDEC31* and *ABSFE_ST* are significantly positive and the coefficients on *LOSS* and *FIN* are significantly negative, consistent with Beaver, McNichols and Wang (2018a).

The estimation results for Model 1 confirm a significant positive association between *T* and *USTAT* (coefficient 0.480, t-stat 12.96), consistent with the general trend in the figures. After including the control variables in Model 2, the positive association between *T* and *USTAT* remains significant (coefficient 0.484, t-stat 14.87).

When *GUIDANCE* is included in Model 3, we see a significant positive relation between *USTAT* and *GUIDANCE* (coefficient 2.783, t-stat 9.68). Consistent with the bivariate relationship presented in Fig. 5, the market response to earnings announcements for Guidance firms is significantly greater than for No-Guidance firms. Furthermore, the coefficient on *T* declines from 0.484 to 0.409, indicating guidance partially explains the increasing time trend in *USTAT*. This may occur because guidance adds to the information investors learn at earnings announcements, or because guidance tends to occur when there is more information in the earnings press release.

When *AF* is included in Model 4, we see a significant positive relation between *USTAT* and *AF* (coefficient 2.866, t-stat 9.62). Consistent with the bivariate relationship presented in Fig. 6, the market response to earnings announcements for firm-quarters with concurrent analyst forecasts is significantly greater than for firm-quarters with no concurrent analyst forecasts. The coefficient on *T* decreases from 0.484 to 0.416 with the addition of *AF* to Model 2, our base for comparison.

The specifications in Models 5 and 6 examine the explanatory power of concurrently disclosed financial statement items. In Model 5, we see a positive association between *USTAT* and *FS* (coefficient 5.225, t-stat 9.69). In Model 6, we see positive associations between *USTAT* and % of financial statement items in each of three financial statements (*IS*: coefficient 2.469,

Table 4
Regression of *USTAT* on concurrent information and additional explanatory variables.

Model	1	2	3	4	5	6	7	8
Intercept	3.414***	2.892***	3.044***	2.215***	1.197**	0.181	1.068***	0.544
	6.64	4.24	5.27	4.77	2.26	0.31	2.72	0.82
T	0.480***	0.484***	0.409***	0.416***	0.387***	0.382***	0.284***	0.282***
	12.96	14.87	16.56	13.81	12.67	11.48	10.56	10.00
GUIDANCE			2.783***				2.323***	2.320***
			9.68				8.98	8.9
AF				2.866***			2.422***	2.395***
				9.62			9.28	10.05
FS					5.225***		4.252***	
					9.70		8.19	
IS						2.469***		1.571**
						3.35		2.52
BS						2.059***		1.689***
						5.01		4.4
SCF						1.607***		1.437***
						3.67		3.65
LCV		0.095	−0.004	0.031	0.107*	0.123*	−0.032	−0.021
		1.43	−0.07	0.50	1.70	1.74	−0.54	−0.33
NUMESTQ		0.144***	0.123***	0.085***	0.126***	0.125***	0.062***	0.062***
		7.75	6.23	3.92	7.27	7.17	2.94	2.94
LOSS		−2.575***	−2.320***	−2.733***	−2.529***	−2.562***	−2.458***	−2.476***
		−8.81	−8.25	−9.92	−9.75	−9.38	−10.16	−9.72
FIN		−3.414***	−2.557***	−3.146***	−2.672***	−2.656***	−1.868***	−1.872***
		−9.55	−8.34	−9.34	−9.73	−9.49	−8.00	−7.77
LAG		−0.016**	−0.015**	−0.012	−0.015*	−0.015*	−0.01	−0.01
		−2.17	−2.12	−1.63	−1.89	−1.89	−1.45	−1.44
NONDEC31		1.707***	1.552***	1.642***	1.610***	1.612***	1.444***	1.444***
		6.55	6.27	6.30	6.40	6.38	5.97	5.96
ABSFE_ST		10.487***	11.455***	14.343***	11.176***	11.398***	15.115***	15.222***
		3.40	3.48	4.26	3.53	3.52	4.14	4.10
Adj R^2	2.69%	4.82%	5.45%	5.39%	5.35%	5.38%	6.25%	6.26%
Nobs	203,127	203,127	203,127	203,127	203,127	203,127	203,127	203,127

The sample comprises all firms in the COMPUSTAT North America database with time stamps from Bloomberg, IBES, or RavenPack. The dependent variable is the one-day U-statistic (*USTAT*). *T* is a trend variable that takes on a value from 1 to 18 for calendar years 1999–2016. *GUIDANCE* is an indicator variable equal to 1 if management guidance is issued on the day earnings are announced and 0 otherwise. *AF* is an indicator variable that is equal to 1 if any analyst issues her forecast on the day earnings are announced and 0 otherwise. *FS* is the percentage of financial statement items disclosed in the earnings announcement. *IS [BS] {SCF}* is the percentage of income statement [balance sheet] {cash flow statement} items disclosed in the earnings announcement. Please refer to Appendix 2 for details on the line items included. *LCV* is the natural log of market capitalization. *NUMESTQ* is the number of analysts forecasting quarterly earnings at fiscal quarter end. *FIN* is an indicator variable that is equal to 1 if a firm has an SIC code between 6000 and 6999 and 0 otherwise. *LOSS* is an indicator variable that is equal to 1 if *PTEBS*, Pre-Tax Earnings Before Special Items, is negative and 0 otherwise. *LAG* is the number of days after the end of the fiscal quarter that earnings are announced. *NONDEC31* is an indicator variable equal to 1 for firm-quarters with Non-Dec31 fiscal year end and 0 otherwise. *ABSFE_ST* is the absolute value of the difference between IBES realized earnings and the fiscal-quarter-end median analyst forecast, scaled by price.. We winsorize variables at 1% and 99% and estimate ordinary least squares regressions. *** [**](*) refers to significance at the 1% [5%](10%) level. Following Gow et al. (2012), we cluster standard errors by firm and calendar year.

t-stat 3.35; *BS*: coefficient 2.056, t-stat 5.01; *SCF*: coefficient 1.607, t-stat 3.67). Consistent with the bivariate relationship presented in Fig. 7, the price response to earnings announcements is positively associated with the percentage of financial statement line items disclosed in earnings announcements. Furthermore, the inclusion of financial statement items in Models 5 and 6 coincides with a decrease in the coefficient on *T*, which reflects the time trend in *USTAT*. These findings indicate the increase in financial statement line item disclosure is associated with increased price response to earnings announcements. These findings are consistent with the findings of Francis, Schipper and Vincent (2002a) on the significance of detailed income statements and statements of cash flows and complement the findings in Francis and Schipper (1999), Collins et al. (2009), and Barth et al. (2018) on the increasing role of balance sheet information in explaining share price revisions.

When all the variables are included in Models 7 and 8, the relationships observed in Models 3–6 are preserved. In Model 7, having concurrent management guidance (analyst forecast) is associated with a 2.323 (2.422) increase in *USTAT*. A one-standard deviation (0.24) increase in *FS* is associated with a 1.02 (0.24*4.251) increase in *USTAT*. A firm-quarter observation with concurrent guidance and analyst forecasts, and financial statement line item disclosures one standard deviation above average would be predicted to have a *USTAT* that is greater by 5.765 than that of a firm with no concurrent guidance or forecast, and average financial statement line item disclosures. A 5.765 increase in *USTAT* reflects an increase in relative squared return variability comparable to what would be experienced on an additional 5.765 non-earnings days. These metrics suggest the effects we are documenting are economically as well as statistically significant.

The coefficient on *T* remains significantly positive (Model 7 coefficient 0.284, t-stat 10.55; Model 8 coefficient 0.282, t-stat 9.99), but is now 58% of the coefficient observed in Model 2 (0.484). The disclosure of management guidance, analyst forecasts and financial statement line items explains 42% of the increase in *USTAT* over our sample period. This may reflect the

Table 5
Regression of *USTAT* numerator on *USTAT* denominator, concurrent information and explanatory variables.

Model	1	2	3	4	5	6	7	8
Intercept	1.616***	4.944***	4.927***	4.392***	3.785***	2.320***	3.499***	2.419***
	8.66	6.09	6.74	6.99	5.32	5.02	7.02	7.33
T	0.164***	0.178***	0.137***	0.119***	0.112***	0.102***	0.040*	0.034
	7.32	7.88	7.12	5.75	6.18	5.44	1.67	1.38
GUIDANCE			1.612***				1.249***	1.247***
			12.54				10.98	10.79
AF				2.450***			2.181***	2.105***
				12.88			11.45	10.94
FS					3.565***		2.894***	
					11.98		10.31	
IS						2.134***		1.488***
						4.42		3.26
BS						2.242***		1.950***
						10.57		9.99
SCF						0.164		0.098
						0.65		0.40
LCV		−0.557***	−0.606***	−0.614***	−0.548***	−0.509***	−0.639***	−0.602***
		−5.83	−6.22	−7.62	−6.01	−5.85	−8.00	−7.83
NUMESTQ		0.128***	0.115***	0.077***	0.116***	0.115***	0.063***	0.064***
		8.39	7.47	5.19	7.83	7.86	4.36	4.51
LOSS		−0.816***	−0.706***	−0.941***	−0.786***	−0.842***	−0.817***	−0.862***
		−3.30	−2.85	−3.86	−3.30	−3.48	−3.44	−3.57
FIN		−2.308***	−1.801***	−2.082***	−1.801***	−1.888***	−1.302***	−1.400***
		−10.68	−9.18	−9.99	−9.79	−10.62	−7.89	−8.40
LAG		−0.005	−0.005	−0.002	−0.005	−0.003	−0.001	0.001
		−1.22	−1.11	−0.40	−1.06	−0.72	−0.28	0.01
NONDEC31		0.897***	0.810***	0.840***	0.830***	0.809***	0.726***	0.705***
		7.65	6.88	7.48	7.16	7.14	6.48	6.41
ABSFE_ST		26.816***	26.650***	30.295***	27.269***	28.363***	30.153***	31.002***
		5.30	5.31	6.29	5.43	5.71	6.30	6.54
*1000*USTAT_DN*	2.142***	1.855***	1.893***	1.846***	1.856***	1.834***	1.877***	1.858***
	17.32	26.90	27.16	24.98	27.01	27.20	24.47	24.53
Adj R^2	7.01%	8.26%	8.59%	8.90%	8.65%	8.78%	9.39%	9.49%
NOBS	203,127	203,127	203,127	203,127	203,127	203,127	203,127	203,127

The sample comprises all firms in the COMPUSTAT North America database with time stamps from Bloomberg, IBES, or RavenPack. The dependent variable is 1000 times the numerator of the one-day U-statistic *USTAT_NM*. *USTAT_DN* is the denominator of *USTAT*. *T* is a trend variable that takes on a value from 1 to 18 for calendar years 1999−2016. *GUIDANCE* is an indicator variable equal to 1 if management guidance is issued on the day earnings are announced and 0 otherwise. *AF* is an indicator variable that is equal to 1 if any analyst issues her forecast on the day earnings are announced and 0 otherwise. *FS* is the percentage of financial statement items disclosed in the earnings announcement. *IS [BS] {SCF}* is the percentage of income statement [balance sheet] {cash flow statement} items disclosed in the earnings announcement. Please refer to Appendix 2 for details on the line items included. *LCV* is the natural log of market capitalization. *NUMESTQ* is the number of analysts forecasting quarterly earnings at fiscal quarter end. *FIN* is an indicator variable that is equal to 1 if a firm has an SIC code between 6000 and 6999 and 0 otherwise. *LOSS* is an indicator variable that is equal to 1 if *PTEBS*, Pre-Tax Earnings Before Special Items, is negative and 0 otherwise. *LAG* is the number of days after the end of the fiscal quarter that earnings are announced. *NONDEC31* is an indicator variable equal to 1 for firm-quarters with Non-Dec31 fiscal year end and 0 otherwise. *ABSFE_ST* is the absolute value of the difference between IBES realized earnings and the fiscal-quarter-end median analyst forecast, scaled by price. We winsorize variables at 1% and 99% and estimate ordinary least squares regressions. *** [**](*) refers to significance at the 1% [5%](10%) level. Following Gow et al. (2012), we cluster standard errors by firm and calendar year.

additional information these disclosures provide directly, or investors' inferences about what these disclosures imply for managers' and analysts' underlying information.

Table 5 presents estimation results for the above models where the dependent variable is the numerator of *USTAT*, *USTAT_NM*. These specifications include *USTAT_DN* as an explanatory variable, and therefore allow the relation between the numerator and denominator to include an intercept and to have a coefficient different from one. This allows us to control directly for the effect of the denominator of *USTAT* in our analysis, and to examine whether the pattern we document for *USTAT* remains after controlling for variation in the magnitude of the denominator.

For the specification in Model 1, there is a significant positive association between *T* and *USTAT_NM* (coefficient 0.164, t-stat 7.32), consistent with the findings in Table 4 for *USTAT*. The coefficient on *USTAT_DN* is 2.14, and highly significant (t-stat 17.32). The findings indicate that without further controls, the announcement effect is on average double the magnitude of squared price revision in the non-announcement period. After including the control variables in Model 2, the positive association between *T* and *USTAT* remains significant (coefficient 0.178, t-stat 7.88).

The estimation results in Models 3,4 and 5 show that as we include *GUIDANCE*, *AF* and *FS*, each has significant explanatory power for *USTAT_NM*. Furthermore, as each concurrent disclosure variable is included, the coefficient on *T* is reduced, indicating these variables have explanatory power for the time trend in the numerator of *USTAT*.

The specification in Model 6 examines the explanatory power of line items from each concurrently disclosed financial statement. Although the coefficients on *IS* and *BS* are positive and significant when all three *FS* components are included, the

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Table 6
Regression of *AVOL* and *AVOL_NM* on concurrent information and additional explanatory variables.

Model	1	2	3	4	5	6	7	8
Dependent Variable	*AVOL*	*AVOL*	*AVOL*	*AVOL*	*AVOL_NM*	*AVOL_NM*	*AVOL_NM*	*AVOL_NM*
Intercept	1.003***	0.427**	0.088	−0.089	0.139	0.674	−2.033**	−3.922***
	7.54	2.50	0.84	−0.70	0.2	0.46	−2.36	−5.42
T	0.077***	0.068***	0.027***	0.026***	0.539***	0.479***	0.131***	0.121**
	7.52	7.09	5.11	4.57	5.40	5.22	2.89	2.38
GUIDANCE			0.531***	0.531***			4.675***	4.688***
			12.27	11.98			12.14	11.85
AF			0.533***	0.521***			3.978***	3.835***
			15.65	16.54			12.19	11.80
FS			0.749***				6.780***	
			10.99				9.86	
IS				0.307***				2.325**
				2.99				2.32
BS				0.401***				4.717***
				5.61				6.90
SCF				0.146**				0.444
				2.28				0.72
LCV		0.036**	0.007	0.013		−0.625***	−0.876***	−0.787***
		2.37	0.52	0.89		−4.05	−6.22	−5.71
NUMESTQ		0.065***	0.048***	0.048***		0.757***	0.620***	0.622***
		17.02	10.79	10.77		14.83	10.98	10.95
LOSS		−0.494***	−0.468***	−0.477***		−5.213***	−4.882***	−5.000***
		−9.75	−11.09	−10.95		−7.72	−7.89	−7.89
FIN		−0.746***	−0.427***	−0.440***		−5.399***	−2.669***	−2.943***
		−12.33	−10.07	−9.92		−13.69	−10.31	−10.83
LAG		0.002	0.003**	0.003**		0.004	0.014	0.017
		1.28	2.14	2.23		0.35	1.13	1.40
NONDEC31		0.464***	0.409***	0.406***		3.817***	3.343***	3.286***
		10.99	10.39	10.31		8.94	8.19	7.98
ABSFE_ST		1.959***	2.959***	3.030***		2.009	10.246	11.525
		2.72	3.67	3.69		0.26	1.31	1.46
AVOL_DN					1.018***	0.989***	0.970***	0.965***
					11.84	12.72	12.48	12.57
Adj R^2	2.53%	9.02%	11.37%	11.42%	13.80%	18.49%	20.06%	20.16%
Nobs	203,127	203,127	203,127	203,127	203,127	203,127	203,127	203,127

The sample comprises all firms in the COMPUSTAT North America database with time stamps from Bloomberg, IBES, or RavenPack. The dependent variable is the one-day abnormal trading volume (*AVOL*). *AVOL_NM* and *AVOL_DN* are the numerator and denominator of *AVOL*. *T* is a trend variable that takes on a value from 1 to 18 for calendar years 1999–2016. *GUIDANCE* is an indicator variable equal to 1 if management guidance is issued on the day earnings are announced and 0 otherwise. *AF* is an indicator variable that is equal to 1 if any analyst issues her forecast on the day earnings are announced and 0 otherwise. *FS* is the percentage of financial statement items disclosed in the earnings announcement. *IS [BS] {SCF}* is the percentage of income statement [balance sheet] {cash flow statement} items disclosed in the earnings announcement. Please refer to Appendix 2 for details on the line items included. *LCV* is the natural log of market capitalization. *NUMESTQ* is the number of analysts forecasting quarterly earnings at fiscal quarter end. *FIN* is an indicator variable that is equal to 1 if a firm has an SIC code between 6000 and 6999 and 0 otherwise. *LOSS* is an indicator variable that is equal to 1 if *PTEBS*, Pre-Tax Earnings Before Special Items, is negative and 0 otherwise. *LAG* is the number of days after the end of the fiscal quarter that earnings are announced. *NONDEC31* is an indicator variable equal to 1 for firm-quarters with Non-Dec31 fiscal year end and 0 otherwise. *ABSFE_ST* is the absolute value of the difference between IBES realized earnings and the fiscal-quarter-end median analyst forecast, scaled by price. We winsorize variables at 1% and 99% and estimate ordinary least squares regressions. *** [**](*) refers to significance at the 1% [5%](10%) level. Following Gow et al. (2012), we cluster standard errors by firm and calendar year.

coefficient on *SCF* is no longer significant.[17] The results for Models 7 and 8 show the significance of concurrent disclosures remains when all concurrent disclosures are included in the model. Furthermore, the estimation results for Models 7 and 8 show that when all concurrent disclosures are included, the coefficient on *T* decreases to 0.04 ($t = 1.67$) and 0.034 ($t = 1.38$). These results indicate that our findings are robust to variation in the denominator of *USTAT*, and that the substantial decline in *USTAT_DN* does not affect our conclusions.

Table 6 presents the related specifications for *AVOL* and *AVOL_NM* as dependent variables. For brevity, we present models 1, 2, 7 and 8 as specified in Tables 4 and 5 for each dependent variable. The findings indicate that similar to the *USTAT* regressions, inclusion of concurrent disclosure variables substantially reduces the coefficient on T, from 0.068 in Model 2 to 0.026 in Model 4, thus explaining 62% of the time trend in abnormal volume at earnings announcements. In the *AVOL* specifications, each of the concurrent disclosure variables, including line items from each financial statement, have significant explanatory power. The findings for *AVOL_DN* are very similar to those of *USTAT_DN* in Table 5. For the *AVOL_NM* specifications, the coefficient on the time trend decreases from 0.479 in Model 6 to 0.121 in Model 8 which includes our concurrent

[17] Untabulated findings document that the coefficients on *IS*, *BS* and *SCF* are positive and significant when entered individually into models 6 and 8.

Table 7
The information content of earnings announcements, management guidance and analyst forecasts.

Panel A: The information content of management guidance and earnings announcements.

	Guidance Bundled with Earnings		Stand-Alone Guidance		Stand-Alone Earnings		Guidance Bundled with Earnings as % of Earnings Anncemts	Stand-Alone Guidance as % of Guidance	Stand-Alone Earnings as % of Earnings Anncemts
Column	1	2	3	4	5	6	7	8	9
Year	Nobs	*USTAT*	Nobs	*USTAT*	Nobs	*USTAT*			
1999	558	7.88	3151	11.15	11,154	2.77	3.22%	84.96%	64.46%
2000	866	6.97	4206	9.66	13,511	2.80	4.34%	82.93%	67.64%
2001	2782	5.11	6523	5.37	10,580	2.91	15.49%	70.10%	58.90%
2002	3738	7.30	5860	7.57	9102	3.67	21.09%	61.05%	51.37%
2003	4150	8.39	4166	6.88	7734	4.21	23.92%	50.10%	44.58%
2004	5866	9.85	5410	7.69	7206	4.81	32.66%	47.98%	40.12%
2005	6355	11.91	5368	7.78	6633	5.82	35.18%	45.79%	36.72%
2006	7202	12.76	5407	7.74	6414	5.59	38.58%	42.88%	34.36%
2007	6879	10.35	4789	5.74	6315	5.20	36.24%	41.04%	33.27%
2008	7277	9.03	5085	4.74	6888	3.30	37.61%	41.13%	35.60%
2009	7043	8.98	4768	3.61	6587	3.63	38.67%	40.37%	36.17%
2010	7373	10.28	4862	3.77	5870	4.81	40.83%	39.74%	32.51%
2011	7660	12.32	4768	4.30	5138	5.34	43.58%	38.36%	29.23%
2012	7504	13.12	4866	4.99	4718	5.11	43.98%	39.34%	27.65%
2013	7276	13.22	4867	4.16	4222	6.72	43.29%	40.08%	25.12%
2014	6845	14.50	5071	4.94	4100	5.17	40.91%	42.56%	24.51%
2015	6939	14.25	4323	4.12	4235	6.12	39.00%	38.39%	23.80%
2016	6278	15.77	3601	4.50	4384	7.61	35.89%	36.45%	25.07%
All	102,591	11.45	87,091	5.97	124,791	4.35	31.76%	45.91%	38.63%

Panel B: The Information Content of Analyst Forecasts and Earnings Announcements.

	Forecast Bundled with Earnings		Stand-Alone Analyst Forecast		Stand-Alone Earnings		Forecasts Bundled with Earnings as % of Earnings Anncemts	Stand-Alone Analyst Forecast as % of Forecasts	Stand-Alone Earnings as % of Earnings Anncemts
Column	1	2	3	4	5	6	7	8	9
Year	Nobs	*USTAT*	Nobs	*USTAT*	Nobs	*USTAT*			
1999	5845	4.27	116,257	1.43	11,154	2.77	33.78%	95.21%	64.46%
2000	6032	4.84	100,167	1.64	13,511	2.80	30.20%	94.32%	67.64%
2001	6155	4.12	98,789	1.54	10,580	2.91	34.27%	94.13%	58.90%
2002	7325	6.45	98,466	1.73	9102	3.67	41.34%	93.08%	51.37%
2003	8524	7.30	95,871	1.63	7734	4.21	49.13%	91.83%	44.58%
2004	9442	8.98	99,346	1.93	7206	4.81	52.57%	91.32%	40.12%
2005	10,200	10.63	103,185	2.02	6633	5.82	56.47%	91.00%	36.72%
2006	10,904	11.59	100,150	2.13	6414	5.59	58.41%	90.18%	34.36%
2007	11,493	9.51	103,037	1.91	6315	5.20	60.55%	89.97%	33.27%
2008	11,175	8.46	115,239	1.90	6888	3.30	57.76%	91.16%	35.60%
2009	10,315	8.26	106,917	1.60	6587	3.63	56.64%	91.20%	36.17%
2010	10,951	9.73	112,809	1.67	5870	4.81	60.64%	91.15%	32.51%
2011	11,075	11.28	115,193	1.70	5138	5.34	63.02%	91.23%	29.23%
2012	11,155	12.31	115,398	1.71	4718	5.11	65.38%	91.19%	27.65%
2013	11,678	11.77	111,649	1.75	4222	6.72	69.47%	90.53%	25.12%
2014	11,769	12.21	114,944	1.97	4100	5.17	70.35%	90.71%	24.51%
2015	12,670	12.59	120,706	1.74	4235	6.12	71.20%	90.50%	23.80%
2016	12,296	13.26	116,705	1.90	4384	7.61	70.30%	90.47%	25.07%
All	179,004	9.89	1,944,828	1.77	124,791	4.35	55.41%	91.57%	38.63%

Panel A presents the mean one-day U-statistic (*USTAT*) of three portfolios: Guidance Bundled with Earnings, Stand-Alone Guidance, and Stand-Alone Earnings. The Guidance Bundled with Earnings portfolio includes management guidance issued on the same days earnings are announced. The Stand-Alone Guidance portfolio includes management guidance issued on days earnings are not announced. The Stand-Alone Earnings portfolio includes earnings announcements without either concurrent management guidance or concurrent analyst forecasts. The seventh column reports the ratio of the number of management guidance bundled with earnings announcements to the number of earnings announcements. The eighth column reports the ratio of the number of Stand-Alone Guidance to the number of management guidance. The ninth column reports the ratio of the number of Stand-Alone Earnings to the number of earnings announcements.

Panel B presents the mean one-day U-statistic (*USTAT*) of three portfolios: Forecasts Bundled with Earnings, Stand-Alone Analyst Forecast, and Stand-Alone Earnings. The Forecast Bundled with Earnings portfolio includes analyst forecasts issued on earnings announcement days. The Stand-Alone Analyst Forecast portfolio includes analyst forecasts issued on days when earnings are not announced. The Stand-Alone Earnings portfolio includes all earnings announcements without concurrent management guidance and concurrent analyst forecasts. The seventh column reports the ratio of the number of analyst forecasts bundled with earnings announcements to the number of earnings announcements. The eighth column reports the ratio of the number of Stand-Alone Analyst Forecast to the number of analyst forecasts. The ninth column reports the ratio of the number of Stand-Alone Earnings to the number of earnings announcements.

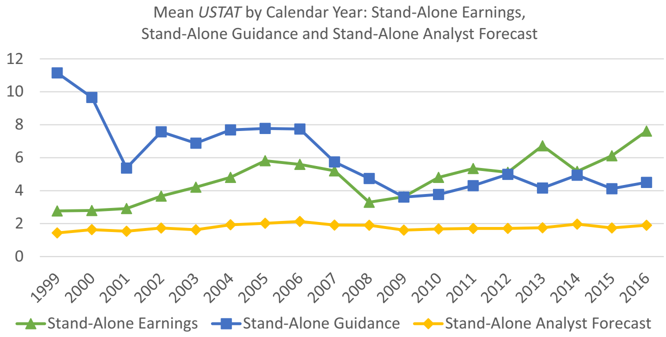

Fig. 8. This graph plots the mean information content of three portfolios: the Stand-Alone Earnings portfolio includes earnings announcements without concurrent management guidance or analyst forecasts; the Stand-Alone Guidance portfolio includes management guidance issued on days earnings are not announced; the Stand-Alone Analyst Forecast portfolio includes analyst forecasts issued on days when earnings are not announced. The underlying numbers are reported in Table 7 Panel A, B.

Table 8
The information content of earnings announcements, management guidance and analyst forecasts.

Regression of one-day information content on time trend interacted with indicator variables for stand-alone earnings, stand-alone guidance and stand-alone forecasts

Variable	*T*SE*	*T*SA*	*T*SG*	*SE*	*SA*	*SG*	*LCV*	ADJR^2	NOBS
Coefficient	0.204***	0.025***	−0.279***	5.512***	4.899***	11.839***	−0.232***	1.20%	2,156,710
t-stat	7.15	3.85	−4.02	13.38	14.18	12.94	−12.00		

Coefficient Comparison	F-stat	p-value
*T*SE = T*SA*	40.86	<0.001
*T*SE = T*SG*	48.12	<0.001

The sample comprises stand-alone earnings announcements, stand-alone guidance and stand-alone analyst forecasts. The dependent variable is the one-day U-statistic (*USTAT*). *T* is a trend variable that takes on a value from 1 to 18 for calendar years 1999–2016. *SE* is an indicator variable equal to 1 for all earnings announcements without concurrent management guidance and concurrent analyst forecasts and 0 otherwise. *SA* is an indicator variable equal to 1 for all analyst forecasts issued on days when earnings are not announced and 0 otherwise. *SG* is an indicator variable equal to 1 for all management guidance issued on days earnings are not announced and 0 otherwise. *LCV* is the natural log of market capitalization. *** [**](*) refers to significance at the 1% [5%](10%) level. Following Gow et al. (2012), we cluster standard errors by firm and calendar year.

disclosure variables, indicating concurrent guidance, analyst forecasts and financial statement line item disclosures explain approximately 75% of the time trend in this specification.

5.5. The market response to earnings releases, management guidance and analyst forecasts

Our final tests compare the market response to earnings announcements to the response to management guidance and analyst forecasts issued separately from earnings. Fig. 8 shows the mean *USTAT* for three portfolios: Stand-Alone Earnings, Stand-Alone Guidance and Stand-alone Analyst Forecasts.[18] Over our sample period from 1999 to 2016, we observe a substantially increased response to Stand-Alone Earnings, a decreased response to Stand-Alone Guidance, and a slightly increased response to Stand-Alone Analyst Forecasts.

Table 7 Panel A shows there has been a substantial decrease in the frequency of Stand-Alone Earnings and Stand-Alone Guidance over time, and an increase in the frequency of Guidance Bundled with Earnings. This is consistent with firms increasingly choosing to issue management guidance with earnings announcements rather than at other times. Surprisingly, the mean *USTAT* for Stand-Alone Guidance firm-years decreases over time, from 11.15 in 1999 to 4.50 in 2016. In contrast, the mean *USTAT* for Stand-Alone Earnings firm-years increases over time, from 2.77 in 1999 to 7.61 in 2016.

Table 7 Panel B shows an increase in the frequency of Forecasts Bundled with Earnings, along with a small decline in the frequency of Stand-Alone Forecasts and the more substantial decline in the frequency of Stand-Alone Earnings Announcements noted above. The total number of analyst forecast days is 2,123,832, more than six times the 323,060 earnings announcements. This greater frequency reflects the fact that multiple analysts can cover a single firm and analysts can update their beliefs between earnings announcements. The findings indicate the mean *USTAT* for Stand-Alone Forecasts increases from 1.43 to 1.90, a substantially smaller increase than that observed for the Stand-Alone Earnings sample.

[18] For these analyses, the Stand-Alone Earnings portfolio has neither management guidance nor analyst forecasts, so we exclude earnings issued with analyst forecasts (guidance) in the comparison to Stand-Alone Guidance (Stand-Alone Forecasts). For this reason, the sum of columns 1 and 5 do not total 100% of the available observations in the denominator in column 7.

The visual and numeric evidence suggests very different time trends for *USTAT* for Stand-Alone Earnings relative to that for Stand-Alone Guidance and Stand-Alone Analyst Forecasts. To assess the statistical significance of this pattern, we regress *USTAT* on indicators for Stand-Alone Earnings, Stand-Alone Guidance[19] and Stand-Alone Forecasts, and each of these indicators interacted with T. The findings are reported in Table 8, and document that the over-time trend in market response to guidance and analyst forecasts is significantly different from the over-time trend for earnings (with F-statistics of 48.12 and 40.86, respectively). These findings indicate that the increased market response to earnings announcements does not reflect a change in investor response to information events in general.

5.6. Robustness tests

We have conducted a number of tests to assess the sensitivity of our findings to alternative research design choices, which we describe in the Internet Appendix. The analyses examine whether our results are sensitive to changes in the composition of our sample over time, to industry composition, to concurrent dividends, to analyst coverage, and to two alternate measures of investor response, a 3-day *USTAT* and the Ball and Shivakumar (2008) adjusted R^2 measure. The findings establish that our conclusions are robust to these alternatives. Most notably, we document that our findings hold for firms without analyst coverage, implying analysts' information acquisition and disclosure activities cannot fully explain the increase in information content of earnings announcements over our sample period. Our findings are similar for the 3-day *USTAT* though the magnitudes of the observed effects are substantially smaller than those for the 1-day *USTAT*. We find that the adjusted R^2 measure exhibits a significant time trend, similar to *USTAT*. Finally, we note that our concurrent information variables fully explain the time trend in this measure.

6. Conclusions

This paper examines the role of concurrent management guidance, analyst forecasts and financial statement line item disclosures in the striking increase in market response to earnings announcements in the 21st century. The findings, based on the return measure *USTAT* and abnormal volume measure *AVOL*, provide a number of new insights. First, we find that guidance, analyst forecasts and disaggregated line items are more frequently bundled with earnings announcements, and that each of these concurrent disclosures are associated with the increase in information content of earnings announcements over time. Furthermore, the extent of line item disclosure from the income statement and balance sheet has explanatory power for price and volume response at earnings dates. This explanatory power is incremental to concurrent guidance by management and forecasts by analysts, highlighting the significance of financial statement information, and especially information about earnings.

We decompose our measure of price variability and volume at earnings dates to separately examine the numerator and denominator. We document that relative price variability at non-announcement dates (the denominator of the *USTAT* ratio) has declined significantly over our sample period. This finding likely reflects broader economic trends that have reduced return volatility, and may also reflect shifts in disclosure such as increased bundling of guidance with earnings announcements. Our tests with the numerator of the earnings date return response, *USTAT_NM*, rather than *USTAT*, document a similar significant time trend and similar associations with concurrent disclosure. This supports our interpretation that concurrent disclosures are a substantial factor in the increase in *USTAT* over time. We find that the denominator of *AVOL* does not exhibit a secular decline, indicating the increase in abnormal volume is not due to denominator effects.

In addition, we examine the magnitude of price response to management guidance and analyst forecasts issued separately from earnings announcements. We find that the average *USTAT* for stand-alone earnings announcements over the full sample period is similar to the *USTAT* for stand-alone management guidance announcements. However, surprisingly, different trends have emerged over our sample period: the *USTAT* on management guidance dates declines over the sample period, whereas the *USTAT* at stand-alone earnings announcements generally increases. These findings support the conclusion that greater relative return variability at earnings announcements reflects the increase in information released at this time rather than more general changes in how investors respond to earnings-related information.

Taken as a whole, the findings shed light on why earnings announcements are an increasingly important information source for investors in the 21st century. Because we assess the market response to guidance, analyst forecasts and financial statement line items incremental to each other and an extensive set of control variables, we believe the inference of a causal relation between disclosure of these information items and investor response is warranted. However, this interpretation is subject to the caveat that if disclosures or actions that are omitted from our research design correlate with the disclosures included in our study, our inferences could be affected.

The findings generate some intriguing patterns and questions for future research. First and foremost, while our concurrent information variables explain a significant part of the increase in market response over time, our quest for an explanation is not complete. The extent to which refinements of our concurrent information measures or additional variables fully explain the increase awaits future research. Despite this, the magnitude of the increase we document and the role of concurrent information related to earnings in explaining this are important findings, particularly in light of the findings of decreased

[19] Our main results include both earnings and non-earnings guidance. Untabulated findings document that the over-time trend in market response to stand-alone earnings guidance is declining and significantly different from the over-time trend for stand-alone earnings announcements.

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value relevance of earnings in other studies. Second, while we find that different measures of investor response to earnings each show an increase after 2001, their patterns over time show differences that merit exploration. Third, whether the increase in concurrent information at earnings announcements and in market response continues past the time of our study is an open question. Lastly, the influence of the regulatory environment on the information content of earnings announcements and management guidance merits further exploration. These directions can further our understanding of the forces that influence the quality of information managers provide to investors through earnings announcements, financial reports, and voluntary disclosures.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jacceco.2019.101244.

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Corporate Financial Disclosure Measurement in the Empirical Accounting Literature: A Review Article

OMAIMA A. G. HASSAN* and
CLAIRE MARSTON

ABSTRACT

This paper develops a framework for corporate financial disclosure measurement to identify and evaluate measures of financial disclosure employed in prior empirical accounting studies. It identifies two approaches: (i) a disclosure-based approach that investigates actual disclosure, operationalizes the concept of disclosure in terms of its main dimensions such as the quantity and quality of disclosure, and develops methods to measure them such as the disclosure index and textual analysis, and (ii) a non-disclosure-based approach that uses the values of some observable variables to proxy for disclosure such as market-based disclosure measures. The study also discusses the extent to which the reliability and validity of these different measures of disclosure are tested. The purposes of this review are: (i) to help future researchers identify exemplars and select or develop their own suitable disclosure measures, and (ii) to identify measurement issues relating to corporate financial disclosure and provide avenues for future research.

Keywords: accounting information; financial disclosure; financial reporting; measurement; reliability; validity.

*Corresponding author

OMAIMA A. G. HASSAN (O.Hassan@rgu.ac.uk) is a lecturer in Accounting and Finance, Department of Accounting and Finance, Robert Gordon University, Garthdee House, Garthdee Road, Aberdeen, AB10 7QB; and CLAIRE MARSTON (c.l.marston@hw.ac.uk) is Emeritus Professor of Accountancy, Department of Accountancy, Economics and Finance, School of Management and Languages, Heriot-Watt University, Riccarton, Edinburgh, EH14 4AS.

1. INTRODUCTION

Corporate financial disclosure[1] is any deliberate release of financial information, whether numerical or qualitative, required or voluntary, via formal or informal channels (Gibbins, Richardson, & Waterhouse, 1990, p. 122). Companies disclose information[2] through various means such as annual reports, conference calls, interim reports, prospectuses, press releases, and websites. Prior empirical accounting studies have attempted to develop various measures for financial disclosure, but to date there is no comprehensive systematic review that identifies and evaluates these measures. This paper addresses this gap and develops a framework for financial disclosure measurement based on a review of 280 prior empirical studies published in top rated accounting journals.

Financial disclosure is important because it is the primary means of communication between management and outside investors as well as market participants in general. Hence the literature on financial disclosure is enormous and investigates a wide range of issues such as the determinants of voluntary disclosure, the impact of regulatory change on the extent of disclosure, and the economic consequences of disclosure. Although many studies investigate financial disclosure for the private sector companies, others look at the public sector and not-for-profit organizations. In all these studies, disclosure plays a key role and must be measured in some way. However, measuring disclosure is difficult because disclosure is a theoretical construct which is not directly observable.

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[1] Some researchers refer to the numbers in the financial statements as "financial reporting". Other scholars view numbers outside the financial statements and texts as "disclosure". Others view both these types as financial disclosure (e.g., Gibbins et al., 1990). We belong to the third school and adopt Gibbins et al.'s (1990) definition of corporate financial disclosure, which covers both the numbers in the financial statements and other numbers as well as texts in the disclosure vehicle.

[2] Corporate disclosure can also be directed to parties other than outside investors, such as stakeholders more generally, strategic investors, and strategic debtholders.

Previous review articles discuss several ways of measuring disclosure, by looking at either one method or one type of disclosure. For example, Marston and Shrives (1991) concentrate on the disclosure index, whereas Jones and Shoemaker (1994) examine textual analysis techniques. Healy and Palepu (2001) discuss concerns about measuring voluntary disclosure and consider the disadvantages of three measurement proxies: management forecasts, analyst ratings, and self-constructed disclosure indices developed by researchers. They consider that analyst ratings and self-constructed disclosure indices are likely to be noisy[3] measures of disclosure.

Beattie, McInnes, and Fearnley (2004) present a selection of methods for measuring narratives in annual reports, including methods reviewed by Jones and Shoemaker (1994) as well as Healy and Palepu (2001). Beyer, Cohen, Lys, and Walther (2010) expand on this list and include properties of reported earnings. Leuz and Wysocki (2016) enlarge this list and include binary indicators and frequency of disclosure. Table 1 provides an overview of the measures of disclosure identified in these studies; however, our study provides a more comprehensive review and discussion of various methods for measuring disclosure, and further extends the list to include measurements of disclosure through other observable variables such as market-based measures and the voluntary adoption of generally accepted accounting principles (GAAP). It goes further by developing a framework for corporate financial disclosure measurement and discussing some related measurement issues. The purpose of this framework is to provide a consistent approach for systematically collecting, analyzing, and evaluating existent measures of financial disclosure. We hope this will help

[3] Healy and Palepu (2001) consider that using these measures of disclosure as independent variables in prior studies are likely to suffer from omitted variable bias.

researchers to make more informed decisions about their choices of measures of financial disclosure or allow them to locate any new measure or method that they develop.

<<Insert Table 1 about here>>

Current gaps in the disclosure literature provide several motivations for our study. Firstly, a framework for disclosure measurement does not currently exist in the literature. Accounting studies do not specifically consider issues involved in measuring disclosure as a latent (unobservable) variable. Secondly, although this literature offers a variety of potential measures for disclosure, to date, there is no comprehensive systematic review that identifies and evaluates existent measures of disclosure. Thirdly, although the assessment of measures of disclosure is discussed to some extent in the extant accounting literature, a comprehensive analysis is lacking. Our study contributes to the literature by filling in these gaps through (i) developing a framework for corporate financial disclosure measurement, (ii) identifying and evaluating common measures of financial disclosure employed in prior empirical studies through a review of the literature from 2005 to 2016, and (iii) providing an in-depth discussion of some related empirical challenges including casual claims, and how the reliability and validity of different measures of disclosure are assessed. The purpose of this review is to help future researchers to identify exemplars and to guide them in the selection or development of their own suitable measures. Additionally, our study highlights some measurement issues related to corporate financial disclosure and provides avenues for future research.

A review of the empirical accounting literature was conducted to identify measures of financial disclosure employed in articles published between 2005 and 2016; articles in accountancy journals that are rated 3* or 4* by the Association of Business Schools were investigated.[4] We believe that selecting articles from top rated accounting journals over a 12-year period provides a reasonably up-to-date time frame for this review. Employing a Boolean search for 'financial reporting' or 'financial disclosure', on the title, abstract and keywords fields of the selected journals over the selected time frame, the results show 2514 articles published between 2005 and 2016. The titles, abstracts and conclusions were then carefully read to identify empirical studies of corporate financial disclosure/reporting in the private sector. We excluded[5] the following studies: intellectual capital studies, timely disclosure studies, research that empirically examines the economic consequences of individual items of financial disclosure, and image/picture disclosure studies. The application of these research criteria yielded a sample of 280 disclosure studies. Table 2 presents a break-down of these studies by journal and shows that most of them are published in the Accounting Review, Journal of Accounting and Economics, Journal of Accounting Research, and the International Journal of Accounting.

<<Insert Table 2 about here>>

We followed an inductive reasoning approach to develop a framework for disclosure measurement. From specific observations about measurements of disclosure developed in the empirical accounting literature, the analysis moves onto broader generalizations. To inform our analysis, we also consulted the literature on the problem associated with measurement of latent variables (Jarvis, MacKenzie, & Podsakoff, 2003; Goertz, 2008). We

[4] This choice may seem biased toward US academic journals. The Association of Business Schools rankings are heavily used in the UK during the selection of academic staff and articles to be entered in the periodic Research Excellence Framework exercise by which UK University departments are ranked. US–based, highly quantitative journals are predominant in these rankings. However, in the first version of this paper prior to our systematic review, we did not apply any restrictions to the academic papers covered, and we reached similar conclusions about common financial disclosure measures in the accounting literature.

[5] We were pragmatically trying to make the review manageable by missing some disclosure areas out.

identified, evaluated and coded the different types of disclosure measures contained within the 280 studies and categorized them into 11 common measures of disclosure. These measures of disclosure are then classified into disclosure-based and non-disclosure-based measures.

The remainder of this paper is organized as follows: in Section 2 we develop a framework for disclosure measurement and identify as well as evaluate different measures of disclosure. In Section 3 we discuss causal claims in prior disclosure studies and explore the extent to which reliability and validity of measures of disclosure are tested within papers identified in the systematic review of the literature. Finally, in section 4 we discuss some measurement issues relating to financial disclosure and highlight areas for future research.

2. A FRAMEWORK FOR DISCLOSURE MEASUREMENT

In this section, we develop a framework to classify various measures of disclosure. To do this, either a deductive or an inductive reasoning approach can be followed.

A deductive reasoning approach works from the more general to the more specific, informally called a "top-down" approach. Applying the deductive approach when constructing or evaluating concepts and quantitative measures, Goertz (2008) suggests, among other things, that the first consideration must be the theory embodied in the concept. Another consideration should be the necessary (minimum) and sufficient (maximum) parts of the concept. However, there is no single theory of disclosure (Verrecchia, 2001), which makes it more complex to develop or evaluate a measure of disclosure. Additionally, empirical studies consider different types of disclosure, for example mandatory and voluntary disclosures. Also, financial disclosure can take different formats such as textual or numerical disclosure (e.g., Kravet & Muslu, 2013; Nelson & Rupar, 2015). This deductive approach is even more complex when we consider that within a single type of disclosure there are different dimensions that can be captured such as the quality and quantity of information disclosure (e.g., Wynn, 2008; Ernstberger & Grüning, 2013; André, Filip, & Moldovan, 2016). For all these reasons, it is probably impossible to adopt a deductive approach to disclosure measurement.

Alternatively, an inductive reasoning approach can be employed to develop a framework for disclosure measurement. Inductive reasoning is a type of thinking that involves identifying patterns in a data set to reach conclusions and build theories (Hair, Wolfinbarger, Money, & Samouel, 2011, p. 276). It moves from specific observations to broader generalizations and theories, informally called a "bottom-up" approach. Using this approach, we review 280 empirical accounting studies published in top rated accounting journals from 2005 to 2016 and identify[6] common proxies employed for financial disclosure. Table 3 shows a list of the common measures of disclosure identified in the review of the literature and provides some exemplars for each measure. It shows 11 different measures of financial disclosure with the classification approach being the most popular, while the disclosure survey (analyst ratings) and the voluntary adoption of quality GAAP are the least popular method employed in the recent empirical accounting literature.

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[6] Since human coding is inevitably subjective, to ensure the reliability of our coding, the authors of the papers have agreed on the coding instructions of the different measures of disclosure before the coding took place. When in doubt, the same paper would be coded by both authors and any discrepancies were discussed and resolved. In addition, after the coding was finalized, a random sample of 40 papers has been re-coded (test-retest) by one of the authors. The recoding of measures of corporate financial disclosure was almost identical to the original ones, which indicates the reliability of our coding.

<<Insert Table 3 about here>>

Analyzing these common measures of disclosure, we identify two main measurement methods: a disclosure-based approach and a non-disclosure-based approach. A further classification[7] relates to whether the non-disclosure-based measure is a formative or reflective variable.

2.1 Disclosure-based approach

This approach investigates actual disclosure and reduces (operationalizes) it to its main dimensions such as quantity, quality, timing, complexity, tone and prominence. It attempts to measure one or more of these dimensions via various means such as textual analysis or the disclosure index approach. Table 4 provides a summary of common disclosure-based measures identified in this review of the literature.

<<Insert Table 4 about here>>

2.1.1 Classification approach

This approach involves sorting observations into mutually exclusive groups according to an aspect of corporate financial disclosure that is being studied. The focus could be broad such as a disclosure policy or a reporting regime, for example whether a firm publicly provide an annual report or files a 10-K report, or narrow such as specific disclosure, for example whether a firm hosts conference calls or provides management forecasts (Leuz & Wysocki,

[7] We acknowledge that some overlap inevitably exists between the sub-clusters. For example, textual analysis methods can be employed to create textual sentiments, but to recognize that sentiment analysis is not limited to written words only and that it can be employed on quantitative data, we prefer to address it as a separate sub-cluster, even if it has some overlap with textual analysis.

2016). Then, it uses a categorical variable to represent these groups in numerical terms. The resultant measure of corporate financial disclosure could be dichotomous or multicategory. For example, Cannizzaro and Weiner (2015) classify disclosures into minimal, partial, and full disclosure to assess transparency. Marquardt and Wiedman (2007) measure the quality of disclosure by classifying information on contingently convertible securities to "high-quality" if the number of shares related to the convertible securities is disclosed; "medium-quality" if enough information is provided for investors to calculate the dilutive impact; and "low-quality" if insufficient information is provided. Gillan and Panasian (2014) sort firms into cross-listed (foreign) firms filing a 40-F, 20-F, 10-K form, or their US-matched domestic counterparts to capture the differential disclosure complexity in these filings. Hollander et al. (2010) assess incomplete disclosure by determining whether requests for information made during conference calls are granted. If at least one request is not granted, they mark this call as containing incomplete disclosure. Bowen et al. (2005), Files, Swanson, and Tse (2009), and Marques (2010) assess the prominence of disclosure using a classification approach based on the position of information in the disclosure vehicle.

A classification approach is commonly applied to specific disclosures such as conference calls, segment information, management forecasts, disclosure of non-GAAP numbers, material restatement and material weakness disclosures, and financial statement disclosure (e.g., Kimbrough, 2005; Botosan & Stanford, 2005; Marques, 2006; Nagy, 2010; Weiss, 2014; Bernard, 2016). However, given the simplicity of this approach, it can be applied to any type of disclosure.

The data have the advantages of being relatively time-efficient to collect and code and can be used for large-scale samples. This might explain the popularity of this method among prior studies with 112 cases identified in the current systematic review of the literature. This approach is able to capture one type of disclosure at a time (e.g., voluntary, or mandatory) in contrast to other methods which fail to separate between these two types of disclosure such as disclosure survey and market-based measures. In addition, Leuz and Wysocki (2016) argue that this approach focuses on the existence of certain disclosures and hence disclosure can be precisely measured. Perhaps this is true when the focus of the measure is narrow, but still other disclosure activities might act as a substitute or a complement which need to be controlled for in the research design. When the focus of the measure is broad, however, at best they only partition companies into mutually exclusive groups (with some sort of order emerging if ordinal variables are employed), without any attempt to capture differences in the dimension of disclosure among companies that belong to the same group. In addition, coding could be subjective, in particular when weights are assigned, and hence results could be difficult to replicate, compare and generalize.

2.1.2 Disclosure index

A disclosure index[8] is a research instrument used to assess the extent of information reported in a disclosure vehicle(s) by a specific entity according to a list of selected items of information. The items of information could be quantitative or qualitative or both. It can be applied to different types of disclosures: mandatory or voluntary; or even to a specific type of

[8] Both the disclosure index method and textual analysis could be generally viewed as sub-types of content analysis because we are trying to draw valuable information from the data to the context of their use (Krippendorff, 1980). However, these two methods differ from each other in several aspects. For example, the unit of analysis under the disclosure index method could be figures or texts or both, while the unit of analysis under textual analysis is texts only. Using a disclosure index method, the researcher assesses whether disclosures have been made about some selected items of information, in contrast to the commonly used bag-of-words methods in textual analysis, for example, where the focus is on word count or word frequency, and where word sequence is ignored. Furthermore, while only human coding is used to develop disclosure scores using a disclosure index method, textual analysis can be conducted either manually or electronically. Therefore, we prefer to address these two methods separately.

disclosure such as management forecasts and segmental data. It does not count all items of information disclosed, but rather assesses whether disclosures have been made about the selected items of information through a close reading of the disclosure vehicle. Thus, the selection of items to include in the disclosure index is a key issue with this approach (Marston & Shrives, 1991). It can also be extended to assess the usefulness of information provided by awarding scores on an ordinal scale (e.g., 0/1/2/3) for disclosures of each item in a list (e.g., disclosures that contain quantitative data or report more information would receive a higher score than a minimal level of disclosure). However, the assignment of weights is itself subject to conceptual and procedural problems (e.g., Dhaliwal, 1980; Cooke & Wallace, 1989; Hodgdon et al., 2009; Cheung, Jiang, & Tan, 2010). The first use of such an index was by Cerf in 1961, and the method has been widely employed ever since (Marston & Shrives, 1991).

A disclosure index can be developed by the researcher (self-constructed disclosure indices) or developed externally by an academic or professional body (existing disclosure indices) such as Standard and Poor's transparency and disclosure scores, US Securities and Exchange Commission (SEC) ratings of the management discussion and analysis disclosure, the Center for International Financial Analysis and Research (CIFAR) disclosure scores, and the Joint Society of Management Accountants of Canada/University of Quebec and Montreal disclosure scores. Our review finds that the disclosure index approach is one of the most popular measures of disclosure; it is used in a variety of contexts indicating how flexible the method is. From our review of the literature, 50 cases were identified, including self-constructed disclosure indices as well as existing disclosure indices. A more detailed analysis reveals that most studies use self-constructed disclosure indices with data extracted from company reports and websites (e.g., Webb, Cahan, & Sun, 2008; Hodgdon et al., 2009; Melis et al., 2015; Mangena et al., 2016; Bazrafshan, Kandelousi, & Hooy, 2016), but some use the CIFAR index (e.g., Guedhami & Pittman, 2006; Han et al., 2012) or Standard and Poor's transparency and disclosure scores (e.g., Dargenidou et al., 2006; Ali, Chen, & Radhakrishnan, 2007).

Self–constructed disclosure indices have the advantage that they can be designed to fit the project (e.g., country, voluntary and/or mandatory disclosure, disclosure topic). However, the use of existing disclosure indices saves time, and results can be compared with the findings from other studies. Self-constructed disclosure index studies generally employ small samples owing to the labor-intensive data collection process, and results obtained are often difficult to replicate, compare and generalize (Hassan, Romilly, Giorgioni, & Power, 2009; Beyer et al., 2010). In addition, the construction of a disclosure index in prior studies often fails to explicitly account for the incremental information content of each new data item added to the index. Future research may develop an approach that can better capture the incremental information content of additional items of information disclosed by means of data reduction techniques such as factor analysis and principal component analysis. Furthermore, the appropriate method of aggregation is also of relevance here. For example, two companies may have disclosed completely different sets of information within the disclosure index and receive the same disclosure score.

2.1.3 Disclosure count

This approach counts the number of distinctive disclosures usually, but not necessarily, without evaluating their content or context. For example, the number of press releases (Francis, Nanda, & Olsson, 2008), the frequency of disclosure of non- GAAP earnings measures over a period of time (Marques, 2010), the number of online announcements

(Debreceny & Rahman, 2005), the number of segments reported by a firm (Kou & Hussain, 2007), and the number of internal control weaknesses reported by a firm in its Management Discussion & Analysis (Lu et al., 2011). This approach usually relates to particular types of disclosure such as conference calls, management forecasts, disclosure of non-GAAP numbers, information about material restatements and weakness, and segmental data (e.g., Rogers & Van Buskirk, 2009; Bergman & Roychowdhury, 2008; Marques, 2006; Lu et al., 2011; Kou & Hussain, 2007). It is frequently used in conjunction with a classification approach (e.g., Ge & McVay, 2005; Wasley & Wu, 2006; Francis et al., 2008; Levine & Smith, 2011).

Our systematic review shows that disclosure count is one of the most popular measures of disclosure with 36 cases identified from the articles analyzed. It is commonly used to measure the quantity of disclosure (Francis et al., 2008; Fu et al., 2012; Baginski, Clinton, & Mcguire, 2014), but it has also been used to assess other dimensions of disclosure such as quality (Sengupta & Zhang, 2015), the quantity and quality of disclosure (Wynn, 2008; Cuny, 2016) as well as the complexity (Kou & Hussain, 2007; Brochet et al., 2016), and credibility (Lu et al., 2011) of disclosures.

The data have the advantage of being relatively time-efficient to collect and code and the data can be used to study large scale samples. Disclosure count can provide new valuable information to the capital market, for example the management might hold frequent conference calls to update outside providers of funds on relevant up-to-date information about the business. However, it could also be induced by other managerial incentives such as management reputation.

2.1.4 Properties of reported earnings

This approach uses properties of reported earnings to measure financial reporting quality (e.g., Wang, 2006; Altamuro & Beatty, 2010; Chen et al., 2011; Kim & Venkatachalam, 2011; Koh et al., 2013; Filip et al., 2015). For example, while Krishnan, Wen, and Zhao (2011) use accruals quality and discretionary accruals to measure financial reporting quality, Altamuro and Beatty (2010) use various characteristics of reported earnings such as changes in loan-loss provision, earnings persistence, earnings predictability, benchmark beating behavior, and accounting conservatism. Lang, Lins, and Maffett (2012) measure firm transparency by less evidence of earnings management using properties of reported earnings, among other measures such as better accounting standards, higher quality auditors, more analyst following, and more accurate analyst forecasts.

Coding of these variables could be relatively easy and time-efficient and can be used for large-scale samples because these variables are constructed by means of economic modelling of available accounting figures rather than coding texts. Furthermore, both continuous and discrete proxies can be constructed. Dechow, Ge, and Schrand (2010) review different measures of earnings quality such as the magnitude of accruals, residuals from accrual models and earnings persistence among others, and reach no single conclusion on what earnings quality is, because ‘‘quality’’ is dependent on the decision context. Thus, different properties of reported earnings may capture different dimensions of quality and may be valid in different contexts (Berger, 2011). Dechow et al. (2010) also suggest that properties of reported earnings capture underlying earnings process with errors that are related to fundamental firms’ characteristics, real economic performance and the measurement of performance, a problem that is common for almost all measures of disclosure (Leuz & Wysocki, 2016). Dechow et al. (2010) further suggest that different proxies based on reported earnings are not equally affected by these factors which emphasizes that these measures are not measuring the same underlying construct. In addition, corporate financial disclosure is not limited to the accounting figures disclosed in the financial statements. It also includes qualitative information in the form of text (e.g., Core, 2001; Easley & O'Hara, 2004; Beyer et al., 2010). Thus, using accounting quality to proxy for the overall quality of corporate financial disclosure would be limited. Leuz and Wysocki (2016) consider attributes of reported earnings as narrow measures of corporate disclosure and reporting which have the advantages of being able to facilitate consistent measurement across firms, but these measures raise concerns about other disclosure activities that could serve as a substitute or a complement, which need to be controlled for in the research design. For example, firms can compensate poor earnings quality with enhanced voluntary disclosure. Even though, whether earnings quality could serve as a substitute or a complement of disclosure quality is still an empirical issue since some scholars suggest that they are substitutes (Mouselli, Jaafar, & Hussainey, 2012), while others suggest that they are complements (Francis et al., 2008).

2.1.5 Sentiment analysis

Scholars have used both quantitative and qualitative financial information to generate sentiments from corporate financial disclosure such as good/bad news disclosure and favorable/unfavorable disclosure. Some of the pioneer studies in this area include Clarkson, Kao, and Richardson (1994) and Skinner (1994). For example, Clarkson et al. (1994) measure voluntary disclosure of good (bad) news by positive (negative) changes in earnings in the current year compared to those of the previous year (or analysts' forecasts of earnings).

Alternatively, a firm is classified as good news if the cumulative residuals from the market model for the firm over the eight-month period after the annual report date are larger than zero. Ali et al. (2007) use the change in earnings per share from that of the same quarter in the previous fiscal year, deflated by stock price at the beginning of the quarter as a measure for voluntary disclosure of bad news (negative changes) and vice versa. Bamber et al. (2010) measure good/bad news disclosure by the difference between the management forecast and the most recent I/B/E/S consensus analyst forecast, deflated by the closing price one day prior to the management forecast date. If the difference is non-negative (negative), this is coded as good (bad) news, and 0 otherwise. Desir (2012) measures good/bad news disclosure based on changes in dividends, where an increase in dividends is considered good news, while a decrease is considered bad news.

In addition, both manual and automated textual analysis methods are used to measure the tone of a financial document (e.g. Skinner, 1994; Kothari et al., 2009; Li, 2010b; Rogers et al., 2011; Yekini et al., 2016). For example, Skinner (1994) constructs a measure of disclosure where disclosures are subjectively classified as good/bad/no news via manual textual analysis if the particular disclosure documents indicate that earnings will be better/worse/same compared to investor expectations. Rogers et al. (2011) use a dictionary-based text analysis program to quantify optimistic tone on a continuous scale. Kravet and Muslu (2013) measure the negative tone in risk disclosures by changes in companies' textual risk disclosures in the 10-K filings and provide evidence that textual risk disclosures reveal new information about corporate risks and uncertainties. Kearney and Liu (2014) survey different textual analysis methods applied on textual sentiment in the finance literature such as word lists, dictionary-based approach, and supervised machine learning. They suggest that corporate disclosure literature often use the term ‘tone’ to refer to textual sentiment, but sentiment in a broader term is not limited to positivity–negativity, but also include other affects such as strong–weak, and active–passive. Loughran and McDonald (2016) find that much of the literature uses a bag-of-words approach, where the word sequence is ignored, and the characters of a document is parsed into chunks of words, to measure document sentiment.

Sentiment analysis can be applied to both quantitative and qualitative financial information which indicates the flexibility of the method. Sentiments created from quantitative data, and textual sentiments developed using automated textual analysis are economical in terms of money, time and effort needed to implement the analysis, and can be applied to large samples. Both continuous and discrete proxies for disclosure can be constructed. However, the approach is inevitably subjective, hence the results could be hard to replicate and generalize, in particular with textual sentiments. In addition, while quantitative data can be distorted for several reasons such as earnings management, textual sentiments can be driven by different managerial incentives such as management reputation and impression management. In addition, textual sentiment analysis could be biased because of a managerial tendency to use positive words to frame negative statements (Loughran & McDonald, 2016). Perhaps future research should consider both quantitative and qualitative sentiments to control for this potential bias. Future research might also investigate how sentiments created using quantitative data compare with textual sentiments.

2.1.6 Textual analysis

Textual analysis is a research method to draw inferences from texts to the context of their use. Loughran and McDonald (2016) suggest the following hierarchy[9] of textual analysis: lexical, collocation, syntactic, semantic, pragmatic, and discourse. They claim that, to date, applications in accounting and finance are predominately in the initial phase of this interpretive sequence of lexical to discourse analysis.

We discuss textual analysis to the extent relevant to the current study and refer the reader to several excellent review studies on the subject (e.g., Jones & Shoemaker, 1994; Li, 2010a; Guo, Shi, & Tu, 2016; Loughran & McDonald, 2016; Grimmer & Stewart, 2013) for more in-depth discussion of the different methods employed under this approach. For example, Li (2010a) surveys recent empirical large-scale textual analysis studies by topical area (e.g., information content, earnings quality, market efficiency), and provides details on earlier manual-based textual analysis studies. Loughran and McDonald (2016) survey readability methods which attempts to measure the ability of the reader to decipher the intended message, and methods which typically focus on computationally extracting meaning from a collection of text such as bag-of-words methods and measuring document similarity. They address various methodological tripwires involved in these methods, highlight the challenges of separating out the concepts of business complexity and readability, and

[9] Loughran and McDonald (2016, pp.26-28) explain this hierarchy as following: the first step in analyzing text is *lexical* (bag-of-words) where the word sequence is ignored, and the characters of a document is parsed into chunks of words. Research interests at this stage are focused on some linguistic features such as word count, word difficulty and word frequency (Beattie, 2014). The second step, *collection*, is where meaning is derived from a collocation of words (or grams). For instance, the bigram of "going" and "concern" is an example where collocation is important, and if we extend this to *n*-grams, we can identify a collection of words as a sentence. Then using *syntactic* analysis, we can derive additional information by examining the grammatical structure of the sentence. Beyond syntax, *semantics* attempts to infer meaning within the context of the sentence. *Pragmatics* infers meaning from information immediately preceding and following the sentence, in addition to context provided by external knowledge. Finally, *discourse* is the attempt to derive meaning from the collective document.

emphasize the importance of replicability in the less-structured methods used in textual analysis. While, Guo et al. (2016) classify textual analysis methods into lexicon-based approach and machine learning approach, where the former includes readability measures and dictionary-based approach, and the later includes Naïve Bayes, Support Vector Machines, Semantic Analysis and Neural Network.

Textual analysis is commonly used to measure the quantity of disclosure (e.g., Chen, Cheng, Gong, & Tan, 2017a). However, the method is also used to assess other dimensions of disclosure such as quality (e.g., Chen, Miao, & Shevlin, 2015), complexity (e.g., You & Zhang, 2009; Filzen & Peterson, 2015) and horizon (Brochet, Loumioti, & Serafeim, 2015). The disclosure being studied can be mandatory, voluntary, or both, which highlights the flexibility of the method. Textual analysis can be partial or comprehensive. Partial textual analysis covers part of a document or selected items of information or key words. Comprehensive textual analysis covers a whole document.

Textual analysis can be conducted manually or automatically. One of the major limitations of manual textual analysis is that it is a labor-intensive data collection process, which inevitably tends to restrict the sample size employed (Beattie & Thomson, 2007). Therefore, in the 1980s, automated textual analysis emerged and has been commonly employed ever since (e.g., Frazier, Ingram, & Tennyson, 1984; Abrahamson & Amir, 1996; Smith & Taffler, 2000; Breton & Taffler, 2001; Schleicher, Hussainey, & Walker, 2007; You & Zhang, 2009; Brown & Tucker, 2011). Automated textual analysis is often accompanied by some element of manual textual analysis depending on the research method. Examples of studies that use automated textual analysis are Schleicher et al. (2007), You and Zhang (2009) and Elshandidy, Fraser, and Hussainey (2015), and examples of manual textual analysis studies are Linsley and Shrives (2006), Boesso and Kumar (2007), and Chen et al. (2017a).

Automated textual analysis is easy to use and economic in terms of the time, effort and financial resources needed to implement the method. It can be easily used to conduct a comprehensive textual analysis and to cover sizable samples. However, textual analysis is not problem–free. When implementing this approach either manually or automatically using the frequency of words or key words, all possible synonyms and words with multiple meanings should be included (Weber, 1990). Using inappropriate or insufficient key words could lead to over- or underestimation of a disclosure level. Additionally, using words or key words isolated from their context in the whole sentence does not provide a sound unit of analysis and may yield misleading results (Milne & Adler, 1999; Beattie & Thomson, 2007). Furthermore, coding (either manually or electronically) that is entirely based on a pre-defined word list without recourse to actual disclosure content may not be able to fully capture the construct under investigation, which limits the validity of the constructed measure of disclosure (Beattie & Thomson, 2007; Grüning, 2011; Loughran & McDonald, 2016). Moreover, the focus of this method is on reported qualitative information, which means that quantitative information well be ignored under this approach.

Attempts to extend this approach beyond lexical analysis include, but are not limited to, the analysis of phrases rather than words and semantic analysis. For example, Grüning (2011) uses an information-retrieval vector space model (VSM), a supervised machine learning tool, to automatically analyze phrases (n-grams) rather than words; he argues that this provides better unit of analysis and eliminates human involvement in the process. Using VSM, Grüning (2011) undertakes the coding of corporate disclosure in two phases: training and application. In the training phase, Grüning manually develops a comprehensive coding scheme based on a sample of representative annual reports, attempting to classify and quantify the diversity of corporate financial and non-financial disclosures. In the application phase, the coding scheme is automatically applied to a larger number of annual reports without human involvement to develop a disclosure score. Brown and Tucker (2011) provide another example of advancement in this area where they use VSM to measure changes in disclosure documents based on identifying semantic similarity. Changes in disclosure rather than disclosure levels could give us more meaningful insights about disclosure practice by removing boiler-plate disclosure for instance. However, the measure obtained is a summary of changes in a document and does not specify the nature of any changes in disclosure which have taken place (Berger, 2011).

2.1.7 Attributes of management forecasts

A management forecast is an item of forward-looking information, which management may provide in annual reports, interim reports, or elsewhere. This information may be quantitative (where a specific figure or range of figures is supplied) or qualitative (where a general direction or trend in company performance might be given). For example, management earnings forecasts available in the First Call database can take the following forms: point, range, one-sided directional, or confirming statements. They can be verified through actual earnings realizations, and hence they enable researchers to construct variables such as management forecast accuracy, error and bias. Recent studies also use management forecasts of cash flows, capital expenditures and store openings (e.g., Adhikari & Duru, 2006; Wasley & Wu, 2006; Cole & Jones, 2015) to construct their measure of disclosures.

Management forecasts have been used widely in the accounting literature to assess voluntary disclosure quantity and quality, especially studies from the US[10]. This may be because of the availability of these data in different databases such as that provided by First Call and the Dow Jones News Retrieval Service. Some studies only use attributes of management forecasts to assess the quality of voluntary disclosure (e.g., Yang, 2012; Bonsall et al., 2013; Cole & Jones, 2015; Kitagawa & Okuda, 2016; Zuo, 2016). While management earnings forecasts have the advantages of being concrete disclosure events, they are considered less comprehensive than other measures of disclosure such as AIMAR disclosure scores (Lang & Lundholm, 1996). In addition, management forecasts could be driven by different managerial incentives other than facilitating communication with external providers of funds such as management reputation and earnings management, which would affect the credibility of measures of disclosure developed from management forecasts (Kim & Park, 2012; Beyer & Dye, 2012; Cheng, Luo, & Yue, 2013). However, attributes of management forecasts are relatively easy and time-efficient to construct and can be used for large-scale samples. Also, both continuous and discrete proxies for disclosure can be constructed using attributes of management forecasts (e.g., Baginski & Rakow, 2012; Bonsall et al., 2013).

2.2 Non-disclosure-based approach

The second measurement approach views disclosure as a latent (unobservable) variable, and thus measures it through some other (non-disclosure-based) observable variables such as market-based data and the adoption of high-quality accounting standards.

[10] While management earnings forecast disclosure is voluntary in the US market, it is mandatory for Japanese companies listed on a stock exchange (Suto & Takehara, 2018).

These observable variables are assumed to relate to the underlying concept (disclosure) that needs to be measured.

Non-disclosure-based observable variables can be further classified into formative and reflective variables. The difference between formative and reflective variables is in the theorized direction of causality between the latent variable and the observable variables (e.g., Fayers & Hand, 2002; Jarvis et al., 2003). If the direction of causality is from the latent variable to the observable variables, and if changes in the latent variable are hypothesized to cause changes in the observable variables, then these measures are referred to as reflective variables. If the observable variables are hypothesized to cause changes in the latent variable, then they are referred to as formative variables. In the context of financial disclosure, possible examples of reflective variables are disclosure surveys and market-based measures of disclosure. This is because the direction of causality is hypothesized to be from corporate financial disclosure to these observable variables. Possible examples of formative variables are regulatory change, the adoption of high-quality accounting standards, and the use of American depositary receipts. This is because these observable variables are hypothesized to cause changes in corporate financial disclosure. Jarvis et al. (2003) provide decision rules for determining whether a measure is formative or reflective, although they note that answering the questions associated with these rules may be difficult and the answers may be contradictory. Although non-disclosure-based measures are less labor-intensive for researchers to develop because they do not require detailed analysis and coding of disclosure instruments and can be used for large-scale samples, their relationship with disclosure may be weak or bidirectional. In addition, using a reduced-form research design, that is not following the entire causal path between corporate disclosure and the variables of interest, makes the analysis susceptible to omitted variable bias, e.g. the change in the variable of interest could be triggered by other omitted confounding variables such as institutional changes and economic shocks (Leuz & Wysocki, 2016). Table 5 provides a summary of common non-disclosure-based measures identified in the current review of the literature.

<<Insert Table 5 about here>>

2.2.1 Formative measures

(i) Regulatory change that affects disclosure

Many prior studies use a regulatory change event to proxy for a change in disclosure quantity or quality or both. For example, Zhou (2007) investigates the link between information asymmetry and increased accounting disclosures following the adoption of new auditing standards using a dummy variable that takes the value of one if the observation is from the post-adoption period, and zero otherwise. Wang (2010) uses a dummy variable equal to zero for the years 1998 through 2001 and one for the years 2002 through 2005 to proxy for increased internal control disclosures mandated by the Sarbanes-Oxley Act (SOX). Leuz et al. (2008) analyze the effects of SOX on SEC deregistration and examine the causes and consequences of a significant and voluntary decrease in a firm's commitment to disclosure which they attribute largely to SOX. Bonaimé (2015) uses a categorical variable to proxy for increased transparency around the 2003 modification to SEC Rule 10b-18, which mandates enhanced disclosure of repurchase transactions. Other studies (e.g., Herrmann, Hope, & Thomas, 2008; Canace, Caylor, Johnson, & Lopez, 2010; Chen, Dhaliwal, & Xie, 2010) examine the consequences of Regulation Fair Disclosure, which prohibits the disclosure of material non-public information to selected groups or individuals such as financial analysts or institutional investors. These studies use a dummy variable to proxy for the quantity and quality of disclosure.

The method is easy to use and economical in terms of the time, effort and money consumed in constructing a proxy for a change in disclosure. Data to construct these variables either come from the event date or filings or databases containing information related to the event. However, the variables merely indicate that a change in disclosure either has/has not taken place, with no attempt to measure the size of this change. In addition, there is no attempt to assess the actual level of compliance with the regulatory change, which could be problematic; particularly in the absence of strong enforcement policies. Leuz and Wysocki (2016) suggest that the observed outcomes around a regulatory change are joint effects of that change and institutional complementarities such as the auditing supervisory agencies, and legal remedies. The impact of the institutional settings will also limit the ability to generalize the outcomes to other environments even if the causal relationship between a regulatory change and the variables of interest is correctly observed.

(ii) Voluntary use of GAAP (e.g., US GAAP or IFRS) to indicate higher disclosure (GAAP)

Several prior studies construct dummy variables about the voluntary adoption of GAAP which are used to proxy for higher disclosure (e.g., US GAAP or International Financial Reporting Standards [IFRS]) versus lower disclosure (local GAAP). For example, Van Tendeloo and Vanstraelen (2005) examine whether the adoption of IFRS is associated with lower levels of earnings management using a dummy variable that takes the value of one if the firm voluntarily adopts IFRS and zero otherwise; this dummy variable is used to proxy for enhanced financial reporting quality. Another example is Frino et al. (2013) who use the early adoption of IFRS in Italy to proxy for increased disclosure and examine its effect on stock liquidity. A further example is Wan–Hussin (2009) who use the early adoption of an accounting standard associated with greater disclosure, namely the disaggregation of accounting information by business segments to proxy for corporate transparency.

Data to construct the variable can be retrieved from databases, or researchers may need to inspect companies' annual reports. These data have the advantage of being relatively time-efficient to collect and code and can be used for large-scale samples. However, the use of a dummy variable only splits companies into two mutually exclusive groups where actual disclosure can still differ among the members of the same group.

2.2.2 Reflective measures

(i) Market–based measures

Market-based measures[11] have been used to proxy for disclosure quantity or quality in prior studies (e.g., Ascioglu et al., 2005; Rogers, 2008; Rogers & Van Buskirk, 2009; Reeb & Zhao, 2013). For example, Rogers (2008) uses changes in market liquidity to proxy for disclosure quality based on the argument that high-quality disclosure improves market liquidity. However, Berger (2011) notes that changes in market liquidity may arise for reasons other than changes in disclosure quality, that is the omitted variable problem. This problem can be eliminated by using control variables and validation tests, but the number of control variables needed might be sizeable. According to Berger (2011), Rogers' (2008) attempt to include controls provides some validation for his measure of disclosure.

[11] We only provide some examples of market-based disclosure measures; thus, this should not be interpreted as a complete list of these measures.

Market-based measures of disclosure have the advantage of being easily obtainable from databases and can be estimated for large samples. Also, they can be constructed using both discrete and continuous variables. However, these measures usually suffer from a lack of theoretical casual path linking them with disclosure. In addition, failure to integrate market efficiency into the discussion could be a fatal oversight (Verrecchia, 2001). Moreover, the availability of these measures will be limited to listed companies only which indicates potential selection bias. Furthermore, market-based measures are noisy measures of corporate financial disclosure because they are likely to capture both public and private information, financial and non-financial information, and information provided by the company and by a third party such as financial analysts and the media. They are also likely to capture not only a firm's disclosure practice but also its fundamental characteristics and performance.

(ii) Disclosure survey

A disclosure survey is an investigation of the perceptions of financial analysts, investors, or other user groups about firms' disclosure practices through questionnaires or interviews (e.g., Nikolaev & Van Lent, 2005; Daske & Gebhardt, 2006; Brown & Hillegeist, 2007; Glaum et al., 2013).

Perhaps the most common example of a disclosure survey in the empirical accounting literature is that conducted by the Financial Analysts Federation and the Association for Investment Management and Research (AIMR), where results of these surveys have been used as proxies for disclosure quantity and quality in many prior US studies (e.g., Dhaliwal, Khurana, & Pereira, 2011; Huang & Zhang, 2012; Ali, Klasa, & Yeung, 2014). Original scores about the importance of different disclosures can be also converted into a dummy variable (e.g., Brown & Hillegeist, 2007). However, these scores are now out of date, given that they were discontinued in 1997 after the fiscal year 1995 (Core, 2001). Since then, several regulatory changes have taken place in the US that may have an impact on firms' disclosure practices (Ertimur, 2007); the earlier survey evidence may therefore be redundant.

Other examples of studies using disclosure survey results in a European context are those of Daske and Gebhardt (2006) and Glaum et al. (2013). Both studies use quality scores extracted from competitions for the best annual reports run by business journals to proxy for disclosure quality.

Disclosure scores constructed by third-party organizations from surveys that they have conducted are not labor-intensive for a researcher because they are already completed. If the survey is applicable to a wide range of organisations, they can be employed for a sizable sample of firms compared to other research methods, such as the self-constructed disclosure index. Additionally, the scores obtained are usually constructed by using inputs from professional analysts familiar with the firms' disclosures, and thus claimed to enable direct measurement of disclosure quality (Glaum et al., 2013). The scores are also claimed to capture both the quantity and quality of disclosure since they provide useful information to expert users of this information (Leuz & Wysocki, 2016). However, this approach is based on analysts' (or other user groups') perceptions about firms' disclosure rather than actual disclosure (Lang & Lundholm, 1993; Beattie et al., 2004). Moreover, the ratings are potentially biased towards large firms which tend to feature prominently in the surveys. Additionally, the objectivity of the views of the investigated user group may be doubted, given that no one will know the user group's incentives to supply their ratings and the types of biases that may be present (Lang, 1999).

3. SOME EMIRICAL CHANLLENGES

In this section we discuss some measurement issues related to the development of a measure of disclosure. These are causal claims and reliability and validity assessment.

3.1 Causal claims

A major empirical issue that most prior empirical studies on corporate financial disclosure face is the causal claim, whether implicit or explicit, made between corporate financial disclosure and other observable variables. Such a claim must first be grounded in theory, that is the causal link between corporate financial disclosure and the observable variables is established in theory, and properly examined using suitable econometric methods. Scholars often borrow theories from economics, finance and psychology to establish a theoretical causal link between corporate financial disclosure and other observable variables (e.g., Healy & Palepu, 2001; Knooe, Seybert, & Smith, 2011). Gow, Larcker and Reiss (2016) view that accounting research needs a clear discussion of the theoretical causal mechanism that is being assumed for the research question and suggest researchers to use causal diagrams to be very transparent about such claims. However, a lack of a relevant theory that links corporate financial disclosure with other observable variables could be an issue. For example, Core (2001, p.449) suggests that tests of a link between disclosure quality and the cost of capital are joint tests of a theory linking disclosure quality to information asymmetry and a theory linking information asymmetry to a cost of capital. Even when a strong theoretical link between corporate financial disclosure and other observable variables can be established, a causal claim may still not be attainable if the variables are endogenous. Endogeneity occurs when the explanatory variable correlates with the error term of the estimation model. This will result in inconsistent and biased estimation of the coefficient of the explanatory variable, that is it does not converge to its true population value no matter how large the sample size is. This, in turn, means that the effect of the independent variable on the dependent variable cannot be interpreted. Some scholars shy away from inferring a causal link between disclosure and other observable variables, claiming that they are testing for association rather than causation. However, if endogeneity exists, even a simple correlation between the dependent variable and independent variable cannot be inferred because the magnitude of the effect can be wrong as well as its sign (Antonakis, Bendahan, Jacquart, & Lalive, 2010). Endogeneity occurs for a variety of reasons such as omitting important control variables from the estimation model, omitting fixed effects, omitting confounding variables, reverse causality, measurement errors in the independent variables, and model misspecification, among others (Ibid). For example, most disclosure studies either examine the determinants or consequences of disclosure but not both, which might fail to account for the full causal chain between disclosure and the variables of interest. This is called a reduced-form research design, which makes the analysis susceptible to endogeneity bias.

Examples[12] of prior studies which explicitly control for endogeneity bias in corporate financial disclosure literature are Nikolaev and Van Lent (2005), Lapointe–Antunes et al. (2006), Altamuro and Beatty (2010), Lim, Matolcsy, and Chow (2007), and Hope and Thomas (2008). For example, Nikolaev and Van Lent (2005) investigate two sources of endogeneity bias that affect the estimation of the relation between cost-of-debt capital and disclosure, namely: unobservable firm heterogeneity and observable omitted variables. They attempt to

[12] We were not specifically looking for discussions of endogeneity issue in prior studies when we did our survey, so this is not to be interpreted as a comprehensive list of studies that dealt with this issue in this review.

mitigate this endogeneity bias by relying on theory to identify additional variables correlated with both disclosure and cost-of-debt capital and by applying fixed effects estimation. Another source of endogeneity bias is reverse causality, which means that the relationship between corporate financial disclosure and other observable variables could be bi-directional. For example, Brown and Hillegeist (2007) control for the endogeneity bias caused by a reverse causality between disclosure quality and information asymmetry by employing a simultaneous equations approach.

Antonakis et al. (2010) provide an excellent review of the different sources of endogeneity bias and present methods that allow social scientists to test causal claims in non-experimental settings where randomization is not possible, such as simultaneous-equation models, Heckman selection models, regression discontinuity and difference-in-difference models, among others. Attempts to discuss sources of endogeneity bias in the accounting literature include Larcker and Rusticus (2010), Tucker (2010), Peel (2014; 2016), Gow et al. (2016), and Leuz and Wysocki (2016). For example, Larcker and Rusticus (2010) provide some insights into the use of instrumental variables and simultaneous equations by accounting researchers to mitigate the biases caused by endogeneity of the predictor variables. Table 1 in their study shows that disclosure research makes use of instrumental variables and identifies other accounting research areas such as auditing and earnings management. Gow et al. (2016) evaluate the different approaches accounting researchers adopt to draw causal inferences from observational data based on a review of all papers published in three leading accounting journals in 2014. They find that about 90% of these papers seek to draw causal inferences and that the most common estimation methods used in these studies include ordinary least-squares regression, difference-in-differences estimates, and propensity-score matching. However, they claim that the assumptions required for these methods to deliver credible estimates of causal effects are unlikely to be met in many applications that rely on observational data. They suggest that accounting research would benefit from more in-depth descriptive research, including a greater focus on the study of causal mechanisms and increased emphasis on the structural modeling of the phenomena of interest. Leuz and Wysocki (2016) discuss how all measures of corporate disclosure and reporting share a fundamental problem which is the need to separate a firm's reporting from its underlying economic characteristics and performance. However, corporate economic characteristics, disclosure policy and performance are co-determined by management strategy, that is management strategy identifies what a firm does and how it performs, and that the omission of this variable from the study methodologies causes an endogeneity problem. Leuz and Wysocki (2016) suggest structural equations modelling, among others, to address this problem. Tucker (2010) and Peel (2014; 2016) discuss selection bias in accounting research that is due to both observable and unobservable differences between the selected control firms and the sample firms in evaluating treatment effects and suggest methods to control both types of bias.

3.2 Reliability and validity assessment

In our search for measures of corporate financial disclosure, we observe that most studies tend to use a single measure of disclosure. Some studies use more than one measure for disclosure to examine different aspects of corporate disclosure or to check the robustness of their results. For example, Francis et al. (2008) use a disclosure index, as well as four categories of disclosure within the index, and finally, three alternative measures of voluntary disclosure: management forecast behaviour, number of firm-initiated press releases, and conference call activity.

However, whether a study uses one or more measures for corporate disclosure, and whatever the approach or scale used to develop it, it is constructed to approximate a theoretical concept that is difficult to measure directly. Hence, it is necessary to assess whether the measure of disclosure employed is a reliable and valid one. If the measure is not reliable and invalid, the resultant statistical inferences will not be meaningful. Although assessment of measures of disclosure is discussed to some extent in the accounting literature, a comprehensive analysis is lacking. Therefore, this section discusses the extent to which testing for reliability and validity is carried out within papers identified in our systematic literature review. Table 6 shows a list of the papers that have conducted some sorts of reliability and validity testing.

<<Insert Table 6 about here>>

3.2.1 Reliability Assessment

Reliability concerns the ability of a measurement instrument (e.g., a disclosure index) to produce consistent results in repeated trials. It also concerns the internal consistency of a measurement instrument, that is, the extent to which all parts of a measurement instrument are measuring the same thing (Carmines & Zeller, 1991). Reliability has three common forms: test-retest, inter-coder reliability, and internal consistency.

The test-retest measures the stability of the results obtained from a measurement instrument over time. In terms of textual analysis, for example, stability can be determined when the same text is coded more than once by the same coder (Weber, 1990, p. 17). Al-Akra and Ali's (2012) study is one example of how the test-retest approach can be used in manual coding for a self-constructed disclosure index. They rely on one coder in the coding process, and to reduce coding error, the annual reports were screened twice with the voluntary disclosure checklists.

Reproducibility or inter-coder reliability refers to the extent to which content classification produces the same results when the same text is coded by more than one coder (Weber, 1990, p. 17). Inter-coder reliability can be measured by the coefficient of agreement (e.g., Al-Shammari et al., 2008), which is the ratio of the number of pairwise inter-judge agreements to the total number of pairwise judgements (Beattie et al., 2004, p. 214). The higher the coefficient obtained, the higher the reliability of the measurement instrument. Because this measure does not consider the likelihood of random agreement between the coders, it is not perceived as an adequate measure of inter-rater reliability unless discrepancies between the coders are scarce or the discrepancies have been analyzed and any differences have been resolved (e.g., Rogers & Grant, 1997; Milne & Adler, 1999). To overcome the problem of random agreement between the coders, other measures including Scott's pi (e.g., Linsley & Shrives, 2006; Abraham & Cox, 2007), Krippendorff's alpha (e.g., Boesso & Kumar, 2007), Cohen's kappa (e.g., Hooghiemstra, 2010), and Leigh's lambda are used to test for inter-coder reliability (for more details, see Milne & Adler, 1999).

The third form of reliability is internal consistency. Litwin (1995, p. 21) describes internal consistency as 'an indicator of how well the different items measure the same issue. This is important because a group of items that purports to measure one variable should indeed be clearly focused on that variable'. For example, Hassan et al. (2009), Cormier et al. (2010), and Elshandidy and Shrives (2016) use Cronbach's alpha, which is a measure of interitem correlation, to assess the internal consistency of their measures of disclosure. Cheng and Courtenay (2006) compute pairwise parametric and non-parametric correlations between all the components of their disclosure index to assess internal consistency. Similarly, Kelton and Yang (2008) assess the correlation between the categories of their internet financial reporting index.

The low level of reliability testing identified within our review is consistent with research by Beattie and Thomson (2007), who report that reliability issues do not appear to be addressed in most intellectual capital disclosure studies which they examined. Reliability tests are mainly performed in studies that use a disclosure index and manual textual analysis. These types of disclosure measures are susceptible to coder error and judgement. However, many studies with no apparent reliability testing use a disclosure index or other variables obtained from company disclosures. Other measures of disclosure are based on third-party data with less room for coder error and judgement, such as market-based measures of disclosure. We recommend that researchers should consider the importance of conducting reliability tests of disclosure measures in future studies, when measures of disclosure are subject to coder error and judgement.

3.2.2 Validity Assessment

Validity is defined as 'the extent to which any measuring instrument measures what it is intended to measure' (Carmines & Zeller, 1979, p. 17). There are three common types of validity scrutinised in disclosure studies: content, criterion, and construct.

The first type of validity is content validity. This is assessed by seeking subjective opinions or judgements from non-experts and/or professionals (hence some refer to it as face validity) about how well the instrument measures what it is intended to measure. In our systematic review, we find that most cases of content validity testing are conducted in disclosure index and textual analysis studies. Not surprisingly, these studies use measures of disclosure that are subject to judgement; hence the authors seek reassurance about the face validity of their measurements of disclosure. A typical example is Patelli and Prencipe (2007), who explain that the inclusion of an item in their disclosure checklist is based on a prior study and is subject to amendment to suit the country in the investigation. They then consult with three experienced auditors and three financial analysts to test its suitability for the Italian setting that they are examining. However, this type of validity is never seen as sufficient when concluding about the validity of a measure. This may be because of concerns about users' perceptions regarding their own use of the information (Dhaliwal, 1980).

Criterion validity is a measure of how well one instrument compares with another instrument or "predictor" (Litwin, 1995, p. 37). Criterion validity assesses if there is a significant correlation between a measure and an external criterion (a desirable outcome). The higher the magnitude of the correlation coefficient, the more valid this instrument or measure is for this criterion. There are two types of criterion validity: concurrent and predictive. The difference between them is the time horizon considered: concurrent validity concerns the correlation between a measure and the criterion at the same time, whereas predictive validity concerns the correlation between a future criterion and the relevant measure. For example, Boesso and Kumar (2007) test the criterion validity of their measure of voluntary disclosure by correlating the number of observations on social perspectives obtained through their textual analysis with the number of awards received by the company. They argue that the greater the emphasis of a company on social activities, the greater the likelihood of being recognized in the form of awards for stakeholder communication by independent evaluators. Grüning (2011) and Ernstberger and Grüning (2013) provide another example where their measures of disclosure correlate negatively with measures of information asymmetry, that is the desired outcomes of enhanced disclosure is to reduce information asymmetry. However, criterion validity is less likely to be used when assessing the validity of social science measures. This is because most social science measures represent theoretical concepts for which there are no known criterion variables available for comparison. The more abstract the concept, the less likely one is to discover an appropriate criterion for assessing a measure of it (Carmines & Zeller, 1979, p.20). Therefore, it is not surprising that in our systematic review we find relatively few examples of this test among the studies considered.

In contrast to both content validity and criterion validity, construct validity has generalized applicability in the social sciences. 'It is concerned with the extent to which a particular measure relates to other external measures consistent with theoretically derived hypotheses concerning the concepts (or constructs) that are being measured' (Carmines & Zeller, 1979, p. 23). Therefore, testing for the construct validity of a measure of disclosure involves three steps: (i) to specify the links between the measure of disclosure and some theoretically related external variables, (ii) to test this theoretical links empirically, and (iii) to explain how the empirical evidence clarifies the construct validity of the measure of disclosure, which requires a pattern of consistent findings with prior studies. For example, Blanco et al. (2014) examine the association between their measure of the quantity of segment disclosure and common control variables, such as firm size, firm age, profitability, and leverage, and obtain results that are largely consistent with prior studies, to provide evidence on the construct validity of their measure of disclosure. Additionally, according to Weber (1990, p. 19), 'a measure has construct validity to the extent that it is correlated with some other measures of the same construct[13]', provided that these measures are proven to be reliable and valid measures of that construct. For example, Ernstberger and Grüning (2013) show that their measure of disclosure has construct validity with respect to other disclosure rankings; its association with the AIMR rating, Standard & Poor's transparency disclosure score and other rating methods is significant.

Although in our systematic review we find some evidence of validity testing, future researchers should carry out validity tests as a matter of course, otherwise the link between their proposed measures and corporate financial disclosure might be wrong or misleading. Overall, Table 6 shows that both the disclosure index and textual analysis methods are heavily scrutinised for their reliability and validity as measures for financial disclosure, which justifies more reliance being placed on these measures of disclosure in future studies.

4. DISCUSSION AND RECOMMENDATIONS

The framework for disclosure measurement developed in this study identifies two approaches: (i) a disclosure-based approach that focuses on investigating actual disclosure, operationalizes the concept of disclosure by disaggregating it into its main dimensions such as the quantity and quality of disclosure, and develops methods to measure them, such as the disclosure index and textual analysis, and (ii) a non-disclosure-based approach that deals with disclosure as a latent (unobservable) variable that we indirectly observe through the values of another observable variable(s). These non-disclosure observable variables can be

[13] In our view, this definition of construct validity could be seen as a narrower application of the former, as Weber limits the potential external variables to other measures of the same construct only.

further classified into formative variables and reflective variables, depending on whether the measure is a determinant or a consequence of disclosure. Our systematic review shows that most prior studies tend to use disclosure-based measures rather than non-disclosure-based measures when investigating disclosure. This is because disclosure-based measures have concrete links to actual disclosure and their reliability and validity can be extensively assessed – as in prior studies. Additionally, most measures of disclosure uncovered in our review are discrete. Discrete measures can be bivariate (0/1 dummies) or multivariate (e.g., disclosure index). Some non-disclosure-based measures are continuous (e.g., market liquidity). However, most disclosure proxies merely rank companies relative to each other, that is, there is no true zero point. Thus, these measures do not possess the characteristics of a ratio scale, but at best only possess the characteristics of an interval scale. Other measures are merely ordinal. Whether a measure is discrete or continuous is important because it impacts the type of econometric analysis that can be employed on the data.

We find that traditional methods for measuring disclosure through direct investigation of a disclosure vehicle such as the disclosure index method continue to dominate the literature, with the classification approach being particularly popular. This prevalence seems to be motivated by ease of coding and the ability to consider large samples. However, the classification approach only sorts companies into mutually exclusive groups with no attempt to study variations in the disclosure attribute within each group. To the best of the authors' knowledge, no new methods are observed that investigate a disclosure vehicle directly, but new directions in the application of automated textual analysis are observed. For example, Grüning (2011) uses VSM, a supervised machine learning tool, to analyze phrases rather than words and to replicate human coding, while Brown and Tucker (2011) use VSM to measure document similarity. Further developments in the artificial intelligence area are expected to induce improvement in automated textual analysis by providing different units for investigation and new directions of analysis. For example, the application of the concept of deep learning in natural language processing could enhance machine coding of textual sentiment analysis and eliminate human involvement (e.g., Araque, Corcuera-Platas, Sánchez-Rada, & Iglesias, 2017; Chen, Xu, He, & Wang, 2017b). However, automated textual analysis methods will never replace careful and close reading of texts given the complexity of language and research interests in both the intended and unintended information conveyed by the text (Grimmer & Stewart, 2013; Loughran & McDonald, 2016). Another common feature of traditional methods is that they focus on individual items of information, key words or phrases rather than the inter-relationship between them. New visualization methods in qualitative data analysis software, such as tag clouds, tree maps, cluster analysis, and word trees, will help researchers to see the patterns and connections in their data and gain more insight about the disclosures.

The non-disclosure-based measurement approach considers a range of observable variables that are related to financial disclosure, such as market-based measures. The non-disclosure-based measures are used to reflect on the different dimensions of financial disclosure such as its quality and quantity. The measures are relatively less labor-intensive for researchers because these they do not require detailed analysis and coding of the disclosure instruments. Data are mostly retrieved and coded from databases, thus enabling the usage of large-scale samples. This may be a pragmatic response to the preference given to large samples by US–based journals. However, the link between these observable variables and financial disclosure may be weak or bidirectional, thus they should be treated with caution.

In addition, an estimation model that involves these variables is likely to suffer from endogeneity bias for different reasons such as reduced-form research design.

We also discuss some empirical challenges related to causal claims and the reliability and validity assessment of measures of disclosure. To make a causal claim between a measure of disclosure and other observable variables, a full theoretical causal path must be grounded in theory and properly examined using suitable econometric methods. However, the theoretical link between disclosure and other observable variables might be weak or bidirectional and the research model might be susceptible to endogeneity bias. If endogeneity exists, scholars must deal with it, otherwise their results cannot be interpreted. Antonakis et al. (2010) provide an excellent review of the different sources of the endogeneity problem and present methods that allow social scientists to test causal claims in non-experimental settings where randomization is not possible. In addition, the Granger causality test might statistically help to detect the direction of causation (Gujarati, 2010) for temporal data, but the results of this test are sensitive to the number of lags included. While there are some attempts to discuss sources of endogeneity bias in accounting research in general (e.g., Larcker & Rusticus, 2010; Tucker, 2010; Peel, 2016; Gow et al., 2016; Leuz & Wysocki, 2016) to date, a comprehensive review of causal claims in corporate financial disclosure literature is lacking. Due to the gravity of this issue and how false inferences from empirical studies could impact business practice and policy formulation at firm level and national and international levels, future research might consider reviewing causal claims in prior empirical financial disclosure studies and their methodological rigor.

Finally, we document a low level of reliability and validity testing within papers identified in our systematic literature review. Reliability and validity tests are mainly performed in studies employing either textual analysis or the disclosure index method to measure disclosure. Furthermore, these two methods have the advantages of being disclosure-based and flexible measures of disclosure; hence they could be considered superior to other measures of disclosure. However, 'reliability' and 'validity' are typically perceived as inversely related (Deffner, 1986). For instance, while human coding shows greater validity because coding can be linked to the underlying construct, it is subject to judgement and coding errors which could reduce its reliability. Therefore, while validity assessment will continue to be essential for all measures of financial disclosure in future research because they are developed to measure a construct that cannot be measured directly, reliability assessment will only be an issue for the measures that are subject to coders' judgment and errors. In addition, researchers should be cautious because validity is context-specific, that is what could be a valid measure for corporate financial disclosure in one context might be invalid in a different context.

A current phenomenon of research into corporate financial disclosure is that it often fails to state explicitly the dimension of disclosure it is investigating (e.g., quantity, quality, tone, prominence, etc.). This is problematic because different measures of disclosure may only be appropriate for investigating specific dimensions of disclosure. For example, while textual analysis could be a suitable method to measure the extent of disclosure, a classification method would be more suitable to examine the prominence given to certain disclosures. Additionally, different inferences can be drawn about different dimensions of the same type of disclosure. For example, some prior studies use disclosure quantity (e.g., Cheung et al., 2010; Mouselli et al., 2012) as a proxy for disclosure quality, although the quantity and the quality measures may lead to different rankings for one sample of companies. In addition, the concept of disclosure quality is subjective and what constitutes quality is still a research question (e.g., Core, 2001; Botosan, 2004; Beattie et al., 2004). Also, more disclosure (quantity) can come at the cost of quality if it hinders readability and increases complexity. Therefore, future researchers should be explicit about the exact dimension(s) of financial disclosure they are investigating and whether the measure of disclosure being employed is, in fact, measuring what it seeks to measure. Additionally, some methods or measures of disclosure are limited in their scope (either numbers or texts) such as textual analysis which focuses on analyzing texts, whereas properties of reported earnings approach focus on accounting numbers only. Therefore, inferences obtained from such metrics should be qualified to reflect their limitations. Furthermore, prior studies have tried to develop proxies for the different dimensions of financial disclosure such as transparency, complexity, quantity, quality, tone, etc. However, a comprehensive list of the necessary and sufficient dimensions of disclosure is lacking, which future research might seek to develop.

Whether a measure of disclosure can be used to assess voluntary or mandatory disclosure is another issue that a researcher needs to consider. Most disclosure-based measures have the flexibility to be applied to different types of disclosure. However, while manual coding can possibly account for different types of disclosure being studied, machine coding is less able to distinguish between the two types of disclosure based on a search of some key words or targeted phrases. This problem can be mitigated if the document is only covering one type of disclosure. On the other hand, some measures are linked to a specific type of disclosure such as the properties of reported earnings, which relate to financial reporting regulations. Others, such as a disclosure survey (Beyer et al., 2010), can capture both voluntary and mandatory disclosures. Therefore, future researchers should be clear about their choice of disclosure measure and consider whether it is solely identifying the specific type of disclosure they aim to measure.

Another related issue to consider is the time orientation of information disclosure, that is whether it is historical information, concurrent information or forward-looking information. Some measures of disclosure can be used to reflect on these different aspects of disclosure such as the disclosure index and textual analysis methods. Other measures of disclosure can only reflect on a specific type of information. For example, attributes of management forecasts are measures for forward-looking information, while properties of reported earnings are reflecting on historical information. Thus, understanding the time orientation of information disclosure is important to define a suitable measure for disclosure. Additionally, the content of disclosure could vary, which might cause different proxies of the same attribute of the same type of disclosure to behave differently in empirical analysis. For example, Francis et al. (2008) find that various measures of the level of voluntary disclosure (self-constructed disclosure index, management forecast behavior, press releases, conference calls) do not produce consistent results in their relations with earnings quality and cost of capital. They suggest that these different measures of the extent of voluntary disclosure are likely to capture different forms of voluntary disclosure (forward-looking information supplied by management; contemporaneous discussion of results in conference calls; an overall index of voluntary disclosure in mandatory filings) that have different content and are likely to be motivated by different managerial incentives.

Given the several aspects of financial disclosure that are at play, and the considerable number of measures of financial disclosure identified in our paper, there is a scope for further research into how the different measures, all other things being equal, compare with one another. It would be interesting to obtain or calculate as many proxies of disclosure as possible for a carefully selected sample of companies. Analysis could then be carried out to see how the different proxies compare in one period and over time. Future research might also investigate the interactions between the different dimensions, the different time orientation and the different types of disclosure, their determinants and consequences, and how they compare. For example, how does the quality of concurrent voluntary disclosure compare to the quality of forward-looking voluntary disclosure? And which one is better able to explain changes in firm value for example, and why? How does the tone or complexity of concurrent voluntary disclosure compare to that of concurrent mandatory disclosure? Which type of information disclosure tends to be more complex and why?

To conclude, the concept of corporate financial disclosure is inherently complex. Corporate financial disclosure has different types (mandatory and voluntary), different vehicles (e.g., company reports, conference calls and press release), different time orientations (e.g., historical data, concurrent data, forward–looking data), different dimensions (e.g., quality, quantity, tone, and prominence), and different formats (e.g., numbers and texts). The different aspects of corporate financial disclosure are probably impossible to unequivocally and conclusively determine. Consequently, all measurement, to some extent, is inevitably subjective and partial. This paper identifies 11 common measures of disclosure that a researcher can choose from depending on the purpose of study, data availability and economic factors in terms of time, effort and money needed to develop a measure of disclosure. However, more work is needed to develop innovative and diverse research methods that can capture the richness of the concept of financial disclosure. New methods need not be sophisticated if simple methods can address the research question(s).

Scholars introducing new methods to the literature should explain them in detail to make their results replicable.

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Table 1. Measures for disclosure identified in previous review articles

	Marston and Shrives (1991)	Jones and Shoemaker (1994)	Healy and Palepu (2001)	Beattie et al. (2004)	Beyer et al. (2010)	Leuz and Wysocki (2016)
Type of Disclosure	Mandatory, Voluntary	Thematic analysis of narratives in annual reports, etc.	Voluntary	Narratives in annual reports	Voluntary, mandatory, quality	Mandatory, voluntary, quality
Methods /Measures Identified	Disclosure index	Characters, words, lines, sentences, paragraphs, themes, whole documents	Self-constructed measures (disclosure indices)	Semi-objective: Textual analyses – thematic content analysis Disclosure index studies	Natural language processing technologies Self-constructed indices	Text-based measures Disclosure index
			AIMR scores (analysts' ratings)	Subjective – usually analysts' ratings	AIMR scores	AIMR scores
			Management forecasts		Management forecasts and conference calls	Specific disclosures such as management forecasts, conference calls and segment disclosures
					Properties of reported earnings	Properties of reported earnings
						Binary indicators and frequency of disclosures.

Table 2. Information about the sample of studies used in the systematic review

This table shows a break-down of the 280 papers covered in this review by journal.

Journal	**Number of papers**	**%**
The Accounting Review	45	16.07
Journal of Accounting and Economics	40	14.29
Journal of Accounting Research	31	11.07
The International Journal of Accounting	26	9.29
Review of Accounting Studies	22	7.86
Contemporary Accounting Research	19	6.79
Journal of Accounting and Public Policy	19	6.79
European Accounting Review	17	6.07
Accounting Horizons	16	5.71
The British Accounting Review	15	5.36
Journal of Accounting, Auditing and Finance	9	3.21
Abacus	7	2.50
Journal of Business Finance and Accounting	6	2.14
Accounting and Business Research	3	1.07
Accounting, Organizations and Society	2	0.71
Accounting Forum	1	0.36
Accounting, Auditing and Accountability Journal	1	0.36
Critical Perspectives on Accounting	1	0.36
Total	280	100

Table 3. Common proxies for financial disclosure

This table shows the extent of commonly used measurements for disclosure in prior studies and provides some exemplars.

Measurement	Approach	Count	%	Exemplars
Classification approach	DB	112	30.19	Bowen, Davis, and Matsumoto (2005); Marquardt and Wiedman (2007); Hollander, Pronk, and Roelofsen (2010); Gillan and Panasian (2014); Cannizzaro and Weiner (2015).
Disclosure index	DB	50	13.48	Dargenidou, Mcleay, and Raonic (2006); Guedhami and Pittman (2006); Hodgdon, Tondkar, Adhikari, and Harless (2009); Han, Kang, and Yoo (2012); Melis, Gaia, and Carta (2015); Mangena, Li, and Tauringana (2016).
Disclosure count	DB	36	9.70	Debreceny and Rahman (2005); Bergman and Roychowdhury (2008); Lu, Richardson, and Salterio (2011); Fu, Kraft, and Zhang (2012); Kirk and Vincent (2014); Brochet, Naranjo, and Yu (2016).
Properties of reported earnings	DB	34	9.16	Wang (2006); Altamuro and Beatty (2010); Chen, Hope, Li, and Wang (2011); Kim and Venkatachalam (2011); Koh, Rajgopal, and Srinivasan (2013); Filip, Labelle, and Rousseau (2015).
Sentiment analysis	DB	34	9.16	Kothari, Li, and Short (2009); Li (2010b); Bamber, Hui, and Yeung (2010); Rogers, Van Buskirk, and Zechman (2011); Kravet and Muslu (2013); Yekini, Wisniewski, and Millo (2016).
Textual analysis	DB	31	8.36	Boesso and Kumar (2007); Abraham and Cox (2007); Grüning (2011); Brown and Tucker (2011); Miihkinen (2012); Filzen and Peterson (2015)
Attributes of management forecasts	DB	29	7.82	Yang (2012); Bonsall, Bozanic, and Fischer (2013); Cole and Jones (2015); Kitagawa and Okuda (2016); Zuo (2016).
Regulatory change that affects disclosure	NDB	21	5.66	Zhou (2007); Leuz, Triantis, and Wang (2008); Wang (2010); Arping and Sautner (2013); Bonaimé (2015); Cho (2015).
Market-based measures	NDB	10	2.70	Ascioglu, Hegde, and McDermott (2005); Rogers (2008); Rogers and Van Buskirk (2009); Reeb and Zhao (2013).
Disclosure surveys	NDB	7	1.89	Nikolaev and Van Lent (2005); Daske and Gebhardt (2006); Brown and Hillegeist (2007); Huang and Zhang (2012); Glaum, Baetge, Grothe, and Rster (2013).
Use of GAAP (e.g., US GAAP or IFRS) to indicate higher disclosure	NDB	7	1.89	Van Tendeloo and Vanstraelen (2005); Lapointe–Antunes, Cormier, Magnan, and Gay-Angers (2006); Wan-Hussin (2009); Frino, Palumbo, Capalbo, Gerace, and Mollica (2013).
Total number of common proxies of disclosure		371*	100	

*. Some studies use more than one measure of disclosure, therefore the total number of measures of disclosure employed in prior studies exceeds the number of studies covered in our systematic review, that is 280 studies. DB (NDB): disclosure-based (non-disclosure-based) measurement approach.

Table 4. Summary of common disclosure-based measures of financial disclosure

This tables provides a summary of common disclosure-based measures of corporate financial disclosure covered in this review. It shows how each measure reflects on a specific dimension(s) of disclosure and the common pros and cons. It also shows whether the measure of disclosure is discrete or continuous which can impact the type of econometric analysis that can be employed.

Measurement	**Dimension of disclosure**	**Type of variable**	**Main Strengths and weaknesses**
Classification approach	It is used to measure different dimensions of disclosure	Discrete	*Pros.* The approach is flexible and can be applied to different types and dimensions of disclosure. It can capture one type of disclosure at a time. It is easy and economical to use in terms of the time, effort and money consumed, and can be applied to large samples. *Cons.* It merely classifies the data to mutually exclusive categories without any attempt to capture differences in the dimension of disclosure among the members of the same group. Coding could be subjective, and hence results could be difficult to replicate, compare and generalize.
Disclosure index	It is typically used to measure the quantity and/or quality of disclosure	Discrete	*Pros.* The measure fits the project well. The method is flexible and can be applied to different types of disclosure. It can also capture one type of disclosure at a time. *Cons.* Self-constructed disclosure index is a subjective method for measuring disclosure, hence the results are hard to replicate and generalize. It is also a labor-intensive and time-consuming method which results in utilizing small samples.
Disclosure Count	It is commonly used to measure disclosure quantity	Discrete	*Pros.* The approach is flexible and can be applied to different types of disclosure. It is easy and economical to use in terms of the time, effort and money consumed, and can be applied to large samples. *Cons.* It merely counts the number of disclosures being made without any attempt to investigate their content or context. It could also be driven by different managerial incentives other than facilitating communication with external providers of capital.
Properties of reported earnings	They are usually used to measure the quality of financial reporting	Discrete or continuous	*Pros.* Both continuous and discrete proxies for disclosure can be constructed. Coding is relatively easy and time-efficient and can be used for large-scale samples. Measures can facilitate consistent measurement across firms. *Cons.* The quality of financial reporting is not limited to accounting quality only. Different properties of reported earnings may capture different dimensions of quality (Berger, 2011). Other disclosure activities that could serve as a substitute or a complement.
Sentiment analysis	It is usually used to measure the tone of financial disclosure	Discrete or continuous	*Pros.* The approach is flexible and can be applied to both quantitative and qualitative financial information. It is easy and economical to use with quantitative data and can be applied to large samples. Both continuous and discrete measures for disclosure can be constructed. *Cons.* The approach is inevitably subjective. While quantitative data can be distorted, textual sentiments can be driven by different managerial incentives such as management reputation.
Textual analysis	It is frequently used to measure the quantity and quality of disclosure	Discrete	*Pros.* The approach is flexible and can be applied to different types of disclosure. Automated textual analysis is particularly easy and economical to use in terms of the time, effort and money consumed, and can be applied to large samples. *Cons.* The use of key words does not provide a sound unit of analysis. Using inappropriate or insufficient key words could lead to over- or underestimation of disclosure level. In addition, coding based on a pre-defined list of words that is developed in isolation of actual disclosure texts may not be able to fully capture the construct under investigation, which limits the validity of the constructed measure of disclosure.

Attributes of management forecasts	They are traditionally used to measure the quantity and quality of voluntary disclosure for the US market.	Discrete or continuous	*Pros.* Both continuous and discrete measures for disclosure can be constructed. Coding is relatively easy and time-efficient and can be used for large-scale samples. *Cons.* Management forecasts are relatively less comprehensive measures of disclosure and they could be subject to earnings management, which would affect the quality of these forecasts as measures of disclosure.

Table 5. Summary of common non-disclosure-based measures of financial disclosure

This tables provides a summary of common non-disclosure-based measures of corporate financial disclosure covered in this review. It shows how each measure reflects on a specific dimension(s) of disclosure and the common pros and cons. It also shows whether the measure of disclosure is discrete or continuous which can impact the type of econometric analysis that can be employed.

Measurement	**Dimension of disclosure**	**Type of variable**	**Main Strengths and weaknesses***
Formative measures			
Regulatory change that affects disclosure	It is often used to proxy for a change in the quantity or quality of disclosure	Discrete	*Pros*. The approach is easy to use and economical in terms of time, effort and money consumed in constructing a proxy for disclosure. *Cons*. The variable merely indicates a change in disclosure, with no attempt to measure the size of that change. There is no attempt to assess actual level of compliance with the regulatory change, which could be problematic, particularly in the absence of strong enforcement policies.
Voluntary use of GAAP (e.g., US GAAP or IFRS) to indicate higher disclosure	It is generally used to proxy for higher level of disclosure quantity and/or quality	Discrete	*Pros.* It is a relatively easy and time-efficient variable to construct and can be used for large-scale samples. *Cons.* It only divides the sample into two mutually exclusive groups where actual disclosure can still differ among the members of the same group.
Reflective measures			
Market-based measures	They are frequently used to proxy for the quality of disclosure	Discrete or continuous	*Pros.* These measures are easily obtainable from databases and can be used for large samples. Also, they can be constructed using both discrete and continuous variables. *Cons.* However, these measures usually suffer from a lack of theoretical casual path linking them with disclosure and are likely to be noisy measures of disclosure.
Disclosure surveys	They are usually used to proxy for disclosure quantity and quality	Discrete	*Pros.* Disclosure scores are ready-made by professional analysts and can be obtained for sizable samples. *Cons.* The scores reflect analysts' perceptions about firms' disclosure policies, rather than direct investigation of actual disclosure practices. Analysts' ratings are profoundly geared towards large firms. This approach is subject to measurement bias because the disclosure score created could capture not only the disclosure practice of a company but also its fundamental characteristics and performance.

*These measures share some common cons such as a reduced-form research design and their relationship with disclosure could be bidirectional.

Table 6. The extent of conducting reliability and validity tests in prior studies

This table shows a list of the studies that have conducted some sorts of reliability and validity testing on their measures of disclosure, so studies that have not explicitly done so are not listed in this table.

Test	**Disclosure Index**	**Textual analysis/ *Textual Sentiment Analysis***	**Other Measures of Disclosure**
Test-retest	Al-Akra and Ali (2012).	Boesso and Kumar (2007).	
Inter-coder reliability	Owusu-Ansah and Yeoh (2005); Cheng and Courtenay (2006); Al-Shammari, Brown, and Tarca (2008); Cheung et al. (2010); Cormier, Aerts, Ledoux, and Magnan, (2010); Melis et al. (2015); Mangena et al. (2016).	Linsley and Shrives (2006); Abraham and Cox (2007); Boesso and Kumar (2007); *Hooghiemstra (2010);* Miihkinen (2012); Chen et al. (2017a).	Adhikari and Duru (2006); Carcello, Hollingsworth, and Neal (2006); Entwistle, Feltham, and Mbagwu (2006); Hollander et al. (2010); Plumlee and Yohn (2010).
Internal consistency	Cheng and Courtenay (2006); Lapointe–Antunes et al. (2006); Kelton and Yang (2008); Cormier et al. (2010); Hassan et al. (2009).	Abraham and Cox (2007); Elshandidy et al. (2015).	
Content validity	Akhtaruddin (2005); Owusu-Ansah and Yeoh (2005); Cheng and Courtenay (2006); Lim et al. (2007); Orens and Lybaert (2007); Patelli and Rencipe (2007); Al-Shammari et al. (2008); Francis et al. (2008); Webb et al. (2008); Çürük (2009); Hodgdon et al. (2009); Sutthachai and Cooke (2009); Al-Akra, Eddie, and Ali (2010a; 2010b), Melis et al. (2015); Bazrafshan et al. (2016).	Linsley and Shrives (2006); Abraham and Cox (2007); Boesso and Kumar (2007); *Feldman, Govindaraj, Livnat, and Segal (2010); Sun (2010);* Miihkinen (2012); *Merkley (2014);* Brochet et al. (2015).	Plumlee and Yohn (2010).
Criterion validity	Melis et al. (2015).	Boesso and Kumar (2007); Grüning (2011); Ernstberger and Grüning (2013).	Beneish, Billings and Hodder (2008).
Construct validity	Cheng and Courtenay (2006); Lapointe–Antunes et al. (2006); Guedhami and Pittman (2006); Patelli and Rencipe (2007); Francis et al. (2008); Mangena et al. (2016).	Li (2010b); Brown and Tucker (2011); Grüning (2011); Ernstberger and Grüning (2013); *Kravet and Muslu (2013); Blanco, Lara, and Tribó (2014)*; Brochet et al. (2015); Chen, et al. (2015); Elshandidy et al. (2015); Filzen and Peterson (2015).	Gu and Li (2007); Wang (2007); Files (2012).

*. These include classification approach, disclosure count and market-based disclosure measures. References in italic are examples of textual sentiment analysis.

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Earnings acceleration and stock returns☆

Shuoyuan He [a, b], Ganapathi (Gans) Narayanamoorthy [a, *]

[a] Tulane University, USA
[b] San Francisco State University, USA

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ABSTRACT

We document that earnings acceleration, defined as the quarter-over-quarter change in earnings growth, has significant explanatory power for future excess returns. These excess returns are robust to a wide range of previously documented anomalies and a battery of risk controls. The future return predictability appears to be consistent with investors assuming a seasonal random walk model for quarterly earnings and missing predictable implications of earnings acceleration for future earnings growth. Finally, the excess returns from the basic earnings acceleration strategy can be enhanced further by focusing on profit firms, low earnings volatility firms and on specific patterns of earnings acceleration.

1. Introduction

Earnings acceleration, or the change in earnings growth, has anecdotally been discussed as a viable trading strategy in the popular press.[1] Despite anecdotal references to its use in the investing world, and in contrast to the vast number of studies on the capital market implications of earnings growth (Kothari, 2001; Lakonishok et al., 1994; Dechow and Sloan, 1997; Bernard and Thomas, 1989; Akbas et al., 2017), earnings acceleration has received limited research attention. In this study, we examine the implications of earnings acceleration for future stock returns.

We measure earnings acceleration as the change in earnings growth from one quarter to the next, where earnings growth is the scaled change in earnings over the corresponding quarter a year ago. Using a sample of 377,907 observations spanning

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* Corresponding author.
E-mail addresses: shhe@sfsu.edu (S. He), gnarayan@tulane.edu (G. Narayanamoorthy).

[1] For example, American Century Investments appears to actively focus on companies with accelerating earnings (see http://americancenturyblog.com/wp-content/uploads/Chart-of-the-Week-Mar.-4-2012-Earnings-Acceleration.pdf). Investor's Business Daily, a historically influential newspaper targeted at investors, promotes a stock picking formula that incorporates "earnings acceleration" (see O'Neil, 1999). Several additional examples are cited in Cao et al. (2011).

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8,824 different firms and 176 fiscal quarters from 1972 to 2015, we find that earnings acceleration is a significant predictor of future stock returns.[2] A trading strategy that involves going long in the top decile of quarterly earnings acceleration and short in the bottom decile of earnings acceleration produces large market-adjusted returns, both in one-month and quarter-long trading windows that start two days after an earnings announcement. We find market-adjusted returns of 1.8% (3.4%) over the month-long (quarter-long) window, which translates to annualized returns in excess of 23% (14%). The significant excess returns persist even when low priced stocks (less than $5) and/or low capitalization stocks (up to $0.5 billion) are excluded from the trading strategy. While the primary trading strategy involves buying/selling stocks two days after the earnings announcement, we still obtain significant excess returns when a conservative trading strategy involving calendar month rebalancing is adopted.

We conduct a battery of tests to rule out two potential explanations for the excess returns: (a) the returns are a manifestation of an already known anomaly, and (b) the analysis omits a risk factor. First, to rule out the known anomaly explanation, we demonstrate that the excess returns are robust to the inclusion of several known anomalies, namely post-earnings announcement drift (PEAD, Bernard and Thomas, 1990), profit trend anomaly (Akbas et al., 2017), combination of known mispricing factors (Stambaugh and Yuan, 2017), gross profit anomaly (Novy-Marx, 2013), accrual anomaly (Sloan, 1996), past earnings volatility (Cao and Narayanamoorthy, 2012), return momentum (Jegadeesh and Titman, 1993), total asset growth anomaly (Cooper et al., 2008), as well as the size and book-to-market anomalies. Second, to preclude a missing risk factor explanation, we document the robustness of our results to the use of Fama-French three-factor and Carhart four-factor adjusted returns. More recently, Fama and French (2015) have proposed a five-factor model that augments the previous three-factor model with two additional factors − investment and profitability. The results are robust to the use of Fama-French five-factor adjusted returns as well. Additionally, the trading strategy spanning 176 quarters rarely produces losses − for a risk explanation, the frequency of losses would be significantly higher.

After ruling out the known anomaly and risk explanations, we then explore the nature of the price relevant information in earnings acceleration that is apparently missed by the market leading to the abnormal returns. We specifically examine whether earnings acceleration has implications for subsequent earnings growth and whether these implications are missed by the market. Recall that, in the PEAD context, the measure of earnings growth (which is basically earnings change from a seasonal random walk model − labeled Standardized Unexpected Earnings or SUE) has been shown to predict future earnings growth, especially one quarter ahead. We test and find that earnings acceleration has implications for earnings growth, especially two and three quarters ahead. Such prediction is incremental to the predictions of past earnings growth, which have been documented before in the context of the PEAD. We also find significant short-window three-day abnormal returns surrounding earnings announcements of these two future quarters. Significant short-window announcement returns make a risk-based explanation for the anomaly unlikely (Brown and Warner, 1980, 1985; Rangan and Sloan, 1998).

Since earnings acceleration is associated with both future returns and future earnings growth, we structure a formal efficiency test to directly associate the future returns from earnings acceleration with the implications of earnings acceleration for future earnings growth. Along the lines of Sloan (1996), we employ the Mishkin test and document that the abnormal returns are associated with the relation between earnings acceleration and future earnings growth.[3]

Having shown that the excess returns are consistent with the market missing the implications of earnings acceleration for future earnings growth, we then explore a possible information processing bias underlying the market missing these implications.[4] It is well known that most quarterly earnings announcements are accompanied by a comparison to earnings from the corresponding fiscal quarter a year ago. The abnormal returns documented in this study are consistent with investors anchoring on earnings change from four quarters ago (i.e., assuming earnings follows seasonal random walk) and ignoring intermediate earnings outcomes. If the true earnings process follows a seasonal random walk (SRW), there would be zero correlation between earnings acceleration and future earnings growth. However, the empirically observed non-zero correlations between earnings acceleration and future earnings growth (and future returns) occur when we assume that the true earnings process is non-seasonal like, for example, IMA (1,1). Thus, our finding of the market missing the implications of earnings acceleration for future earnings growth is consistent with the market adopting a SRW model (thus assuming zero correlations between earnings acceleration and future growth) when the true process is IMA (1,1).[5]

Furthermore, we analytically show that the correlations between earnings acceleration and three of the next four quarters' earnings growths monotonically decrease in the IMA (1,1) parameter, and the correlation for the other quarter is nearly constant. The IMA (1,1) parameter represents the extent of mean reversion in the earnings process. Thus, if the market is missing the above correlations, the excess returns will be larger with lower mean reversion. Consistent with this prediction, we document that earnings acceleration effect is stronger among profit firms and among firms with low earnings volatility, both of which have been shown to be associated with lower mean reversion (Brooks and Buckmaster, 1976; Dichev and Tang,

[2] While majority of our tests focus on earnings acceleration, we show that general acceleration strategies involving changes in growth of sales and profitability demonstrate similar abnormal returns.

[3] Some recent studies employing the Mishkin test framework include Chen and Shane (2014), Hui et al. (2016) and Ma and Markov (2016).

[4] Fama (1998) argues that documenting abnormal returns alone is not enough and recommends the presentation of a valid alternative model documenting information processing biases that can explain the observed results. A notable feature of our study is that we provide such an alternative.

[5] While the signs of the correlations observed between earnings acceleration and future earnings growth can be generated by a number of non-SRW processes, the IMA (1,1) assumption appears to predict the magnitudes of the correlations well and hence appears to be a reasonable approximation for the true earnings process in this specific context.

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2009). Additionally, going long on high earnings acceleration firms represented by consecutive positive earnings growth quarters (which signifies low mean reversion) and going short on low earnings acceleration firms represented by positive earnings growth followed by negative earnings growth can improve the anomalous returns by nearly 45% (from 1.8% to 2.6% over a month).

Recently, there are heightened p-hacking concerns with studies documenting anomalies. Harvey et al. (2016) recommend a higher hurdle (t-statistic greater than 3.0) for any new variable purporting to explain the cross-section of returns. Earnings acceleration comfortably beats this hurdle. Green et al. (2017) document that post-2003 returns from several well-documented anomalies are insignificantly different from zero. The earnings acceleration anomaly continues to perform well even in the post-2003 period. Several previously documented anomalies do not remain significant when equal-weighted portfolios are replaced by value-weighted portfolios (Hou et al., 2017). Our results remain robust to the construction of value-weighted portfolios.

To our knowledge, this is the first study to examine the implications of earnings acceleration for future returns. Cao et al. (2011) find that annual earnings acceleration is associated with long window contemporaneous returns.[6] We make two significant departures from Cao et al. (2011) in this study. First, we focus on *future* returns rather than *contemporaneous* returns since we are interested in whether the market is efficient in incorporating the effects of earnings acceleration. Second, given the anomaly context, we focus on *quarterly* earnings growth rather than *annual* earnings growth since much of the information to the market in an annual earnings number has been pre-empted by three quarterly earnings numbers and likely is assimilated in the stock price well before the annual earnings information is released (see Lee, 1992, and Landsman and Maydew, 2002 for evidence on the speed with which accounting information is assimilated into stock prices).[7] Consequently, earnings acceleration in this study is measured as the change in earnings growth from one quarter to the next, while earnings growth is the change in earnings over the corresponding quarter a year ago.[8]

In sum, we document that abnormal returns can be earned by employing a trading strategy that goes long in high past earnings acceleration stocks and short in low past earnings acceleration stocks. The excess returns are robust to risk adjustments and other known anomalies, and are particularly relevant given the recent general disillusionment with several accounting based anomalies not being robust (Linnainmaa and Roberts, 2017; Hou et al., 2017). Additionally, we show that the anomaly is consistent with a specific information processing bias - anchoring on a SRW model for quarterly earnings. While prior literature has documented future return implications of earnings levels (Novy-Marx, 2013), earnings changes (Bernard and Thomas, 1990; Akbas et al., 2017) and earnings volatility (Cao and Narayanamoorthy, 2012), this study contributes to the literature by documenting the future return implications of earnings acceleration or the second derivative of earnings.

While we consider the abnormal returns associated with earnings acceleration a new anomaly, we acknowledge that our results can be interpreted alternatively as premium from an as yet unknown risk factor. Based on a simple dividend discount model, Fama and French (2006) demonstrate a positive relation between expected return and future profitability. Since earnings acceleration is related to future profitability, from a rational pricing perspective, earnings acceleration can alternatively be labeled a risk factor (Penman and Zhu, 2014). Regardless of the labeling, the main take-way from this study is that earnings acceleration is associated with future excess returns, and the association cannot be explained by known risk factors.

The rest of the study is organized as follows. In section 2, we present the data and basic excess return results from the acceleration-based trading strategy. We also discuss how the anomaly is distinct from previously documented anomalies and is robust to risk adjustments. In section 3, we present results on the implications of earnings acceleration for future earnings growth and short-window abnormal return tests around future earnings announcements. We also conduct formal statistical tests of the association between abnormal returns and the earnings acceleration – future earnings growth relation. In section 4, we analytically examine the relation between earnings acceleration and future earnings growth assuming the true earnings process follows IMA (1,1). In section 5, we consider alternative earnings acceleration patterns and discuss additional robustness tests. In section 6, we provide our concluding remarks.

2. Earnings acceleration and future returns

In this section, we begin with discussing our sample selection and variable construction. Next, we document abnormal returns from portfolio tests of the acceleration-based trading strategy. We also document the robustness of these returns to risk as well as to other known anomalies. Finally, we augment our portfolio test results by conducting regression tests of the anomaly.

[6] Others have used an earnings acceleration measure in their empirical tests (Aboody et al., 2004; Copeland et al., 2004; Chen and Zhang, 2007). However, they include the *forecasted* change in earnings growth in their return models, while we include the *current* (realized) change in earnings growth. Additionally, while earnings acceleration is simply a control variable in these prior studies, it is the focus of this study.

[7] A trading strategy involving annual earnings acceleration as defined in Cao et al. (2011) does not yield excess returns.

[8] There is a vast amount of literature beginning with Latané et al. (1969) that documents 4th difference in earnings to be the relevant growth measure in the context of quarterly earnings.

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2.1. Data and descriptive statistics

2.1.1. Sample selection

Data used in this study is obtained from CRSP-Compustat Merged (quarterly), CRSP (daily), and I/B/E/S (detail) databases. The sample selection procedure includes all quarterly earnings announcements from CRSP-Compustat Merged database between 1972 and 2015. We delete observations if a firm has (i) more than one earnings announcement on any date, (ii) earnings announcement date within 30 days of a previous earnings announcement date or (iii) earnings announcement date either prior to or more than 180 days after the corresponding fiscal period-end, as these observations are potentially subject to data errors. We restrict the sample to NYSE, AMEX and NASDAQ firms that have stock return data in CRSP. We exclude financial and utility firms with SIC codes from 6000 to 6999 and from 4900 to 4949, as financial and utility firms were highly regulated during much of our sample period, which can result in unusual earnings-return relationships. We require that every observation has non-missing data to calculate market capitalization (SIZE), book-to-market ratio (BM), one-month market-adjusted return (VMAR) and the various earnings acceleration measures. Our final sample consists of 8,824 firms and 377,907 firm-quarter observations from 1972 to 2015. Table 1 summarizes the sample selection procedure.

2.1.2. Construction of earnings acceleration and other variables

The measurements for all the variables used in this study are summarized in Table 2. The primary variable of interest is our earnings acceleration measure, which we define as the earnings growth in quarter t minus the earnings growth in quarter t-1. Earnings growth in quarter t is calculated as the deflated change in earnings per share (EPS) from quarter t-4 to quarter t (that is, seasonally differenced EPS).[9] We consider three alternative deflators for our earnings growth measure: the absolute value of EPS in quarter t-4, the stock price at the end of quarter t-1, and the standard deviation of EPS calculated from the most recent eight quarters (including quarter t). In other words, our earnings growth measures, EGA, EGP and EGV, are scaled measures of $EPS_t - EPS_{t-4}$. In addition, we also consider sales growth and profitability growth as alternative growth measures[10]. We define sales growth as seasonally differenced sales per share (SPS), deflated by sales per share four quarters ago, and profitability growth as the seasonally differenced return-on-assets (ROA). Thus, our first definition of earnings acceleration (EAA) is calculated as:

$$EAA_{i,t} = EGA_{i,t} - EGA_{i,t-1} = \frac{EPS_{i,t} - EPS_{i,t-4}}{|EPS_{i,t-4}|} - \frac{EPS_{i,t-1} - EPS_{i,t-5}}{|EPS_{i,t-5}|}$$

Our second definition of earnings acceleration (EAP) is calculated as:

$$EAP_{i,t} = EGP_{i,t} - EGP_{i,t-1} = \frac{EPS_{i,t} - EPS_{i,t-4}}{\text{Stock Price}_{i,t-1}} - \frac{EPS_{i,t-1} - EPS_{i,t-5}}{\text{Stock Price}_{i,t-2}}$$

Table 1
Sample Selection.
This table reports the sample selection procedures. Data are firm-quarter observations from 1972 to 2015.

All Compustat-CRSP merged database firm-quarters between 1972 and 2015	1,027,392	100%
Drop observations with missing earnings announcement date	(231,338)	−23%
Drop observations with more than one earnings announcement on the same date for the same firm	(2,215)	0%
Drop observations whose current quarter earnings announcement date is before or more than 180 days after current quarter fiscal period end date	(1,483)	0%
Drop if current earnings announcement is less than 30 days away from the previous earnings announcement	(3,976)	0%
Keep NYSE, AMEX or NASDAQ firms	(177,462)	−17%
Drop firms with SIC codes between 6000 and 6999 or between 4900 and 4949	(141,008)	−14%
Keep observations with nonmissing CRSP daily price at the earnings announcement date	(8,218)	−1%
Keep domestic common stocks	(38,998)	−4%
Drop observations with missing SIZE or BM	(4,036)	0%
Drop observations with all five acceleration measures (i.e., EAA, EAP, EAV, SA and PA) missing	(40,224)	−4%
Drop observations with missing VMAR	(527)	0%
Total	377,907	37%

[9] Following Cao et al. (2011) and Chan et al. (2003), we define earnings acceleration on a per share basis to account for the effects of mergers and acquisitions, as well as to strip out any predictability due to changes in the scale of the firm's operations.
[10] Chan et al. (2003) suggest using sales growth as an additional growth measure due to problems with negative base-period earnings. We include profitability growth because it is similar to the measure used by Cao et al. (2011).

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Table 2
Variable Definitions.
This table summarizes variable definitions.

Variables	Descriptions
VMAR	Value-weighted market-adjusted buy-and-hold return during the one-month window, defined as the raw return (two days through 30 days after quarter t earnings announcement date) adjusted for the same period CRSP value-weighted index return
VMARQ	Value-weighted market-adjusted buy-and-hold return during the quarter-long window, defined as the raw return (two days after quarter t earnings announcement date through one day after quarter t+1 earnings announcement date) adjusted for the same period CRSP value-weighted index return
EMAR	Equal-weighted market-adjusted buy-and-hold return during the one-month window following earnings announcement date
SAR	Size-adjusted buy-and-hold return during the one-month window following earnings announcement date
FF3	Fama-French three-factor-adjusted buy-and-hold return during the one-month window following earnings announcement date
FFM	Fama-French three-factor and momentum-adjusted buy-and-hold return during the one-month window following earnings announcement date
FF5	Fama-French five-factor-adjusted buy-and-hold return during the one-month window following earnings announcement date
EGA	Earnings growth (deflated by absolute value of earnings), defined as quarter t's earnings per share (EPS) minus quarter t-4's EPS, scaled by the absolute value of quarter t-4's EPS; where EPS is calculated as income before extraordinary items (IBQ), divided by shares outstanding (CSHOQ). Shares are adjusted for stock splits and stock dividends.
EGP	Earnings growth (deflated by price), defined as quarter t's EPS minus quarter t-4's EPS, scaled by the stock price at the end of quarter t-1
EGV	Earnings growth (deflated by standard deviation of earnings), defined as quarter t's EPS minus quarter t-4's EPS, scaled by the standard deviation of EPS in the most recent 8 quarters (including quarter t)
SG	Sales growth, defined as quarter t's sales per share (SPS) minus quarter t-4's SPS, scaled by quarter t-4's SPS; where quarter t's SPS is calculated as net sales (SALEQ), divided by shares outstanding (CSHOQ). Shares are adjusted for stock splits and stock dividends.
PG	Profitability growth, defined as quarter t's return-on-assets (ROA) minus quarter t-4's ROA; where ROA is defined as operating income after depreciation (OIADPQ) per share at quarter t, divided by total assets (ATQ) per share at quarter t-1. Shares are adjusted for stock splits and stock dividends.
EAA	Earnings acceleration (absolute value of earnings deflated), defined as quarter t's EGA minus quarter t-1's EGA
EAP	Earnings acceleration (price deflated), defined as quarter t's EGP minus quarter t-1's EGP
EAV	Earnings acceleration (standard deviation of earnings deflated), defined as quarter t's EGV minus quarter t-1's EGV
SA	Sales acceleration, defined as quarter t's SG minus quarter t-1's SG
PA	Profitability acceleration, defined as quarter t's PG minus quarter t-1's PG
MSCORE	Mispricing factor, from Yu Yuan's website (http://www.saif.sjtu.edu.cn/facultylist/yyuan/)
TREND	Trend in quarterly gross profitability, measured as b1 from estimating the following trend regression each quarter: GPQ = a0 + b1*t + b2*D1 + b3*D2 + b4*D3 + ε; where GPQ is calculated as sales (SALEQ) minus cost of goods sold (COGSQ), divided by total assets (ATQ)
SIZE	Market capitalization, defined as market price at earnings announcement date multiply by the total number of shares outstanding
BM	Book-to-market ratio, defined as the book value of equity at the end of quarter t divided by the market capitalization at earnings announcement date
PASTRET	Past return, defined as the value-weighted market-adjusted stock return during the [-180,-2] window before quarter t earnings announcement date
GP	Gross profitability, defined as quarter t's SALEQ minus COGSQ, divided by ATQ
ACC	Accruals, defined as quarter t's (ΔACTQ - ΔCHEQ - ΔLCTQ + ΔDLCQ + ΔTXPQ)/Average ATQ, where ACTQ, CHEQ, LCTQ, DLCQ, TXPQ represent current assets, cash and short-term investments, current liabilities, debt in current liabilities and income tax payable, respectively
VOL	Earnings volatility, defined as standard deviation of EPS in the most recent 8 quarters (including quarter t)
AG1	Asset growth (definition 1), defined as quarter t's total assets per share minus quarter t-1's total assets per share, divided by quarter t-1's total assets per share
AG2	Asset growth (definition 2), defined as quarter t's total assets per share minus quarter t-4's total assets per share, divided by quarter t-4's total assets per share
VMAR3	Value-weighted market-adjusted buy-and-hold return during the earnings announcement window, defined as the raw return (one day before through one day after quarter t earnings announcement date) adjusted for the same period CRSP value-weighted index return

Our third definition of earnings acceleration (EAV) is calculated as:

$$EAV_{i,t} = EGV_{i,t} - EGV_{i,t-1} = \frac{EPS_{i,t} - EPS_{i,t-4}}{SDEPS_{i,t}} - \frac{EPS_{i,t-1} - EPS_{i,t-5}}{SDEPS_{i,t-1}}$$

Our definition of sales acceleration (SA) is calculated as:

$$SA_{i,t} = SG_{i,t} - SG_{i,t-1} = \frac{SPS_{i,t} - SPS_{i,t-4}}{SPS_{i,t-4}} - \frac{SPS_{i,t-1} - SPS_{i,t-5}}{SPS_{i,t-5}}$$

Our definition of profitability acceleration (PA) is calculated as:

$$PA_{i,t} = PG_{i,t} - PG_{i,t-1} = \left(ROA_{i,t} - ROA_{i,t-4}\right) - \left(ROA_{i,t-1} - ROA_{i,t-5}\right)$$

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While our basic portfolio tests employ all five acceleration measures, we use EAP as our primary measure of focus in subsequent tests for two reasons. First, earnings is the most widely accepted optimal measure of firm performance. Second, the use of price as deflator is consistent with the broad capital markets literature in accounting.

To mitigate the impact of outliers, we follow prior research (see, for example, Rangan and Sloan, 1998; Livnat and Mendenhall, 2006) and transform our earnings acceleration measures into decile ranks. The decile cutoffs are based on the distribution of the previous fiscal quarter's earnings accelerations. The decile ranks are initially numbered 0 through 9. We then convert the numbers to scaled ranks by dividing by 9 and subtracting 0.5. The resulting scaled ranks vary from −0.5 to +0.5 with a mean of zero and a range of one. The range of one implies that the coefficient on earnings acceleration in a return regression represents the abnormal return from a zero investment strategy of going long on the highest earnings acceleration decile and short on the lowest earnings acceleration decile. This choice of range facilitates a comparison of the economic magnitudes of our main results to prior research.

The primary abnormal return measures in our study are calculated over two windows: (a) a window beginning two days after quarter t's earnings announcement date and ending on day 30, and (b) a window beginning two days after quarter t's earnings announcement date and ending one day after quarter t+1's earnings announcement date. We use value-weighted market-adjusted return as our measure for abnormal returns, and calculate the return as the difference between a firm's buy-and-hold raw return and the same period CRSP value-weighted index return.[11]

2.1.3. *Descriptive statistics*

Table 3 presents descriptive statistics for the sample. In Panel A, the mean and median of all five earnings acceleration measures are either negative or zero, indicating that the average firm's growth rate decreased over the time-period used in our study. In Panel B, we report Spearman and Pearson correlations among variables. Both one-month and quarter-long abnormal returns are positively correlated with all five earnings acceleration measures. The Spearman (Pearson) correlation between one-month value-weighted market-adjusted return (VMAR) and EAA, EAP, EAV, SA and PA are 0.037 (0.013), 0.043 (0.018), 0.044 (0.039), 0.034 (0.022) and 0.045 (0.029), respectively; which indicates a possible positive association between earnings acceleration and future returns. We also note that the earnings acceleration variables are negatively correlated with the profitability trend (TREND) variable, suggesting that our earnings acceleration measures represent a phenomenon different from the profitability trend phenomenon documented in Akbas et al. (2017).[12]

2.2. *Basic empirical results*

In Table 4, we present the results for both the one-month and quarter-long market-adjusted returns sorted into acceleration deciles for the five measures of acceleration. In Panel A, we report the results for equal-weighted average portfolio returns. The month-long VMAR for the bottom decile on EAP is −0.2% while the VMAR for the topmost decile is 1.6%. This represents a hedge portfolio return of 1.8% over one month, which in annualized terms is an excess return exceeding 23%. Over the quarter-long window, the corresponding hedge return is 3.4%. The hedge portfolio returns for the other four measures of acceleration over both return windows are comparable. Additionally, moving from the bottom decile to the top decile, the stock returns are monotonically increasing, showing that the anomaly gradually increases in acceleration decile and is not concentrated in a particular decile. In Fig. 1, we show the evolution of the cumulative abnormal return over the month-long (day 2 to day 30) window for the top and bottom decile of earnings acceleration. Decile one has a small negative return in the immediate aftermath of the earnings announcement and then remains at roughly that level for the entire month. Decile ten, on the other hand, increases virtually monotonically to reach 1.6% at day 30. Recent research has documented that several anomalies vanish when equal-weighted portfolios are replaced by value-weighted portfolios (Hou et al., 2017). In Panel B, we report the results for value-weighted average portfolio returns, and we find that the returns remain robust to this portfolio construction. The value-weighted portfolio for EAP, our primary acceleration variable, yields a hedge return of 1.5% over a month compared to 1.8% for the equal-weighted portfolio. The table also presents results when other acceleration variables are used. The other four acceleration measures (EAA, EAV, SA and PA) all yield consistently positive abnormal returns.

In Table 5, we present the results for the robustness of the anomaly to alternative risk adjustments. Columns one through five present returns for equal-weighted portfolios and columns six through ten provide the results for value-weighted portfolios.[13] Recall that our base results already adjust for value-weighted market index returns. In column one, we present stock returns adjusted for equal-weighted market index returns (EMAR). The excess returns again show a monotonically

[11] If a stock is delisted subsequent to portfolio formation, we compute the remaining return using the CRSP delisting return if it is available. Thereafter we reinvest any remaining proceeds in the market portfolio until the end of the holding period.

[12] Notwithstanding the negative correlation, our earnings acceleration measure is also conceptually different from the trend variable in Akbas et al. (2017). In Akbas et al. (2017), the trend in profitability is defined as the trend coefficient in an earnings level regression, meaning that the trend variable is an average of past quarter over quarter growth rates. In contrast, our earnings acceleration measure represents the change in the past quarter over quarter growth rates.

[13] While we present the results for one earnings acceleration measure (EAP) in the month-long return window, the results for this measure in the quarter-long window are similarly significant. Additionally, the results for the other four acceleration measures (EAA, EAV, SA and PA) in both return windows are similar to the results for EAP.

Table 3
Descriptive Statistics.
This table provides descriptive statistics for our sample. See Table 2 for variable definitions. Panel A reports the summary statistics. Panel B reports correlations among variables. Spearman (Pearson) correlations are presented above (below) the diagonal. Correlations that are significant at the 1% significance level are marked in bold.

Panel A: Summary statistics

	N	Mean	Std. Dev.	Q1	Median	Q3
VMAR	377,907	0.006	0.148	−0.075	−0.005	0.070
VMARQ	368,653	0.014	0.237	−0.115	−0.006	0.112
EAA	377,618	−0.035	6.822	−0.530	−0.014	0.475
EAP	377,620	−0.001	0.296	−0.007	0.000	0.006
EAV	352,331	−0.006	1.458	−0.800	−0.009	0.794
SA	373,821	−0.008	0.290	−0.082	−0.002	0.074
PA	333,298	0.000	0.031	−0.009	0.000	0.009
MSCORE	303,952	48.382	13.116	38.830	47.600	57.190
EGP	355,573	0.010	0.261	−0.005	0.001	0.006
TREND	319,224	0.000	0.008	−0.003	0.000	0.002
SIZE (millions)	377,907	2060.959	7917.914	49.826	205.669	915.994
BM	377,907	0.706	0.652	0.309	0.543	0.913
PASTRET	377,906	0.043	0.466	−0.217	−0.023	0.199
GP	360,298	0.087	0.128	0.051	0.089	0.135
ACC	288,806	0.003	0.046	−0.015	0.003	0.023
VOL	358,806	0.374	1.088	0.050	0.118	0.286
AG1	358,858	0.019	0.108	−0.021	0.011	0.046
AG2	359,861	0.099	0.292	−0.030	0.064	0.174

Panel B: Pearson (below), Spearman (above) correlations

	VMAR	VMARQ	EAA	EAP	EAV	SA	PA	MSCORE	EGP	TREND	SIZE	BM	PASTRET	GP	ACC	VOL	AG1	AG2
VMAR	1	**0.597**	**0.037**	**0.043**	**0.044**	**0.034**	**0.045**	**−0.030**	**0.029**	**0.012**	**0.048**	**0.017**	**0.017**	**0.031**	**−0.029**	**−0.024**	**0.015**	**0.006**
VMARQ	**0.617**	1	**0.044**	**0.050**	**0.053**	**0.049**	**0.055**	**−0.059**	**0.058**	**0.035**	0.004	**0.046**	**0.039**	**0.047**	**−0.033**	**−0.039**	**0.020**	**−0.008**
EAA	**0.013**	**0.015**	1	**0.697**	**0.732**	**0.280**	**0.466**	**0.050**	**0.398**	**−0.032**	0.001	**−0.010**	**0.029**	**0.036**	**0.059**	0.000	**0.064**	**−0.035**
EAP	**0.018**	**0.018**	**0.161**	1	**0.858**	**0.287**	**0.537**	**0.046**	**0.436**	**−0.038**	**0.012**	**−0.009**	**0.019**	**0.038**	**0.057**	**−0.017**	**0.078**	**−0.020**
EAV	**0.039**	**0.045**	**0.337**	**0.2692**	1	**0.318**	**0.563**	**0.058**	**0.414**	**−0.050**	**−0.007**	0.003	**0.016**	**0.026**	**0.044**	**0.008**	**0.060**	**−0.040**
SA	**0.022**	**0.032**	**0.094**	**0.0511**	**0.2453**	1	**0.443**	**−0.036**	**0.171**	**−0.065**	0.002	**−0.008**	**0.060**	**0.037**	**0.056**	**−0.009**	**0.141**	**0.046**
PA	**0.029**	**0.040**	**0.188**	**0.179**	**0.455**	**0.374**	1	**0.052**	**0.249**	**−0.074**	**−0.006**	**0.007**	**0.025**	**0.039**	**0.052**	**0.008**	**0.060**	**−0.055**
MSCORE	**−0.020**	**−0.044**	**0.034**	**0.015**	**0.061**	**−0.035**	**0.045**	1	**−0.124**	**−0.204**	**−0.144**	**0.097**	**−0.274**	**−0.337**	**−0.006**	**0.110**	**−0.091**	**−0.009**
EGP	**0.024**	**0.026**	**0.087**	**0.475**	**0.141**	**0.040**	**0.104**	**−0.031**	1	**0.347**	−0.004	**−0.096**	**0.257**	**0.121**	**0.098**	**0.032**	**0.131**	**0.041**
TREND	**0.020**	**0.036**	**−0.005**	**−0.017**	**−0.034**	**−0.058**	**−0.056**	**−0.152**	**0.086**	1	**−0.018**	**−0.085**	**0.210**	**0.172**	**0.045**	0.001	**0.028**	**−0.099**
SIZE	**−0.007**	**−0.013**	0.000	0.000	−0.001	0.003	−0.001	**−0.135**	**−0.009**	**−0.013**	1	**−0.452**	**0.160**	**−0.020**	**−0.005**	**0.090**	**0.132**	**0.180**
BM	**0.040**	**0.068**	**−0.005**	**0.004**	**0.004**	**−0.006**	0.004	**0.088**	**−0.036**	**−0.038**	**−0.140**	1	**−0.249**	**−0.191**	**−0.049**	**0.107**	**−0.125**	**−0.189**
PASTRET	**0.012**	**0.023**	**0.012**	**−0.014**	**0.014**	**0.041**	**0.017**	**−0.204**	**0.063**	**0.160**	**0.017**	**−0.205**	1	**0.122**	**0.059**	**−0.079**	**0.159**	**0.119**
GP	**0.010**	**0.018**	**0.016**	**0.007**	**0.018**	**0.030**	**0.066**	**−0.199**	−0.003	**0.193**	**0.015**	**−0.162**	**0.062**	1	**0.083**	**−0.211**	**0.173**	**0.153**
ACC	**−0.025**	**−0.028**	**0.049**	**0.029**	**0.051**	**0.050**	**0.075**	**−0.008**	**0.036**	**0.047**	**−0.010**	**−0.048**	**0.052**	**0.063**	1	**−0.071**	**0.187**	**0.140**
VOL	**−0.014**	**−0.017**	0.001	**−0.012**	**0.006**	**−0.010**	**0.005**	**0.089**	**0.179**	0.001	−0.003	**0.022**	**−0.030**	**−0.070**	**−0.033**	1	**−0.192**	**−0.275**
AG1	**−0.007**	**−0.009**	**0.048**	**0.029**	**0.045**	**0.113**	**0.042**	**−0.038**	0.003	**0.024**	**0.024**	**−0.101**	**0.149**	**0.086**	**0.191**	**−0.100**	1	**0.518**
AG2	**−0.026**	**−0.042**	**−0.015**	**−0.015**	**−0.032**	**0.044**	**−0.024**	**0.067**	**−0.065**	**−0.071**	**0.034**	**−0.143**	**0.099**	**0.044**	**0.116**	**−0.132**	**0.491**	1

Table 4
Portfolios Formed Based on Acceleration Measures.
This table reports the average market-adjusted returns for portfolios formed based on acceleration deciles. See Table 2 for variable definitions. t-statistics are reported in parentheses, and are calculated based on the time-series of the portfolio market-adjusted stock returns.

Panel A: Equal-weighted portfolio returns

	One-month abnormal returns (VMAR)					Quarter-long abnormal returns (VMARQ)				
EA deciles	EAA	EAP	EAV	SA	PA	EAA	EAP	EAV	SA	PA
Lowest	0.001	−0.002	−0.002	0.000	0.002	0.010	0.007	−0.001	0.001	0.003
	(0.404)	(−0.617)	(−1.196)	(−0.038)	(0.56)	(2.515)	(1.152)	(−0.397)	(0.225)	(0.466)
2	0.000	0.000	0.002	0.002	0.001	0.004	0.001	0.002	0.005	0.002
	(0.213)	(0.199)	(0.956)	(1.203)	(0.346)	(0.995)	(0.353)	(0.594)	(1.316)	(0.573)
3	0.001	0.001	0.003	0.003	0.003	0.003	−0.001	0.008	0.007	0.006
	(0.951)	(0.596)	(1.867)	(1.54)	(1.438)	(0.959)	(−0.195)	(2.352)	(2.275)	(1.684)
4	0.003	0.003	0.003	0.005	0.005	0.006	0.006	0.010	0.012	0.008
	(1.821)	(1.902)	(1.923)	(3.063)	(3.271)	(1.826)	(2.187)	(3.437)	(3.704)	(2.978)
5	0.004	0.006	0.007	0.006	0.006	0.009	0.012	0.017	0.014	0.013
	(2.967)	(5.159)	(4.008)	(3.933)	(3.778)	(3.326)	(5.689)	(5.078)	(5.224)	(4.603)
6	0.009	0.011	0.010	0.008	0.010	0.019	0.023	0.022	0.017	0.017
	(6.121)	(8.682)	(5.439)	(5.018)	(6.283)	(6.638)	(10.864)	(6.841)	(6.142)	(6.222)
7	0.013	0.012	0.011	0.011	0.012	0.027	0.023	0.025	0.024	0.022
	(8.213)	(7.872)	(6.445)	(7.248)	(7.288)	(7.096)	(8.586)	(7.04)	(8.165)	(7.331)
8	0.013	0.013	0.014	0.013	0.016	0.027	0.026	0.030	0.028	0.030
	(7.284)	(7.959)	(7.565)	(7.594)	(8.046)	(7.596)	(8.704)	(8.186)	(8.732)	(8.329)
9	0.014	0.015	0.016	0.014	0.018	0.033	0.031	0.032	0.032	0.036
	(7.223)	(7.279)	(8.535)	(7.628)	(8.31)	(8.529)	(7.81)	(9.168)	(8.824)	(9.172)
Highest	0.015	0.016	0.018	0.013	0.020	0.037	0.042	0.038	0.035	0.046
	(6.225)	(5.131)	(8.484)	(5.868)	(6.775)	(8.233)	(6.19)	(9.306)	(7.405)	(6.604)
Highest - Lowest	0.014	0.018	0.020	0.013	0.017	0.026	0.034	0.039	0.034	0.042
	(9.218)	(10.254)	(13.736)	(8.975)	(7.648)	(11.078)	(11.451)	(15.866)	(12.724)	(10.314)

Panel B: Value-weighted portfolio returns

	One-month abnormal returns (VMAR)					Quarter-long abnormal returns (VMARQ)				
EA deciles	EAA	EAP	EAV	SA	PA	EAA	EAP	EAV	SA	PA
Lowest	−0.002	−0.007	−0.005	−0.001	−0.003	−0.002	−0.014	−0.009	−0.005	−0.015
	(−0.824)	(−2.672)	(−2.846)	(−0.481)	(−1.087)	(−0.515)	(−2.791)	(−3.584)	(−1.418)	(−3.727)
2	−0.001	−0.003	0.002	−0.001	0.000	−0.003	−0.009	0.001	−0.007	−0.003
	(−0.443)	(−1.849)	(0.947)	(−0.657)	(−0.109)	(−1.277)	(−2.651)	(0.423)	(−2.212)	(−1.114)
3	−0.002	−0.003	0.000	0.000	−0.001	−0.007	−0.007	−0.004	−−0.001	−−0.002
	(−1.109)	(−1.573)	(−0.191)	(−0.004)	(−0.371)	(−2.862)	(−2.884)	(−1.496)	(−0.467)	(−0.731)
4	−−0.001	−−0.001	0.002	0.001	0.000	−0.001	−0.003	−0.001	−0.001	−0.001
	(−0.747)	(−0.433)	(1.192)	(0.529)	(0.321)	(−0.306)	(−1.359)	(−0.335)	(−0.738)	(−0.293)
5	0.002	0.005	0.001	0.003	0.000	−0.002	0.003	0.002	0.004	0.000
	(1.559)	(3.838)	(1.105)	(1.868)	(0.143)	(−1.2)	(1.267)	(0.66)	(1.887)	(0.152)
6	0.003	0.003	0.004	0.003	0.003	0.003	0.005	0.001	0.004	0.004
	(2.379)	(2.254)	(3.073)	(1.708)	(2.117)	(1.303)	(2.528)	(0.474)	(1.695)	(2.007)
7	0.007	0.003	0.004	0.004	0.003	0.007	0.004	0.004	0.005	0.002
	(5.04)	(1.987)	(2.918)	(3.066)	(2.12)	(3.044)	(1.749)	(1.789)	(2.374)	(0.672)
8	0.004	0.002	0.005	0.005	0.005	0.005	0.000	0.005	0.004	0.005
	(2.416)	(1.143)	(2.888)	(3.614)	(2.451)	(1.859)	(0.085)	(1.771)	(1.544)	(1.54)
9	0.002	0.005	0.005	0.005	0.009	0.004	0.008	0.008	0.007	0.011
	(0.832)	(2.326)	(2.233)	(2.682)	(4.186)	(1.499)	(2.522)	(2.84)	(2.604)	(3.021)
Highest	0.005	0.008	0.005	0.006	0.004	0.013	0.008	0.008	0.010	0.011
	(2.122)	(2.985)	(2.803)	(2.636)	(1.48)	(3.406)	(1.921)	(2.902)	(3.061)	(2.165)
Highest - Lowest	0.007	0.015	0.010	0.007	0.006	0.014	0.022	0.017	0.015	0.026
	(2.582)	(4.394)	(3.993)	(2.14)	(1.737)	(3.734)	(3.876)	(4.895)	(3.51)	(4.281)

increasing trend across the EAP deciles and the hedge portfolio return is again 1.8%. In column two, we present the results of the EAP strategy using size-adjusted returns and again obtain a hedge portfolio return of 1.8%. In columns three and four, we employ returns that are adjusted by the typical Fama French (FF) factors. Column three presents the results with the traditional three factor model and column four uses the Fama French three factor plus Momentum adjustment. Recently, Fama and French (2015) have developed and tested a five-factor model that extends their original three-factor model with investment and profitability factors. They argue that this augmented model explains a number of well-documented anomalies. In column five, we test the robustness of the earnings acceleration strategy to this augmented risk model and show that the excess hedge portfolio return remains significant over the month long window. Columns six through ten present qualitatively similar results for value-weighted portfolio returns and provide confidence in the robustness of the results to various risk adjustments. In all the remaining tests, we continue to employ the VMAR measure for excess returns.

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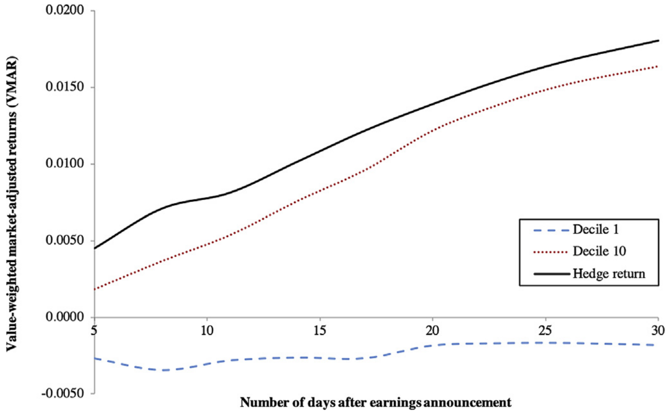

Fig. 1. Earnings Acceleration Strategy over Different Horizons.
This figure depicts the difference in value-weighted market-adjusted returns (VMAR) between top and bottom earnings acceleration (EAP) deciles over different time horizons (after earnings announcement). The x-axis represents the number of days after the earnings announcement date. The y-axis represents the VMAR for the top and bottom EAP deciles as well as their difference averaged over 176 fiscal quarters from 1972 till 2015. See Table 2 for variable definitions.

Table 5
Portfolios Formed Based on Earnings Acceleration: Alternative Risk Adjustments.
This table reports the average one-month risk-adjusted returns for portfolios formed based on EAP deciles. See Table 2 for variable definitions. t-statistics are reported in parentheses, and are calculated based on the time-series of the portfolio risk-adjusted stock returns.

	Equal-weighted portfolio returns					Value-weighted portfolio returns				
EAP deciles	EMAR	SAR	FF3	FFM	FF5	EMAR	SAR	FF3	FFM	FF5
Lowest	−0.010	−0.002	−0.004	−0.004	−0.003	−0.015	−0.008	−0.008	−0.007	−0.007
	(−5.199)	(−1.028)	(−2.273)	(−2.449)	(−1.786)	(−5.264)	(−3.072)	(−3.601)	(−3.761)	(−3.49)
2	−0.009	−0.001	−0.003	−0.003	−0.002	−0.012	−0.004	−0.003	−0.004	−0.003
	(−6.499)	(−0.414)	(−2.327)	(−2.776)	(−2.388)	(−4.631)	(−2.108)	(−2.113)	(−2.367)	(−2.112)
3	−0.008	0.001	−0.001	−0.002	−0.001	−0.011	−0.003	−0.001	−0.001	−0.001
	(−6.021)	(0.538)	(−1.735)	(−1.894)	(−1.412)	(−4.203)	(−1.603)	(−0.347)	(−0.699)	(−0.599)
4	−0.006	0.002	0.000	0.000	0.001	−−0.009	−0.001	0.000	−0.001	−0.001
	(−4.578)	(2.173)	(0.678)	(0.419)	(0.863)	(−3.425)	(−0.525)	(−0.239)	(−0.499)	(−0.74)
5	−0.003	0.005	0.003	0.003	0.003	−0.003	0.005	0.003	0.003	0.003
	(−1.804)	(5.834)	(4.227)	(3.687)	(4.112)	(−1.16)	(3.808)	(2.74)	(2.216)	(2.565)
6	0.001	0.010	0.007	0.007	0.007	−0.006	0.003	0.003	0.002	0.003
	(1.043)	(10.16)	(10.81)	(10.66)	(10.52)	(−2.339)	(2.353)	(3.145)	(2.772)	(2.541)
7	0.003	0.011	0.008	0.008	0.008	−0.005	0.003	0.003	0.002	0.003
	(2.139)	(11.142)	(10.398)	(10.205)	(10.71)	(−2.082)	(1.906)	(2.731)	(2.161)	(2.355)
8	0.004	0.013	0.008	0.008	0.008	−0.006	0.002	0.001	0.001	0.000
	(3.282)	(11.807)	(9.796)	(9.898)	(10.219)	(−2.344)	(1.051)	(1.059)	(0.948)	(0.245)
9	0.006	0.014	0.009	0.009	0.010	−0.004	0.004	0.003	0.004	0.004
	(3.731)	(10.512)	(7.787)	(8.066)	(8.452)	(−1.278)	(2.088)	(2.211)	(2.409)	(2.703)
Highest	0.007	0.016	0.011	0.011	0.012	0.000	0.007	0.005	0.005	0.006
	(3.183)	(7.084)	(5.769)	(6.107)	(6.372)	(−0.101)	(2.96)	(3.012)	(2.805)	(3.472)
Highest - Lowest	0.018	0.018	0.015	0.015	0.015	0.015	0.015	0.013	0.012	0.013
	(9.973)	(9.946)	(9.899)	(9.642)	(9.637)	(4.338)	(4.535)	(4.982)	(5.061)	(5.108)

In Table 6, we examine the robustness of the earnings acceleration strategy to other well-documented anomalies. Stambaugh and Yuan (2017) create a comprehensive mispricing measure — M-Score that incorporates several well-documented anomalies. In Panel A, we examine the robustness of the earnings acceleration strategy hedge portfolio excess returns to this M-Score measure. We follow Liu et al. (2017) in constructing portfolios independently sorted on both the M-Score measure as well as our variable of interest, namely earnings acceleration. As we move from column one to column five, we move from the lowest quintile to the highest quintile of earnings acceleration. Similarly, when we move from row one to row five, we move from the lowest M-Score (which represents underpricing) to the highest M-score (which represents overpricing). The last column depicts the returns from a hedge portfolio strategy of going long on highest quintile of earnings acceleration and short on the lowest quintile of earnings acceleration. The trading strategy yields consistently positive returns across all rows showing the robustness of the strategy to other well documented anomalies captured in M-

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Table 6
Portfolios Formed Based on Earnings Acceleration and Other Anomaly Variables.
This table reports the average one-month market-adjusted returns for equal-weighted portfolios formed based on EAP deciles and other anomaly variables (using independent sorting). See Table 2 for variable definitions. t-statistics are reported in parentheses, and are calculated based on the time-series of the portfolio market-adjusted stock returns.

Panel A: Two-way sorting, controlling for Mscore effect

			EAP					
		Mscore effect	Lowest	2	3	4	Highest	Highest - Lowest
Mscore	Underpriced	0.008	−0.002	0.001	0.009	0.015	0.020	0.021
		(6.221)	(−0.881)	(0.895)	(7.151)	(10.055)	(8.304)	(7.438)
	2	0.007	−0.003	−0.001	0.008	0.014	0.016	0.019
		(5.29)	(−1.417)	(−0.904)	(6.195)	(8.872)	(7.305)	(7.981)
	3	0.006	−0.006	0.001	0.009	0.012	0.011	0.017
		(4.555)	(−3.07)	(0.669)	(6.361)	(7.203)	(4.945)	(7.769)
	4	0.006	−0.004	0.002	0.009	0.010	0.011	0.015
		(3.802)	(−1.445)	(1.377)	(5.4)	(5.459)	(4.701)	(6.261)
	Overpriced	0.001	−0.007	0.000	0.003	0.006	0.005	0.012
		(0.684)	(−2.366)	(−0.164)	(1.538)	(2.545)	(1.998)	(5.445)
	Underpriced - Overpriced	0.006	0.005	0.002	0.006	0.009	0.014	
		(3.029)	(1.613)	(0.694)	(2.223)	(3.401)	(4.667)	

Panel B: Two-way sorting, controlling for PEAD effect

			EAP					
		SUE effect	Lowest	2	3	4	Highest	Highest - Lowest
EGP	Lowest	0.000	−0.002	0.002	−0.002	0.004	0.009	0.011
		(0.174)	(−0.839)	(0.846)	(−0.521)	(1.367)	(2.392)	(4.182)
	2	0.003	−0.003	0.000	0.007	0.006	0.010	0.012
		(2.269)	(−1.015)	(0.02)	(4.193)	(3.109)	(3.235)	(3.749)
	3	0.008	−0.002	0.000	0.010	0.011	0.016	0.019
		(6.603)	(−0.681)	(0.273)	(8.249)	(6.513)	(4.168)	(3.797)
	4	0.010	0.000	0.004	0.007	0.016	0.013	0.013
		(6.128)	(0.155)	(1.886)	(3.483)	(9.342)	(4.923)	(4.039)
	Highest	0.015	0.004	0.003	0.010	0.015	0.020	0.016
		(5.849)	(1.11)	(0.98)	(2.131)	(5.626)	(7.109)	(5.833)
	Highest - Lowest	0.014	0.006	0.001	0.012	0.011	0.011	
		(8.77)	(1.873)	(0.381)	(1.86)	(3.503)	(3.988)	

Panel C: Two-way sorting, controlling for Profit Trend effect

			EAP					
		TREND effect	Lowest	2	3	4	Highest	Highest - Lowest
TREND	Lowest	0.006	−0.001	0.004	0.011	0.010	0.011	0.011
		(3.162)	(−0.354)	(1.907)	(5.827)	(4.858)	(3.541)	(4.014)
	2	0.008	0.002	0.002	0.007	0.013	0.016	0.014
		(5.295)	(0.765)	(1.073)	(4.664)	(6.788)	(6.445)	(5.325)
	3	0.008	0.002	−0.001	0.009	0.013	0.017	0.016
		(5.349)	(0.549)	(−0.554)	(6.105)	(7.644)	(5.886)	(5.739)
	4	0.009	0.001	0.002	0.008	0.015	0.023	0.022
		(5.54)	(0.459)	(1.228)	(5.182)	(7.716)	(6.454)	(6.841)
	Highest	0.015	0.005	0.008	0.012	0.021	0.026	0.020
		(5.32)	(1.744)	(3.569)	(4.982)	(7.269)	(6.369)	(7.033)
	Highest - Lowest	0.009	0.006	0.004	0.003	0.011	0.015	
		(5.298)	(2.242)	(2.216)	(1.291)	(4.13)	(5.475)	

Score.[14] More importantly, the lowest excess return is still economically large at 1.2% over the month long window. The returns to the M-score strategy, depicted along the last row, are typically lower than the magnitude of the returns for the earnings acceleration strategy. Additionally, they do not remain consistently significant across all the earnings acceleration quintiles.

In Panel B, we follow the same methodology as Panel A, but examine the joint returns from the earnings acceleration and post-earnings announcement drift (PEAD) strategies. The key variable used in traditional PEAD studies is Standardized Unexpected Earnings (SUE). The "Unexpected" earnings are the surprise from a seasonal random walk model for earnings. Thus, they are identical to the seasonal growth in earnings, which is the growth measure we use to compute earnings acceleration. As such, we use the variable EGP to represent the same SUE variable that has been employed in the PEAD literature. Again, we

[14] The same pattern is observed when we use deciles instead of quintiles.

obtain significant excess returns to a strategy of going long in the highest EAP quintile and short in the lowest EAP quintile across all rows (as shown in the last column) and the lowest hedge return across the rows is 1.1%. In contrast, the PEAD strategy does not yield significant results uniformly across all EAP quintiles. Akbas et al. (2017) have recently documented a profitability trend anomaly that can potentially overlap with the earnings acceleration anomaly presented in this study. A direct comparison of the two anomalies is presented in Panel C. Once again, the earnings acceleration strategy tends to produce much higher excess returns than the profitability trend anomaly. More importantly, the acceleration anomaly is present across all profitability trend partitions, while the profitability trend anomaly appears to be significantly smaller in several of the earnings acceleration partitions.[15]

In addition to the hedge portfolio return tests, a typically more conservative test of the anomaly entails a regression analysis across all deciles. Besides including data from all deciles, another advantage of the regression approach is the ability to control for several risk factors and anomalies simultaneously. In Table 7, we present regression analysis of excess returns from the earnings acceleration strategy after including all the controls. For columns one through three, the dependent variable is the month-long excess return and for columns four through six, it is the quarter-long excess return. The main regression model estimated is:

$$\begin{aligned}\mathrm{VMAR(Q)}_{i,t} = \alpha_0 + \alpha_1 \mathrm{EGP}_{i,t} + \alpha_2 \mathrm{EAP}_{i,t} + \alpha_3 \mathrm{SIZE}_{i,t} + \alpha_4 \mathrm{TREND}_{i,t} + \alpha_5 \mathrm{BM}_{i,t} + \alpha_6 \mathrm{PASTRET}_{i,t} + \alpha_7 \mathrm{GP}_{i,t} + \alpha_8 \mathrm{ACC}_{i,t} \\ + \alpha_9 \mathrm{VOL}_{i,t} + \alpha_{10} \mathrm{AG}_{i,t} + \varepsilon_{i,t}\end{aligned} \tag{1}$$

where EAP is earnings acceleration, defined as quarter t earnings growth minus quarter t-1 earnings growth, and earnings growth is the seasonal change in EPS scaled by the stock price at the end of quarter t-1 (see Table 2).

The standard errors employed are from Fama-Macbeth regressions (with Newey-West correction with six lags) and hence are controlled for cross-sectional and serial correlation in the panel data. Model one includes controls for the PEAD strategy and size and model two includes additional controls for the profitability trend, book-to-market, past returns, profitability, accruals, earnings volatility and asset growth. In the discussion, we focus on the results from model two. The regression coefficient on EAP, our earnings acceleration variable, is 0.016. Recall that the EAP decile rank variable has been scaled to have

Table 7
Earnings Acceleration and Stock Returns: Regression Analysis.
This table reports the regression results testing the relation between earnings acceleration and stock returns. See Table 2 for variable definitions. Standard errors are from a Fama-MacBeth estimation with Newey-West correction for up to six lags. t-statistics are reported in parentheses. ***, **, * indicate significantly different from zero at the 1%, 5%, 10% level, respectively.

	One-month abnormal returns (VMAR)			Quarter-long abnormal returns (VMARQ)		
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.007***	0.008***	0.008***	0.016***	0.017***	0.016***
	(4.109)	(4.104)	(4.289)	(4.742)	(4.823)	(4.470)
EGP	0.009***	0.012***	0.012***	0.042***	0.038***	0.040***
	−4.956	(5.025)	(5.102)	(12.878)	(8.041)	(7.952)
EAP	0.016***	0.016***	0.015***	0.023***	0.023***	0.021***
	(10.628)	(9.221)	(9.429)	(8.792)	(8.428)	(8.251)
SIZE	−0.009***	−0.004	−0.003	−0.041***	−0.032***	−0.028***
	(−3.295)	(−1.212)	(−0.951)	(−6.797)	(−4.344)	(−3.944)
TREND		0.005**	0.004*		0.013***	0.012***
		(2.217)	(1.930)		(3.809)	(4.484)
BM		0.014***	0.014***		0.025***	0.024***
		(4.303)	(4.350)		(3.521)	(3.431)
PASTRET		−0.010***	−0.011***		−0.005	−0.006
		(−3.328)	(−3.457)		(−0.932)	(−1.097)
GP		0.011***	0.012***		0.017***	0.018***
		(3.632)	(3.778)		(3.296)	(3.696)
ACC		−0.013***	−0.012***		−0.022***	−0.019***
		(−9.909)	(−9.416)		(−9.502)	(−8.127)
VOL		−0.011***	−0.012***		−0.028***	−0.032***
		(−6.461)	(−6.993)		(−8.598)	(−10.535)
AG1		0.001			0.003	
		(0.588)			(0.995)	
AG2			−0.001			−0.014***
			(−0.219)			(−3.817)
Observations	355,492	244,864	244,864	347,802	239,353	239,353
R-squared	0.010	0.053	0.053	0.019	0.067	0.068
Number of groups	176	162	162	176	162	162

[15] We get similar results using Fama-French three- and five-factor adjusted returns instead of VMAR for all three panels A, B and C.

a range of one and a mean of zero. Thus, the coefficient of 0.016 can be interpreted as the return (1.6%) from a hedge portfolio that entails going long in the highest decile of earnings acceleration and short on the lowest decile. In column five, the corresponding incremental return is 2.3%. These returns are comparable in magnitude to the PEAD anomaly, which had returns of 1.2% over the first month and 3.8% over a quarter. Book-to-market and gross profitability have incremental returns of 1.4% (2.5%) and 1.1% (1.7%) over the next month (quarter), respectively. In contrast, the profit trend anomaly only yields incremental returns of 0.5% over the month and 1.3% over the quarter.[16]

3. Earnings acceleration and future earnings growth

So far, we have demonstrated that earnings acceleration can predict future stock returns and that these returns are robust to adjustments for risk and other known anomalies. We now explore the nature of the information contained in earnings acceleration. We examine whether earnings acceleration has incremental predictive ability for future earnings growth and whether the future abnormal return from the earnings acceleration strategy documented in section 2 is associated with this predictive ability.[17] If so, the abnormal return we document likely manifests because investors do not consider fully the implications of earnings acceleration for future earnings growth.

3.1. Implications of earnings acceleration for future earnings growth

We estimate a regression of future earnings growth on past earnings acceleration. Since past earnings growth has been shown to predict future earnings growth (in the PEAD context), we also control for past earnings growth to document that the implications of earnings acceleration are incremental.

$$\mathrm{EGP}_{t+k} = \alpha + \beta \mathrm{EAP}_t + \gamma \mathrm{EGP}_t + \varepsilon_{t+k} \tag{2}$$

Here k takes on the values 1, 2 and 3 meaning that EGP_{t+k} represents the seasonal earnings growth one, two and three quarters in the future.

Table 8 reports the regression results testing the relation between earnings acceleration and the earnings growth for each of the three subsequent quarters. Columns one, four and seven represent the basic relation between earnings acceleration and future earnings growth one, two and three quarters, respectively, in the future. While the coefficient for one quarter ahead growth is negative, the coefficients for the two subsequent quarters (i.e., 0.046 and 0.237) are significantly positive.[18] The other columns examine the effect of earnings acceleration for future earnings growth after including various controls for a wide range of potential explanatory variables for earnings growth. These control variables are defined in Table 2. With controls, the coefficients on EAP for every subsequent quarter are positive, though they are consistently stronger for earnings growth two and three quarters into the future than for one quarter into the future. In columns five and eight, the coefficients are significantly positive at 0.056 and 0.248, respectively, suggesting that earnings acceleration is a significant predictor of future two- and three-quarters-ahead earnings growth. Economically, moving from the bottom decile to the top decile of scaled earnings acceleration leads to a nearly 25% incremental change in the decile of earnings growth three quarters hence. For comparison, the EGP coefficient, that is relevant in the PEAD context, is 32% for one quarter ahead earnings growth (column two), and is actually negative (−4.5% in column eight) for three quarters ahead earnings growth.

3.2. Short-window returns around future earnings announcement dates

While our primary results employ one-month and quarter-long abnormal returns and are robust to controlling for a litany of risk factors, a further intuitive test involves shorter-window returns, which are typically less susceptible to risk considerations (Bernard and Thomas, 1990; Sloan, 1996). Specifically, since we wish to assess whether the earnings acceleration anomaly is attributable to the market missing, at least partially, the implications of earnings acceleration for earnings growth two and three quarters in the future, we examine whether abnormal returns occur in short windows around earnings announcements two and three quarters ahead.

Table 9 reports the regression results testing the relation between earnings acceleration and the three-day abnormal return surrounding each of the three subsequent earnings announcements. The coefficient on EAP is positive and significant in all columns (ranging in magnitude from 0.2% to 0.8%). The short-window excess returns are largest around the third subsequent quarter's earnings announcement (ranging from 0.7% to 0.8% in columns seven through nine). These magnitudes are comparable to or larger than historically reported three-day returns in the PEAD context. Our finding that earnings acceleration is positively associated with three-day returns around all three subsequent earnings announcements strongly indicates that investors do not appear to incorporate fully the implications of earnings acceleration for subsequent earnings in

[16] These results remain robust to estimating Fama-MacBeth regressions based on market-value-weighted least squares method as in Green et al. (2017).
[17] Such a test is analogous to the PEAD context, where current earnings growth from a seasonal random walk model had implications for future earnings growth and these implications have been shown to be associated with PEAD (see Bernard and Thomas, 1990; Rangan and Sloan, 1998, among others).
[18] When EGP is excluded, the coefficient on EAP is significantly positive and economically large for one quarter ahead as well.

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Table 8
Earnings Acceleration and Future Earnings Growth.
This table reports the regression results testing the relation between earnings acceleration and future earnings growth. See Table 2 for variable definitions. Standard errors are from a Fama-MacBeth estimation with Newey-West correction for up to six lags. t-statistics are reported in parentheses. ***, **, * indicate significantly different from zero at the 1%, 5%, 10% level, respectively.

	One-quarter-ahead earnings growth			Two-quarters-ahead earnings growth			Three-quarters-ahead earnings growth		
	EGP_{t+1}			EGP_{t+2}			EGP_{t+3}		
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	−0.001	0.000	0.002	−0.002	0.002	0.001	−0.001	0.002	0.002
	(−0.670)	(0.134)	(0.803)	(−0.832)	(0.791)	(0.660)	(−0.349)	(0.480)	(0.549)
EGP	0.416***	0.323***	0.331***	0.220***	0.166***	0.176***	−0.006	−0.045***	−0.035***
	(56.963)	(35.022)	(37.623)	(34.501)	(24.196)	(26.078)	(−0.786)	(−7.011)	(−5.727)
EAP	−0.018***	0.011***	0.005	0.046***	0.056***	0.046***	0.237***	0.248***	0.238***
	(−4.642)	(2.813)	(1.277)	(10.331)	(14.611)	(12.373)	(41.149)	(39.663)	(39.761)
SIZE	−0.024***	−0.060***	−0.045***	−0.047***	−0.074***	−0.056***	−0.070***	−0.088***	−0.073***
	(−8.788)	(−18.104)	(−14.236)	(−13.194)	(−18.407)	(−14.589)	(−18.082)	(−21.543)	(−18.452)
TREND		0.030***	0.016***		−0.007	−0.021***		0.013*	0.003
		(8.583)	(4.336)		(−1.145)	(−5.276)		−1.682	(0.723)
BM		−0.046***	−0.052***		−0.052***	−0.063***		−0.055***	−0.066***
		(−10.363)	(−11.891)		(−10.384)	(−12.571)		(−10.578)	(−12.720)
PASTRET		0.124***	0.131***		0.083***	0.088***		0.043***	0.049***
		(23.265)	(21.600)		(17.250)	(17.881)		(6.353)	(6.199)
GP		0.011***	0.017***		0.005	0.011**		−0.007	−0.002
		(2.692)	(4.540)		(0.791)	(2.047)		(−1.096)	(−0.330)
ACC		−0.009***	0.000		−0.019***	−0.010***		−0.021***	−0.014***
		(−3.535)	(0.091)		(−6.254)	(−3.452)		(−6.900)	(−4.887)
VOL		0.072***	0.054***		0.077***	0.055***		0.081***	0.061***
		(10.556)	(9.398)		(10.156)	(7.747)		(11.610)	(9.950)
AG1		0.006			−0.021***			−0.031***	
		(1.195)			(−6.276)			(−6.651)	
AG2			−0.077***			−0.118***			−0.117***
			(−18.510)			(−21.962)			(−16.671)
Observations	335,264	231,678	231,678	321,755	222,671	222,671	318,129	219,348	219,348
R-squared	0.171	0.210	0.216	0.068	0.112	0.122	0.068	0.115	0.124
Number of groups	175	161	161	174	160	160	173	159	159

a timely fashion. Although a significant portion of the mispricing is corrected in the one-month following an earnings announcement, some of the correction only takes place when future quarterly earnings are announced (especially two and three future fiscal quarters).

3.3. The association between earnings acceleration's implications for future earnings growth and for future stock returns

Having documented that earnings acceleration has implications for both earnings growth up to three quarters in the future and for three-day returns surrounding each of the three subsequent earnings announcements, we then conduct a formal statistical analysis of market efficiency, i.e., the Mishkin test. In earnings-based anomaly literature, several prior studies conduct the Mishkin test to examine whether the signs and magnitudes of abnormal stock returns reflect the market's understanding of the earnings process.[19] A primary advantage of the Mishkin test is that the test of market efficiency remains valid regardless of what other correlated (omitted) variables help to predict earnings (Lewellen, 2010). In our Mishkin test, we simultaneously estimate two equations (one for future abnormal returns [VMAR] and one for future earnings growth [EGP_{t+k}]). EGP_t is also included as an independent variable in both the equations to ensure that the effect documented is incremental to the previously known effect of earnings growth on future earnings growth and future stock return. Simultaneous estimation establishes whether the relation between future growth (EGP_{t+k}) and past acceleration (EAP_t) implicit in future abnormal returns (VMAR) is the same as the directly observable relation between future earnings growth and past earnings acceleration.

If the market correctly understands the implications of the earnings process depicted in Eq. (2), any price response subsequent to the earnings announcement should not be related to past earnings acceleration and only be related to the earnings growth surprise ε_{t+k}. Specifically, assuming the price response to ε_{t+k} over the month subsequent to the current earnings announcement is linear, we have

[19] See, for example, Sloan (1996), Dechow and Sloan (1997), Rangan and Sloan (1998), Collins and Hribar (2000), Narayanamoorthy (2006), Cao and Narayanamoorthy (2012), Chen and Shane (2014), Hui et al. (2016) and Ma and Markov (2016).

Table 9
Earnings Acceleration and Future Three-Day Abnormal Returns around Earnings Announcements.
This table reports the regression results testing the relation between earnings acceleration and future three-day abnormal returns around earnings announcements. See Table 2 for variable definitions. Standard errors are from a Fama-MacBeth estimation with Newey-West correction for up to six lags. t-statistics are reported in parentheses. ***, **, * indicate significantly different from zero at the 1%, 5%, 10% level, respectively.

	Three-day abnormal return (t+1)			Three-day abnormal return (t+2)			Three-day abnormal return (t+3)		
	$VMAR3_{t+1}$			$VMAR3_{t+2}$			$VMAR3_{t+3}$		
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	0.004***	0.004***	0.003***	0.004***	0.003***	0.003***	0.004***	0.003***	0.003***
	(6.804)	(5.637)	(5.198)	(6.866)	(4.875)	(5.098)	(6.817)	(3.039)	(2.921)
EGP	0.006***	0.003	0.003*	−0.000	−0.000	0.000	−0.006***	−0.005***	−0.005***
	(3.495)	(1.595)	(1.704)	(−0.259)	(−0.060)	(0.318)	(−7.626)	(−4.740)	(−4.438)
EAP	0.002***	0.002***	0.002***	0.005***	0.004***	0.004***	0.008***	0.007***	0.007***
	(3.716)	(3.286)	(3.235)	(8.506)	(5.864)	(5.454)	(11.102)	(8.416)	(8.120)
SIZE	−0.007***	−0.004***	−0.004***	−0.007***	−0.005***	−0.004***	−0.007***	−0.004***	−0.003**
	(−5.318)	(−3.291)	(−2.949)	(−5.695)	(−3.220)	(−2.865)	(−5.666)	(−2.767)	(−2.369)
TREND		−0.000	0.001**		0.000	−0.000		−0.001	−0.001
		(−0.116)	(2.283)		(0.339)	(−0.312)		(−0.668)	(−1.168)
BM		0.008***	0.008***		0.006***	0.006***		0.007***	0.007***
		(9.067)	(8.352)		(6.814)	(6.100)		(7.580)	(6.879)
PASTRET		0.002**	0.002***		0.001	0.001		−0.002*	−0.001
		(2.548)	(2.770)		(0.791)	(1.025)		(−1.736)	(−1.506)
GP		0.006***	0.007***		0.007***	0.007***		0.007***	0.007***
		(4.683)	(5.145)		(5.041)	(5.289)		(4.179)	(4.430)
ACC		−0.001	−0.001		−0.004***	−0.004***		−0.002***	−0.002***
		(−1.601)	(−0.751)		(−6.985)	(−6.143)		(−3.827)	(−3.494)
VOL		−0.006***	−0.006***		−0.006***	−0.007***		−0.007***	−0.008***
		(−6.928)	(−7.918)		(−8.116)	(−9.174)		(−7.953)	(−8.356)
AG1		0.002***			0.000			−0.001	
		(2.661)			(0.401)			(−0.892)	
AG2			−0.004**			−0.004***			−0.004***
			(−2.080)			(−5.099)			(−4.384)
Observations	335,314	231,700	231,700	321,806	222,693	222,693	318,171	219,372	219,372
R-squared	0.007	0.041	0.040	0.005	0.039	0.040	0.005	0.040	0.041
Number of groups	175	161	161	174	160	160	173	159	159

$$VMAR_{t+1} = k_0 + k_1\varepsilon_{t+k} + \mu_{t+1} \tag{3}$$

If the market is efficient in incorporating the effect of earnings acceleration, it will only respond to the actual innovation (or noise) after controlling for acceleration. In other words, if the market correctly infers the relation in Eq. (2), ε_{t+k} in Eq. (3) will be the same as ε_{t+k} in Eq. (2). Substituting ε_{t+k} with $EGP_{t+k} - \alpha - \beta EAP_t - \gamma EGP_t$ from Eq. (2), we then get

$$VMAR_{t+1} = k_0 + k_1(EGP_{t+k} - \alpha - \beta EAP_t - \gamma EGP_t) + \mu_{t+1}$$

which, on rearranging, yields

$$VMAR_{t+1} = (k_0 - k_1\alpha^*) + k_1 EGP_{t+k} - k_1\beta^* EAP_t - k_1\gamma^* EGP_t + \mu_{t+1} \tag{4}$$

In Eq. (2), β is the actual coefficient on our variable of interest while in Eq. (4), β^* is the coefficient inferred from the market's expectation of EGP_{t+k}.[20] The restriction $\beta = \beta^*$ yields a likelihood ratio statistic that has a chi-square distribution with one degree of freedom. If $\beta^* = 0$, then we conclude that the market appears to completely ignore the implications of earnings acceleration for future earnings growth. If $\beta^* = \beta$, then the market appears to understand the implications of earnings acceleration perfectly. If $0 < \beta^* < \beta$, then the market partially understands the earnings acceleration. If $\beta^* < 0$, then the market not only underestimates the implications of earnings acceleration, but also prices stocks as if they expect current earnings acceleration to have negative implications for future earnings growth.

We present the results of the Mishkin Test in Table 10. Panel A presents the results from jointly estimating the one-quarter-ahead earnings forecasting equation and the pricing equation. While the coefficient (β) on the actual correlation between earnings acceleration and one-quarter-ahead earnings growth is −0.031, the coefficient (β^*) on market's assessment (based on one month excess returns) of the effect is −0.564. Panel B presents the results from jointly estimating the two-quarters-

[20] Standard OLS does not readily provide direct estimates and associated standard errors for β^*. The Mishkin framework, in contrast, extracts the underlying parameter estimates by using non-linear least squares estimation and is asymptotically equivalent to OLS. Thus, the Mishkin approach allows us to directly estimate and test hypotheses relating to the implications of earnings acceleration for future stock returns (Dechow et al., 2011).

Table 10
Test of Stock Market Efficiency for the Earnings Acceleration Effect.
This table reports the regression results from nonlinear generalized least squares estimation of the following two equations.
$EGP_{t+k} = \alpha + \beta EAP_t + \gamma EGP_t + \varepsilon_{t+k}$
$VMAR_{t+1} = (k_0 - k_1\alpha^*) + k_1 EGP_{t+k} - k_1\beta^* EAP_t - k_1\gamma^* EGP_t + \mu_{t+1}$
See Table 2 for variable definitions. The likelihood ratio statistic is distributed asymptotically as χ^2 with 1 degree of freedom.

Panel A: One-quarter-ahead			
Parameter	Coef.	z-statistics	p-value
γ	0.403	225.710	0.000
β	−0.031	−17.400	0.000
γ^*	0.215	6.480	0.000
β^*	−0.564	−15.840	0.000
Test of market efficiency:		$\gamma = \gamma^*$	$\beta = \beta^*$
Likelihood ratio statistics:		31.78	223.290
Marginal significant level:		0.000	0.000
Panel B: Two-quarters-ahead			
Parameter	Coef.	z-statistics	p-value
γ	0.207	107.150	0.000
β	0.039	19.990	0.000
γ^*	0.022	0.660	0.509
β^*	−0.500	−14.160	0.000
Test of market efficiency:		$\gamma = \gamma^*$	$\beta = \beta^*$
Likelihood ratio statistics:		31.26	232.270
Marginal significant level:		0.000	0.000
Panel C: Three-quarters-ahead			
Parameter	Coef.	z-statistics	p-value
γ	−0.023	−11.970	0.000
β	0.238	121.660	0.000
γ^*	−0.222	−6.430	0.000
β^*	−0.331	−8.890	0.000
Test of market efficiency:		$\gamma = \gamma^*$	$\beta = \beta^*$
Likelihood ratio statistics:		31.27	214.530
Marginal significant level:		0.000	0.000

ahead earnings forecasting equation and the pricing equation. While β is 0.039, indicating a positive actual association between earnings acceleration and two-quarters-ahead earnings growth, β^* is −0.5, suggesting market's negative assessment of the effect of earnings acceleration on future earnings growth. Panel C presents the results from jointly estimating the three-quarters-ahead earnings forecasting equation and the pricing equation. Estimated β of 0.238 and β^* of −0.331 suggest that while there is a significant positive association between earnings acceleration and three-quarters-ahead earnings, the market's assessment of the association between the two is incrementally negative. In all three panels, the likelihood ratio test reject that $\beta = \beta^*$, indicating that market underestimates the implication of earnings acceleration for future one-, two- and three-quarters-ahead earnings. In particular, we provide unique evidence that the market appears to not only underestimate the magnitude of the effect of earnings acceleration on two- and three-quarters-ahead earnings growth, but assumes it is incrementally negative.[21]

4. Why do investors miss the implications of earnings acceleration?

Our results in Section 3 confirm that the post-earnings acceleration returns are consistent with investors not understanding fully some of the implications of earnings acceleration for future earnings growth. In this section, we explore whether the missing of these implications is consistent with investors assuming a particular time series process for quarterly earnings when the underlying model is different.

Earnings has long been modeled in accounting research as arising either from a random walk plus noise process (Beaver et al., 1980) or as comprising of “permanent” and “transitory” components (Ali and Zarowin, 1992). Econometrically, both of these characterizations are captured by an IMA (1,1) model (Kothari, 2001). While this model assumption has primarily been applied to annual earnings, Narayanamoorthy (2006) employs it for quarterly earnings to represent a non-seasonal random

[21] β^*_k being negative for k = 1, 2 and 3 is similar to the results obtained in prior studies employing the Mishkin test (see, for example, Rangan and Sloan [1998]). If investors completely ignored the implications of earnings acceleration for future earnings growth, then β^*_k would be exactly zero. Thus, the negative values indicate that investors not only ignore the earnings acceleration implications, but also price stocks as if they expect earnings acceleration to have negative implications for future earnings.

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walk process.[22] Here, we exploit the same IMA (1,1) model assumption and examine its implications for the relation between earnings acceleration and future earnings growth.

Let earnings follow a simple IMA (1,1) process with parameter $\theta \neq 0$. θ is a measure of the extent of mean reversion in earnings changes. The higher the θ, the higher the extent of mean reversion. If X_t is the earnings at time t, then the IMA (1,1) process characterizing X_t is:

$$X_t = X_{t-1} + \varepsilon_t - \theta\varepsilon_{t-1}$$

If we seasonally difference this series,

$$\begin{aligned}\Delta_4 X_t &= X_t - X_{t-4} = (X_t - X_{t-1}) + (X_{t-1} - X_{t-2}) + (X_{t-2} - X_{t-3}) + (X_{t-3} - X_{t-4}) \\ &= \varepsilon_t - \theta\varepsilon_{t-1} + \varepsilon_{t-1} - \theta\varepsilon_{t-2} + \varepsilon_{t-2} - \theta\varepsilon_{t-3} + \varepsilon_{t-3} - \theta\varepsilon_{t-4}\end{aligned}$$

$$\Delta_4 X_{t-1} = \varepsilon_{t-1} - \theta\varepsilon_{t-2} + \varepsilon_{t-2} - \theta\varepsilon_{t-3} + \varepsilon_{t-3} - \theta\varepsilon_{t-4} + \varepsilon_{t-4} - \theta\varepsilon_{t-5}$$

Then, earnings acceleration is:

$$EA_t = \Delta_4 X_t - \Delta_4 X_{t-1} = \varepsilon_t - \theta\varepsilon_{t-1} - \varepsilon_{t-4} + \theta\varepsilon_{t-5}$$

We are interested in the predictability of EA_t for $\Delta_4 X_{t+1}$, $\Delta_4 X_{t+2}$, $\Delta_4 X_{t+3}$ and $\Delta_4 X_{t+4}$. Thus,

$$\Delta_4 X_{t+1} = \varepsilon_{t+1} + (1-\theta)\varepsilon_t + (1-\theta)\varepsilon_{t-1} + (1-\theta)\varepsilon_{t-2} - \theta\varepsilon_{t-3}$$

$$\delta_{t+1} = \mathrm{Corr}(EA_t, \Delta_4 X_{t+1}) = \frac{(1-\theta)^2}{\sqrt{2(1+\theta^2)}\sqrt{1+3(1-\theta)^2+\theta^2}}$$

$$\Delta_4 X_{t+2} = \varepsilon_{t+2} + (1-\theta)\varepsilon_{t+1} + (1-\theta)\varepsilon_t + (1-\theta)\varepsilon_{t-1} - \theta\varepsilon_{t-2}$$

$$\delta_{t+2} = \mathrm{Corr}(EA_t, \Delta_4 X_{t+2}) = \frac{(1-\theta)^2}{\sqrt{2(1+\theta^2)}\sqrt{1+3(1-\theta)^2+\theta^2}}$$

$$\Delta_4 X_{t+3} = \varepsilon_{t+3} + (1-\theta)\varepsilon_{t+2} + (1-\theta)\varepsilon_{t+1} + (1-\theta)\varepsilon_t - \theta\varepsilon_{t-1}$$

$$\delta_{t+3} = \mathrm{Corr}(EA_t, \Delta_4 X_{t+3}) = \frac{\theta + (\theta-1)^2}{\sqrt{2(1+\theta^2)}\sqrt{1+3(1-\theta)^2+\theta^2}}$$

$$\Delta_4 X_{t+4} = \varepsilon_{t+4} + (1-\theta)\varepsilon_{t+3} + (1-\theta)\varepsilon_{t+2} + (1-\theta)\varepsilon_{t+1} - \theta\varepsilon_t$$

$$\delta_{t+4} = \mathrm{Corr}(EA_t, \Delta_4 X_{t+4}) = \frac{-\theta}{\sqrt{2(1+\theta^2)}\sqrt{1+3(1-\theta)^2+\theta^2}}$$

Using a representative θ value of 0.5, the correlation values are 0.112, 0.112, 0.335 and −0.224, respectively.[23] In other words, the model shows that earnings acceleration has small positive implications for earnings growth one and two quarters ahead and a much larger positive effect three quarters ahead. The implications for four quarters-ahead earnings growth are negative. Earnings acceleration's correlation with earnings growth one, two and three quarters—ahead is driven by the presence of two common error terms: ε_t and ε_{t-1}. While both the error terms reinforce each other in their implication for earnings growth three quarters ahead, they act in opposite directions in determining the correlation with earnings growth one and two quarters ahead.

[22] Several prior studies model quarterly earnings with seasonal differencing (e.g., Brown and Rozeff, 1979; Griffin, 1977; Watts, 1975; Foster, 1977). We do not employ these models here for two reasons. First, these models are shown to have limited out of sample prediction performance. Second, while quarterly earnings are shown to have both seasonal and non-seasonal characteristics, we specifically explore the theory that the market misprices the latter. Hence we need a model without seasonal differencing. We note that several other non-seasonal models like, for example, AR (1) [see Brown and Han (2000)] would yield results similar to IMA (1,1). In other words, it is not necessary for the earnings process to be IMA (1,1) for our theory of the market seasonally differencing a non-seasonal process to hold. That said, IMA (1,1) represents a wide range of economic data including earnings well (Brown, 1993) and is more readily tractable analytically.

[23] In comparison to the calculated values of the model predictions depicted above, the actual observed correlations appear to be reasonably close at 0.150, 0.132, 0.225 and −0.115, respectively. Note that the coefficient on EAP in Table 8 will be different from these correlations since the multivariate regression tests in Table 8 include controls for EGP while the model here does not.

In contrast to IMA (1,1), if the true process were a seasonal random walk (SRW) model, earnings acceleration will be $\varepsilon_t - \varepsilon_{t-1}$ and the future earnings growths would be $\varepsilon_{t+1}, \varepsilon_{t+2}, \varepsilon_{t+3}$and ε_{t+4}, respectively. In such a case, the correlations between earnings acceleration and future earnings growth would be zero. Thus, if the market uses a naïve SRW model to form earnings expectations, it assumes zero correlation between earnings acceleration and future earnings growth. Consequently, it will miss the implications (correlations) of current earnings acceleration for future earnings growth that are a result of true earnings being a process like IMA (1,1) (which appears to have empirical validity − see footnote 23).

Representing the true earnings as IMA (1,1) with mean reversion parameter, θ, allows for cross-sectional tests of the earnings acceleration effect with variation in mean reversion. In Appendix, we depict the sensitivities of the correlations between earnings acceleration and future earnings growth to θ. We find that three of the four correlations monotonically decrease in θ and the fourth correlation is almost unchanged in θ. If the market were missing the correlations between earnings acceleration and future earnings growth due to a fixation on the SRW model, we will observe greater returns when the correlations are algebraically larger, that is, when the mean reversion parameter is lower.

To empirically test this prediction, we examine the relation between earnings acceleration and future abnormal returns conditional on two measures that have been previously shown to be associated with mean reversion in earnings: losses and earnings volatility. Specifically, Brooks and Buckmaster (1976) document higher mean reversion for loss firms. Dichev and Tang (2009) find that higher volatility firms mean-revert more. Thus, under the hypothesis that market fixates on the SRW model, firms with losses and more volatile earnings should demonstrate lower future abnormal returns from the earnings acceleration strategy. In Table 11, Panel A, we compare returns from the acceleration-based strategy for loss versus profit firms. Firms with EPS in quarter t smaller than zero are classified as loss firms and the rest are classified as profit firms. The top quintile of earnings acceleration for loss firms produces an abnormal return of 0.9% while the same for profit firms produces a return of 1.7%. The top minus bottom quintile abnormal return is 0.8% for loss firms while it is 1.8% for profit firms. We test for the significance of difference in hedge returns using an approach similar to Paternoster et al. (1998).[24] The difference in hedge returns between loss firms and profit firms is 1% and statistically significant.

In Panel B, we stratify companies according to past earnings volatility. Firms with above median earnings volatility in each quarter are classified as high volatility firms and the rest are classified as low volatility firms. The top minus the bottom

Table 11
Losses and Earnings Volatility on the Effect of Earnings Acceleration.
This table reports the portfolio results testing the relation between earnings acceleration and stock returns, conditional on losses and earnings volatility. See Table 2 for variable definitions. t-statistics are calculated based on the time-series of the portfolio market-adjusted stock returns.

Panel A: Loss and the effect of earnings acceleration

	Loss firms		Profit firms	
EAP quintiles	VMAR	t-statistics	VMAR	t-statistics
Lowest	0.001	0.263	−0.001	−0.351
2	0.006	2.128	0.001	0.714
3	0.002	0.466	0.008	7.535
4	0.008	1.970	0.013	8.898
Highest	0.009	2.429	0.017	8.403
Highest - Lowest	0.008	3.537	0.018	13.683
Test for significance of difference in hedge returns between profit firms and loss firms:				
Difference in hedge returns	0.010			
z-statistics	3.766			

Panel B: Earnings volatility and the effect of earnings acceleration

	High earnings volatility firms		Low earnings volatility firms	
EAP quintiles	VMAR	t-statistics	VMAR	t-statistics
Lowest	0.000	0.154	0.001	0.422
2	0.002	1.097	0.002	1.553
3	0.003	2.074	0.009	8.377
4	0.008	4.976	0.016	9.796
Highest	0.014	5.726	0.021	6.849
Highest - Lowest	0.014	10.950	0.020	7.403
Test for significance of difference in hedge returns between low earnings volatility and high earning volatility firms:				
Difference in hedge returns	0.006			
z-statistics	2.044			

[24] Specifically, we evaluate the significance of the difference in returns between two groups (G1 and G2) using z-statistic, computed as: $z = \frac{meanG1 - meanG2}{\sqrt{SEG1^2 + SEG2^2}}$, where meanG1 and meanG2 refer to mean returns in hedge return groups G1 and G2; SEG1 and SEG2 refer to the standard errors of returns in hedge return groups G1 and G2.

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quintile abnormal return is 2% for low volatility firms and 1.4% for high volatility firms. The earnings acceleration effect being stronger for profit firms and for low volatility firms (which are firms with lower mean reversion in earnings) is consistent with our prediction, and it provides added corroboration for the hypothesis that the market misses the correlations between earnings acceleration and future earnings growth due to a fixation on the SRW model for earnings.

5. Additional tests

In this section, we address three additional topics: (1) additional ways to enhance returns from the acceleration-based strategy, (2) robustness of the results to the adoption of alternative definitions/deflators, and (3) preliminary tests regarding the implementability of the strategy.

5.1. Enhancing the earnings acceleration strategy returns by considering alternative earnings acceleration patterns

In Section 4 above, we show that the basic earnings acceleration strategy can be enhanced by focusing on profit firms or low earnings volatility firms. Here, we explore additional ways to enhance the strategy. Specifically, following Cao et al. (2011), we partition EAP into six patterns as follows:

Pattern 1: Both current and previous quarter's earnings growth are positive, and current quarter's earnings growth is higher than previous quarter's.

Pattern 2: Current quarter's earnings growth is positive, while previous quarter's earnings growth is negative.

Pattern 3: Both current and previous quarter's earnings growth are negative, and current quarter's earnings growth is higher than previous quarter's.

Pattern 4: Both current and previous quarter's earnings growth are positive, and current quarter's earnings growth is smaller than previous quarter's.

Pattern 5: Current quarter's earnings growth is negative, while previous quarter's earnings growth is positive.

Pattern 6: Both current and previous quarter's earnings growth are negative, and current quarter's earnings growth is smaller than previous quarter's.

We examine the relation between earnings acceleration and stock returns conditional on each of the earnings acceleration patterns. As discussed in Section 4, our theory suggests that the earnings acceleration effect is stronger when mean reversion is lower. Basu (1997) documents that earnings decreases mean revert more than earnings increases. Thus, among the six earnings acceleration patterns, the one pattern which should have the lowest mean reversion, and consequently, the highest future returns, is Pattern 1 (since it is an increase-in-increase pattern). Every other pattern has at least one kind of decrease, and hence will have some degree of mean reversion.[25] Consistent with this prediction, we find that pattern 1 has the largest EAP coefficient among all the patterns (untabulated). In Table 12, Panel A, we show that employing only pattern 1 observations has EAP coefficient of 5.6% (in column three) relative to 1.6% when using the full sample (column one).

While pattern 1 has the strongest earnings acceleration effect due to low mean reversion in earnings, it is not possible to build a hedge portfolio strategy using pattern 1 alone. By construction, pattern 1 observations have positive earnings accelerations and hence negative earnings acceleration deciles will not be represented in a hedge portfolio. As such, we need to combine pattern 1 with patterns 4, 5 or 6 (which, by construction, populate the majority of the negative earnings acceleration deciles) to form a hedge portfolio. Patterns 4, 5 and 6 all have higher mean reversion than pattern 1. However, there is no theoretical guide for which of patterns − 4, 5 or 6 − have relatively lower mean reversion. We find that pattern 5, when combined with pattern 1, produces the largest hedge portfolio returns (Table 12, Panel A, columns five and six). This combination, despite producing higher hedge portfolio returns than the full sample, still yields lower returns in regression tests relative to using pattern 1 alone (3.3% in column five versus 5.6% in column three), which is consistent with our theory. In Table 12, Panel B, we report the hedge portfolio returns for portfolios double sorted (independently) based on EAP deciles and whether the stock belongs to either pattern 1 or pattern 5. A trading strategy that focuses only on pattern 1 or pattern 5 generates one-month hedge return of 2.6%. In contrast, our base strategy only yielded a hedge return of 1.8% (Table 4). Thus, focusing on specific patterns of earnings acceleration can enhance the excess returns by nearly 45%.

5.2. Alternative acceleration definitions/deflators

While we show that the relation between earnings acceleration and stock returns is present under each of the five definitions of acceleration (i.e., EAA, EAP, EAV, SA and PA) in section 2, we only present results for EAP when investigating the relation between earnings acceleration and future earnings growth in section 3. Un-tabulated results show that the relation between earnings acceleration and future earnings growth is present and remarkably robust across each of the other four acceleration measures.[26]

[25] Patterns 2, 3, 5, 6 all have at least one period of negative earnings growth. For pattern 4, although earnings growth in both periods is positive, the change in earnings growth rate is negative (or in other words, there is a decrease in earnings growth rate).

[26] We find that EAV consistently produces even stronger results than EAP.

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Table 12
Patterns of Earnings Acceleration
This table reports the regression and portfolio results testing the relation between earnings acceleration and stock returns, conditional on different earnings acceleration patterns. See Table 2 for variable definitions. Standard errors are from a Fama-MacBeth estimation with Newey-West correction for up to six lags. t-statistics are reported in parentheses. ***, **, * indicate significantly different from zero at the 1%, 5%, 10% level, respectively.

Panel A: Full sample, pattern 1 only, and pattern 1 or 5

	One-month abnormal returns (VMAR)					
	Full sample		Pattern 1 firms only		Pattern 1 or 5 firms only	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.008***	0.008***	0.006**	0.006**	0.010***	0.010***
	(4.104)	(4.289)	(2.177)	(2.125)	(4.965)	(4.983)
EGP	0.012***	0.012***	−0.013	−0.014	−0.001	−0.002
	(5.025)	(5.102)	(−1.124)	(−1.151)	(−0.108)	(−0.247)
EAP	0.016***	0.015***	0.056***	0.058***	0.033***	0.034***
	(9.221)	(9.429)	(4.428)	(4.752)	(4.616)	(4.802)
SIZE	−0.004	−0.003	−0.018***	−0.017***	−0.010***	−0.009***
	(−1.212)	(−0.951)	(−3.895)	(−3.770)	(−2.883)	(−2.820)
TREND	0.005**	0.004*	0.007**	0.009**	0.004	0.004
	(2.217)	(1.930)	(1.977)	(2.364)	(1.591)	(1.650)
BM	0.014***	0.014***	0.020***	0.021***	0.012***	0.013***
	(4.303)	(4.350)	(3.870)	(4.041)	(3.042)	(3.089)
PASTRET	−0.010***	−0.011***	0.002	0.002	−0.005	−0.005
	(−3.328)	(−3.457)	(0.552)	(0.460)	(−1.540)	(−1.551)
GP	0.011***	0.012***	0.014***	0.015***	0.010***	0.010***
	(3.632)	(3.778)	(3.637)	(3.843)	(2.765)	(2.885)
ACC	−0.013***	−0.012***	−0.011***	−0.010***	−0.013***	−0.012***
	(−9.909)	(−9.416)	(−3.986)	(−3.682)	(−6.392)	(−6.097)
VOL	−0.011***	−0.012***	−0.026***	−0.026***	−0.014***	−0.014***
	(−6.461)	(−6.993)	(−6.560)	(−6.554)	(−5.764)	(−5.928)
AG1	0.001		0.008**		0.002	
	(0.588)		(2.482)		(0.831)	
AG2		−0.001		0.007**		0.000
		(−0.219)		(2.155)		(0.120)
Observations	244,864	244,864	55,724	55,724	94,491	94,491
R-squared	0.053	0.053	0.079	0.079	0.059	0.060
Number of groups	162	162	160	160	160	160

Panel B: Non-pattern 1 or 5 versus Pattern 1 or 5

	Non-pattern 1 or 5		Pattern 1 or 5	
EAP deciles	VMAR	t-statistics	VMAR	t-statistics
Lowest	0.000	−0.036	−0.005	−1.645
2	0.004	1.575	−0.005	−2.456
3	0.002	1.338	−0.002	−1.290
4	0.004	2.411	−0.001	−0.344
5	0.006	4.557	0.007	3.987
6	0.009	5.101	0.011	7.998
7	0.007	4.157	0.016	8.748
8	0.009	5.184	0.018	8.532
9	0.013	6.078	0.022	7.809
Highest	0.015	4.621	0.022	4.831
Highest - Lowest	0.014	6.290	0.026	7.093
Test for significance of difference in hedge returns between pattern 1 or 5 and non-pattern 1 or 5 firms:				
Difference in hedge returns	0.012			
z-statistics	2.777			

We also examine how different deflators for EGP and EAP affect our results. Specifically, we examine a total of 16 scenarios, as a combination of using each of the following four variables as deflators for EGP and for EAP: last quarter's stock price, four-quarters-prior stock price, last quarter's total asset, and four-quarters-prior total assets. The returns results remain qualitatively unchanged under these different EGP and EAP deflators.

Lastly, we estimate a Taylor-series expansion of the earnings process using the past 8 quarters' earnings, and define earnings acceleration as the coefficient on the square of the time variable. This definition is analogous to acceleration in physics, and it frees us from the need to use a deflator in defining earnings acceleration. The acceleration variable defined in this manner also positively predicts future abnormal returns (untabulated).

5.3. Implementability of the earnings acceleration strategy

We have already discussed in section 2 the robustness of the strategy to the use of value-weighted portfolios instead of equal-weighted portfolios. We further examine here the implementability of the earnings acceleration strategy along three dimensions — stability of the excess returns over time, the exclusion of low price/low market capitalization stocks and the use of calendar month rebalancing. In Fig. 2, we depict the one-month hedge returns to the earnings acceleration strategy for each of the 176 quarters in our sample. The hedge return is positive in 140 out of the 176 fiscal quarters (80%), which suggests that the relation between earnings acceleration and subsequent stock returns is quite stable over time. This also alleviates concerns that the excess returns are a result of unidentified risk factors. More importantly, Fig. 2 shows that the trading strategy is equally successful in recent years compared to earlier periods. From 2004 to 2015, the strategy yields positive excess returns in 41 out of 48 fiscal quarters (85%). This finding is relevant in view of the recent finding by Green et al. (2017) that a majority of the previously well documented anomalies do not generate returns significant from zero in the post-2003 period.

Notwithstanding that a detailed cost-benefit analysis of the trading strategy is beyond the scope of this study, our second set of results indicate significant positive excess returns of between 0.9% and 1.5% per month even when low priced stocks (less than $5) and/or various partitions of small capitalization stocks (up to $0.5 billion) are excluded from the trading strategy.

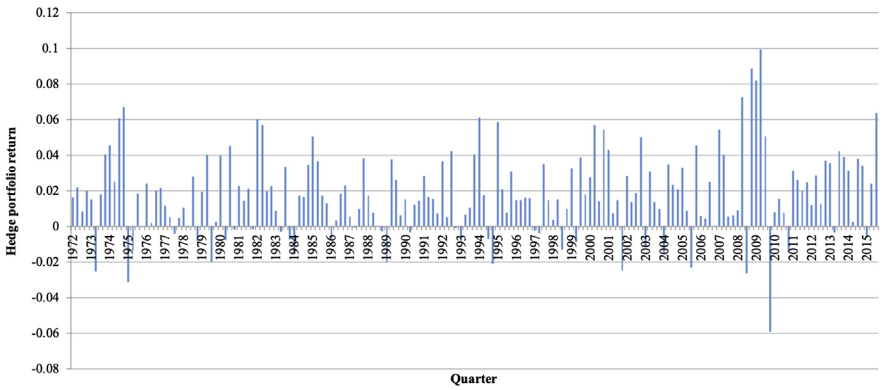

Fig. 2. Stability of Earnings Acceleration Strategy over Time.
This figure depicts the one-month return by fiscal quarter to a hedge portfolio taking a long position in the stock of firms in the highest decile of EAP and an equal sized short position in the stock of firms in the lowest decile of EAP. The x-axis represents fiscal quarters. The y-axis represents the one-month hedge portfolio returns.

Table 13
Alphas and Factor Loadings on Portfolios Sorted on Earnings Acceleration.
This table reports calendar-month average returns to portfolios sorted on earnings acceleration, and results of time series regressions of these portfolios' returns on the Fama and French five factors [the market factor (MKT), the size factor small-minus-large (SMB), the value factor high-minus-low (HML), the profitability factor robust-minus-weak (RMW), and the investment factor conservative-minus-aggressive (CMA)]. t-statistics are reported in parentheses. ***, **, * indicate significantly different from zero at the 1%, 5%, 10% level, respectively.

EAP deciles	Average raw return	Alpha	MKT	SMB	HML	RMW	CMA
Lowest	0.015***	0.004*	1.132***	1.180***	0.188	−0.613***	0.009
	(4.283)	(1.916)	(22.600)	(13.370)	(1.380)	(−6.082)	(0.040)
2	0.013***	0.002	1.086***	0.971***	0.236***	−0.173*	−−0.117
	(4.506)	(1.335)	(32.250)	(15.136)	(2.709)	(−1.964)	(−0.961)
3	0.012***	0.001	1.069***	0.872***	0.147**	0.029	−0.163
	(4.49)	(0.777)	(38.848)	(15.812)	(1.967)	(0.338)	(−1.427)
4	0.013***	0.002**	1.056***	0.759***	0.059	0.106*	−0.063
	(5.048)	(2.164)	(58.170)	(22.714)	(1.323)	(1.827)	(−0.906)
5	0.014***	0.004***	1.040***	0.613***	−0.060	0.168***	−0.052
	(5.969)	(6.527)	(51.321)	(19.940)	(−1.421)	(3.866)	(−0.922)
6	0.017***	0.006***	1.054***	0.569***	−0.043	0.197***	0.005
	(6.976)	(9.445)	(60.761)	(20.356)	(−1.021)	(4.453)	(0.093)
7	0.017***	0.006***	1.060***	0.692***	0.013	0.091	0.029
	(6.825)	(8.468)	(48.754)	(18.080)	(0.221)	(1.424)	(0.509)
8	0.018***	0.007***	1.096***	0.792***	0.044	−0.010	0.090
	(6.871)	(8.752)	(37.940)	(14.381)	(0.627)	(−0.107)	(0.950)
9	0.020***	0.008***	1.097***	0.936***	0.158**	−0.139*	0.067
	(7.035)	(8.253)	(38.265)	(16.880)	(2.091)	(−1.756)	(0.664)
Highest	0.024***	0.012***	1.175***	1.152***	0.217	−0.451***	0.200
	(6.963)	(6.156)	(20.851)	(11.461)	(1.572)	(−3.147)	(0.959)
Highest - Lowest	0.009***	0.008***	0.044	−0.028	0.029	0.162**	0.191**
	(8.784)	(7.116)	(1.451)	(−0.550)	(0.481)	(2.219)	(2.018)

The trading strategy outlined earlier involved buying and selling stocks two days after an earnings announcement. Such a strategy can potentially lead to significant portfolio rebalancing costs. In our third set of tests, we adopt a conservative calendar month-based rebalancing strategy. At the beginning of each calendar month, we sort stocks of companies that announced earnings in the previous three months into earnings acceleration deciles. Table 13 presents the results of the calendar month rebalancing strategy using equal-weighted portfolio returns.[27] A hedge portfolio going long in the top earnings acceleration decile and short in the bottom decile still yields about 0.9% excess returns over the month-long window. The table also presents factor loadings on the five Fama-French factors.

6. Conclusion

We document that earnings acceleration is an important variable that active investors can focus on in their stock picking efforts to earn significant excess returns. We find economically significant excess returns to an earnings acceleration-based strategy over a quarter following an earnings announcement (with a significant portion accruing over the first month). The returns are robust to a battery of controls for risk and are distinct from previously documented anomalies. In portfolio tests, the incremental excess returns at 1.8% over a month translate to an annualized returns of over 23%. The returns are also remarkably stable over a long period of time (we report results for 176 past quarters).

Our results indicate that the abnormal returns are consistent with investors not incorporating fully the implications of current earnings acceleration for future earnings growth, especially two and three quarters in the future. Notably, current earnings acceleration appears to be associated with significant positive returns in these quarters' earnings announcement windows. Our direct tests of market efficiency also confirm that the positive returns from the earnings acceleration strategy and the positive implications of earnings acceleration for future earnings growth are strongly associated. Last but not least, we show that the results are consistent with investors employing a SRW model for quarterly earnings when the true underlying process is not SRW. The test for whether investors do adopt such a model is only possible, however, in an experimental setting.

Appendix

Correlations between Earnings Acceleration and Future Earnings Growth: Sensitivity to Mean Reversion

Recall that expressions for δ_j, the correlations between earnings acceleration and future earnings growths, were derived under an IMA (1,1) model assumption in Section 4. Sensitivities of the correlations, δ_j, to the IMA (1,1) parameter θ, the extent of mean reversion, are computed analytically below.

$$\frac{d\delta_{t+1}}{d\theta} = \frac{5\theta^4 - 6\theta^3 + 6\theta - 5}{4(\theta^2+1)^{\frac{3}{2}}(2\theta^2 - 3\theta + 2)^{\frac{3}{2}}}$$

$$\frac{d\delta_{t+2}}{d\theta} = \frac{5\theta^4 - 6\theta^3 + 6\theta - 5}{4(\theta^2+1)^{\frac{3}{2}}(2\theta^2 - 3\theta + 2)^{\frac{3}{2}}}$$

$$\frac{d\delta_{t+3}}{d\theta} = \frac{\theta^4 - 3\theta^3 + 3\theta - 1}{4(\theta^2+1)^{\frac{3}{2}}(2\theta^2 - 3\theta + 2)^{\frac{3}{2}}}$$

$$\frac{d\delta_{t+4}}{d\theta} = \frac{4\theta^4 - 3\theta^3 + 3\theta - 4}{4(\theta^2+1)^{\frac{3}{2}}(2\theta^2 - 3\theta + 2)^{\frac{3}{2}}}$$

In the range of $0 < \theta < 1$, the derivatives of δ_{t+1}, δ_{t+2} and δ_{t+4} are always negative. While the derivative of δ_{t+3} is not always negative, it is very small, which makes the correlation between earnings acceleration and future earnings growth nearly flat lying within a narrow range of 0.33–0.35.

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[27] The results are nearly unchanged if we consider earnings announcements only in the previous month instead of the previous three months or if we use value-weighted portfolio returns.

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Capital markets research in accounting: Lessons learnt and future implications

Christo Karuna

Monash University, Australia

A B S T R A C T

I review the capital markets literature in accounting by describing the journey taken by researchers since the inception of this stream of research in the late 1960s. Based on a discussion of topics related to the relation between earnings and stock returns, I show how thinking has evolved depending on changing paradigms, methodologies, and data availability. What is clear from a review of the literature is that the usefulness of earnings in determining firm value is both contextual and broadening over time with changes in the global environment. Thus, more research needs to be conducted on a broader notion of earnings that appeals to not just the shareholder but a wide range of firm stakeholders.

1. Introduction

This paper provides an overview of the empirical capital markets literature in accounting based on a keynote speech I gave at the 2018 Financial Markets and Corporate Governance Conference on lessons learnt in capital markets research in accounting and future implications.[1] There is a vast array of topics that fall under the umbrella of capital markets research in accounting; however, my discussion focuses narrowly on the relation between accounting earnings and stock returns. Specifically, I discuss in this paper what, in my opinion, are lessons learnt from important research topics on the stock return-earnings relation in this literature that would be of interest to a finance audience. Thus, the purpose of this paper is to provide an overview of the journey taken by capital markets researchers in accounting since inception that would be informative (in terms of breadth and depth) to a finance audience.

I begin this overview with a summary of the historical development of the capital markets literature in accounting in section two. In section three, I discuss two main areas of capital markets research in accounting that would be of interest to finance researchers, namely, tests of capital market efficiency and fundamental analysis and accounting-based valuation. Development of these two topics mirror that in the finance literature, with the latter topic closely related to the behavioural finance literature. In section four, I discuss current research that evolved from changes in paradigm, methodology, and data availability. I conclude this overview in section five, where I also discuss future implications and provide suggestions for future research.

2. Historical development of capital markets research in accounting

Capital markets research in accounting blossomed in the late 1960s after the development of the Efficient Markets Hypothesis (EMH) and event study methodology at the University of Chicago by Eugene Fama and his colleagues (Fama et al., 1969). Seminal studies in accounting by Ball and Brown, (1968) and Beaver, (1968) on the stock return-earnings relation, combining insights from Positive Economics Theory, EMH, and the Capital Asset Pricing Model (CAPM), paved the way for researchers examining accounting

E-mail address: christo.karuna@monash.edu.

[1] This paper is not exhaustive in its discussion of topics. For detailed insights from this literature the reader is referred to several reviews, namely, Bradshaw, (2011), Dechow et al., (2014), Kothari, (2001), Barth et al., (2001), Healy and Palepu, (2001), Holthausen and Watts, (2001), Lee, (2001), Landsman, (2007), Richardson et al., (2010), Leuz and Wysocki, (2016)), Ryan, (2016).

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earnings within the capital markets context. What followed was a plethora of studies in the accounting literature in the 1970s and 1980s that examined the stock price reaction to an earnings announcement over a short window ranging from a few minutes to a few days (short-window tests), and long-window tests that examined the same relation over a period of one to five years in studies conducted in the late 1980s and 1990s, a period that witnessed research in fundamental analysis, valuation and tests of market efficiency based on challenges to EMH.

The 1970s, 1980s, and 1990s were also periods when methodological research dominated capital markets research in accounting. Topics examined in this area are earnings response coefficients, properties of time series of earnings, management and analyst earnings forecasts, earnings growth rates, statistical inferences, and discretionary/non-discretionary accruals models, drawing inferences from event studies, post-earnings-announcement drift (PEAD), long horizon returns to accruals management and analyst forecast optimism, and cross-sectional tests of return predictability.

The 1990s and 2000s witnessed research conducted on the following topics: motivation for fundamental analysis, value-relevance, valuation models, Regulation Fair Disclosure (Reg. FD), Sarbanes-Oxley Act (SOX), Fair Value accounting, implied cost of capital, recognition versus disclosure, impact of governance, large shareholder ownership, stewardship and valuation roles of earnings, and debt contracting.

In the next section I discuss two main areas of capital markets research in accounting that dominated the capital markets research in accounting literature, namely, tests of capital market efficiency and fundamental analysis and accounting-based valuation.

3. Two main areas of capital markets research in accounting

3.1. Tests of capital market efficiency

Tests of capital market efficiency in accounting parallel those in economics and finance. An efficient market is one in which security prices reflect all available information (Fama, 1970). In accounting, researchers have largely focused on examining how well security prices reflect information contained in earnings, specifically, via the earnings announcement. This is important because security prices are associated with wealth allocation in society, and therefore, knowledge of how accounting is impounded in the security price will enable researchers to gauge its usefulness in wealth creation.

A large body of research in capital markets research in accounting is dominated by tests of EMH in the form of both event studies, as well as cross-sectional tests of the predictability of returns or the anomalies literature; thus, they examine the information content of earnings. Event studies examine the impact of an earnings announcement on the level or variability of security prices or trading volume and are “joint tests of market efficiency and the model of expected rates of return used in estimating abnormal returns” (Kothari, 2001). Studies that provide evidence on the informativeness of earnings announcements are Ball and Brown, (1968), Beaver, (1968) and Amir and Lev, (1996), to name a few. Specifically, these studies document a significant positive relation between the sign of an earnings change, at an earnings announcement, and abnormal stock return. The stronger the relation, the more informative are earnings as well as the better the quality of the earnings expectation model employed in the test.

In contrast to event studies, association studies in accounting examine the relation between earnings and stock returns over a longer period, for example, a year. Such studies allow for the possibility for other information to confound the stock returns-earnings relation. Thus, rather than measure the informativeness of earnings with respect to stock prices, association studies examine whether and how quickly earnings capture changes in the information captured in stock returns over the period. Studies in this stream of research include Ball and Brown, (1968), Collins and Kothari, (1989) and Easton and Harris, (1991), to name a few. These studies provide evidence that annual earnings are not sufficiently timely as information (e.g., quarterly earnings) is leaked to the market before annual earnings announcements. Thus, the evidence in these studies suggests that stock prices lead earnings in reflecting new information. Several studies also document a post-earnings announcement drift (PEAD) (e.g., Ball and Brown, 1968; Bernard and Thomas, 1989; 1990), which shows a lag with which earnings are impounded in stock prices. For example, in the first study to document PEAD, Ball and Brown, (1968) document an asymmetric adjustment to the nature of the news contained in earnings announcements – bad news are reflected in stock prices after several months, indicating an underreaction and slow adjustment of the market to earnings. Among other studies, Bernard and Thomas, (1989); (1990) attribute PEAD to delayed response to new information.

Several studies compare the informativeness of earnings and cash flows and provide evidence that earnings are more informative than cash flows (e.g., Dechow, 1994). These studies conclude that the accrual component of earnings contributes to the greater informativeness of earnings relative to cash flows.

The stock return-earnings relation, labelled the earnings response coefficient (ERC), has been documented to be weak in the literature, ranging from 1 to 3 (e.g., Easton and Zmijewski, 1989; Kormendi and Lipe, 1987). Several studies provide cross-sectional and time-series evidence on the determinants of ERCs (e.g., Collins and Kothari, 1989; Easton and Zmijewski, 1989; Kormendi and Lipe, 1987). The evidence in these studies show that researchers need to control for the effects of earnings persistence, risk, and growth to examine the impact of a variable on ERC. Other studies document that factors related to a firm's strategy like its life cycle and business strategy (Anthony and Ramesh, 1992) and industry product market competition (Baginski et al., 1999; Biddle and Seow, 1991).

Several explanations have been forwarded for the low magnitude of the stock return-earnings relation, namely, that prices lead earnings in terms of reflecting all relevant information, and thus reducing earnings informativeness, inefficient capital markets that fail to accurately capture an earnings surprise, accounting distortions that generate noise in earnings and deficient Generally Accepted Accounting Principles (GAAP) in capturing relevant factors that influence firm market value like intangibles, and transitory components in earnings like one-off gains and losses and asset sales.

3.2. Fundamental analysis and accounting-based valuation

Following developments in behavioural economics and finance, accounting scholars embarked on another stream of research that examined whether information contained in earnings could be used to create/enhance wealth incrementally to the stock price. For example, behavioural finance models of inefficient markets (Barberis et al., 1998; Daniel et al., 1998; Hong and Stein, 1999) question the veracity of EMH - according to Fama, (1965), new information will be instantaneously and fully reflected in stock prices based on competitive behaviour among rival rational, profit-maximising actors operating in a competitive context.

Similarly, accounting researchers have also produced evidence that is inconsistent with EMH. Ample evidence challenging the legitimacy of EMH was provided to stimulate research into the lag with which accounting information is impounded into stock prices. These researchers claim that stock returns are predictable using the time-series properties of earnings and/or properties of earnings forecasts, and that trading strategies could be formed using accounting information to maximise wealth. This stimulated fundamental analysis research, which was focused on identifying mispriced securities for investment purposes. The mispricing of these securities is dependent on the difference between a firm's current security price and the intrinsic value of the firm, which in turn is determined by the information contained in the firm's current and past financial statements as well as industry and macroeconomic data.

Different valuation models surfaced to compute a firm's value. The residual income model by Ohlson, (1995) and Feltham and Ohlson, (1995), is derived from the dividend discounting model, and expresses value as the sum of the current book value and the discounted present value of expected abnormal earnings, defined as forecasted earnings minus a capital charge equal to the forecasted book value times the discount rate.

The usefulness of earnings in determining a firm's value has also been extensively examined in the literature. I next discuss two popular topics in this literature that are concerned with how the accounting system influences the usefulness of earnings in determining firm value: accrual accounting and accounting conservatism.

3.2.1. Accrual accounting

The stock price is generally computed as the present value of future cash flows, discounted at the cost of equity capital. Finance researchers typically regard cash flows as superior to earnings in valuing securities, either because they feel that earnings can be manipulated and is subject to accounting distortions like the immediate expensing of research and development expenditure as required by GAAP. However, as discussed above, the market reacts to earnings news (announcements). Thus, it is evident that information contained in earnings is useful to value stock prices beyond cash flows.

A vital component of earnings which enhances its timeliness, and thus its usefulness to signal future cash flows more than past cash flows is accruals. Dechow, (1994) provides evidence that accruals dominates cash flows in predicting future cash flows. Under the assumption of efficient markets, Dechow estimates the R squares from annual regressions of returns on earnings or cash flows and finds that the explanatory power of earnings dominates that of cash flows. According to the Statement of Financial Accounting Concepts No. 8 of the Financial Accounting Standards Board (FASB 2010, page 4), "Accrual accounting depicts the effects of transactions, and other events and circumstances on a reporting entity's economic resources and claims in the periods in which those effects occur, even if the resulting cash receipts and payments occur in a different period." This description illustrates the completeness with which accruals captures past and future cash flows compared to current cash flows. Dechow et al., (2014) attribute the timeliness of accruals to their ability to anticipate future cash inflows based on the Revenue Recognition Principle, which allows firms to recognise revenue and record an asset before it is received, as long as it is realisable and earned. Dechow et al. also list other features of accruals that reduce earnings volatility and increase earnings persistence relative to cash flows. First, accruals are able to anticipate future cash outflows as firms are required to anticipate certain costs that have not yet been incurred (labelled a liability). Second, the recognition of expense can be delayed even though cash has been paid. For example, inventory can be capitalised when paid for with cash, and labelled an asset, and becomes an expense only when it is sold (or impaired). Finally, the recognition of revenue can be delayed even though cash has been received. For example, when a firm has not yet provided the good or service, but has received cash for it from the customer, the firm has to defer recognising the revenue (and hence, labelled a liability).

Accounting researchers also examined components of earnings to gauge whether they are more or less useful in explaining stock returns. For example, Bradshaw and Sloan, (2002) show that by removing transitory components of earnings (resulting in "proforma or street earnings"), earnings' ability to reflect underlying firm value is significantly enhanced as they are more closely related to stock prices when they are more persistent in nature. In an earlier study, Fairfield et al., (1996) find evidence that financial statement items relating to extraordinary items, special items, and discontinued operations are less persistent than income items that are more persistent.

Sloan, (1996) finds evidence that 84% of current earnings persist into the following year's earnings. However, he shows that the cash component of earnings is more persistent (and thus of higher quality) than the accruals component of earnings. Due to the reversal of accruals, possible managerial manipulation, and accounting rules, accruals contain measurement error, which contributes to its lower persistence compared to the cash component of earnings. Thus, investors should consider these issues when making their decisions. Sloan find that stock prices act as if investors are fixated on earnings while failing to consider fully information in the accrual and cash flow components of current earnings until the information influences future earnings. Therefore, if the accrual component is unusually high (low), investors tend to experience negative (positive) abnormal stock returns around earnings announcements when the mispricing is corrected in the future, as the investors would have overpriced (underpriced) stocks in which the accrual component is relatively high (low) due to not anticipating the lower persistence of earnings performance attributable to the accrual component of earnings. Sloan advocates that a trading strategy of going long in stock of firms with relatively low levels of accruals and short in the stock of firms with relatively high levels of accruals will yield positive abnormal stock returns.

3.2.2. Accounting conservatism

Statement of Financial Accounting Concepts No. 2 of the Financial Accounting Standards Board defines conservatism as “a prudent reaction to uncertainty to try to ensure that uncertainties and risks inherent in business situations are adequately considered. Thus, if two estimates of amounts to be received or paid in the future are about equally likely, conservatism dictates using the less optimistic estimate…” (FASB, 1980), Accounting conservatism reflects the prudency with which the accounting system recognises transactions that affect earnings in that it requires a high degree of verification before making an irrefutable claim to earnings. Thus, accounting conservatism provides guidance in the event of uncertainty or when the need for estimation arises. Likely losses and expenditures should be recognised as soon as they are identified and incurred, respectively. Similarly, under the revenue recognition principle, revenue can only be recognised when it is verified. Thus, due to the uncertainty pertaining to accrual accounting, future revenue or costs are recognised only when there is certainty regarding the associated transaction. For example, under a credit sale transaction, overestimating an allowance for doubtful collection of payment is encouraged, and the sale is only allowed to be recognised when the transaction actually takes place, thus providing a more accurate picture of the accounts receivable account. In addition to its effect on earnings, accounting conservatism affects how assets are reported. For example, in valuing inventory, firms are required to report inventory at the lower of its historical cost or its current market value.

Two types of conservatism have been identified in the accounting literature, namely, unconditional conservatism and conditional conservatism. Unconditional conservatism does not depend on news. For example, unconditional conservatism is illustrated via the immediate expensing of research and development expenditure. Conditional conservatism refers to a property of earnings that is dependent on news. An example of unconditional conservatism is the asymmetric recognition of gain and loss contingencies. Basu, (1997) is the first study to document the asymmetric timeliness property of earnings in that earnings reflects the “bad news” reflected in negative stock returns more quickly than the “good news” reflected in positive returns. Basu also finds that negative earnings changes are less persistent than positive earnings changes. Studies show that accounting conservatism reduces the persistence and predictability of earnings, encourages earnings management, reduces the forecast accuracy of analysts, and may reduce the value relevance of earnings (Ruch and Taylor, 2015). Therefore, accounting conservatism has the tendency to reduce the usefulness of earnings from a valuation perspective.

Overall, accounting conservatism results in potentially understated assets and revenue, and overstated liabilities and expenses, which results an understatement of the book value relative to market value of equity as well as lower reported net income and future financial benefits.

4. Current capital markets research in accounting

Prior capital markets research in accounting has generally focused on whether and how earnings mapped into stock returns as well as how earnings is useful to investors. The evidence shows that trading volume and abnormal stock returns are approximately double around earnings announcements, thus showing that earnings announcements contain information that is used by investors to make their trading decisions. However, earnings announcements could lack information value if earnings are computed with measurement error or if the information in earnings announcements could be conveyed through more timely sources (e.g., dividend announcements, management forecasts). Dechow et al., (2014) provide evidence that the information content of earnings announcements was the highest during the 2001–2012 period.

Notwithstanding the documented usefulness of earnings in determining firm value, several studies have challenged earnings' usefulness in capturing a broader notion of firm value, specifically, the non-financial component of firm value. For example, Lev and Zarowin, (1999) show that the usefulness of accounting numbers declined over the 20 years prior to their study. They attribute this to the failure of the accounting system to adequately reflect innovative activities. The internet bubble in the late 1990s witnessed a lack of timeliness of earnings in explaining stock prices. This has prompted a new stream of research scrutinising financial statements to generate new insights using advanced methodological developments. I discuss next two research topics of current interest in the literature to both finance and accounting academics.

4.1. Textual analysis of disclosures

First, in order to examine more closely qualitative and text-based narrative information (which were previously difficult to use) contained in important disclosure, management, discussion, and analysis (MD&A), 10-K footnote disclosures, and conference call transcripts, finance and accounting researchers have started using recent advances in textual analysis, computational linguistics, and natural language processing to construct new measures for narrative disclosures. The availability of rich textual datasets via the Edgar filing system, SEC comment letters, financial analyst reports, and conference call transcripts provide researchers with additional sources of information beyond financial statements to determine firm value.

The studies in finance and accounting that helped researchers advance their knowledge of textual analysis are Frazier et al., (1984), Antweiler and Frank, (2004), Das and Chen, (2007), Tetlock, (2007), Li, (2008); (2010), and (Loughran and McDonald, (2011); (2013); (2014); (2015). Other studies have provided evidence on the information content of textual disclosures and have generally found that they are informative in terms of both fundamentals and market reactions. For example, some studies show that optimistic information contained in earnings releases (e.g., Davis et al., 2012; Henry, 2008) and 10-K SEC filings (e.g., Loughran and

McDonald, 2011) is associated with a positive reaction by the market. Davis et al., (2012) find evidence that optimistic language in earnings press releases is positively related with future earnings (specifically, return on assets) and stock return. They also find that median earnings press length increased by 90% from 1998 to 2003. This finding is consistent with that of Francis et al., (2002), who document a significant increase in the number of words in earnings press releases from 1980 to 1999.

In contrast, Li and Ramesh, (2009) find a significant market reaction surrounding 10-Q filings that is limited to filings that release earnings information for the first time. They also find a market reaction to information contained in 10-K reports only when they are filed around calendar quarter-ends. Thus, the evidence provided by Li and Ramesh, (2009) shows little market reaction and, therefore, limited information content in the filings beyond what the market already knows. Li, (2010) attributes this difference between the findings in Li and Ramesh, (2009)) and both Loughran and McDonald, (2011) and Davis et al., (2012) to the consideration of the tone of disclosures in the Loughran and McDonald, (2011) and (Davis et al., (2012) studies. Also focusing on the tone of disclosure, Kothari et al., (2009) find that a favourable textual disclosure tone is associated with lower firm risk (proxied for by the cost of capital, stock return volatility, and analyst forecast dispersion).

Textual analysis of qualitative information enables researchers to gauge useful information associated with firm value beyond the aggregated nature of the earnings announcement. Developments in behavioural economics have identified cognitive biases of individuals and how these influence decision-making (e.g., Kahneman, 2003). Textual analysis enables researchers to gauge managerial biases, which could be useful to investors in assessing firm operating, investing, and financing decisions.

Textual analysis enabled researchers to examine three disclosure characteristics of interest, namely, the amount, tone, and transparency (readability) of the disclosed information. For example, studies that examine the impact of transparency/readability and tone of disclosure on future earnings are Li, (2008) and (2010), respectively. Lee, (2012) and Lawrence, (2013) examine the relation between transparency/readability on market pricing and Davis et al., (2012), Henry, (2008), and Li, (2010) are some papers that examine the relation between the tone of disclosure and market pricing.

4.2. Implied cost of equity capital

The second research topic of current interest among both finance and accounting researchers is the implied cost of capital. The cost of equity capital has historically been computed using the firm's ex ante expected stock return, based on tests of asset pricing theory, and proxied for using ex post realised return due to the unobservability of expected returns; in an efficient market where risk is suitably priced, the average ex post realised returns are arguably an unbiased estimator of ex ante expected returns. However, several researchers have emphasised that realised returns are a noisy proxy for expected returns (e.g., Elton, 1999; Froot and Frankel, 1989; Sharpe, 1978). To address this deficiency, more recent studies (e.g., Claus and Thomas, 2001; Easton, 2004; Ohlson and Juettner-Nauroth, 2005) advocate the use of the implied cost of capital to estimate expected returns – these studies define the implied cost of capital as the discount rate that the market uses to discount the expected cash flows of the firm. This measure estimates expected return directly from stock prices and cash flow forecasts. To proxy for cash flow forecasts, the literature uses analysts' earnings forecasts. However, other studies (e.g., Easton and Monahan, 2005) show that the implied cost of capital computed using analysts' earnings forecasts has little predictive power for future realised returns after controlling for cash flow news and discount rate news. Hou et al., (2012) use earnings forecasts generated by a cross-sectional model to proxy for cash flow expectations and find that their model captures significant variation in earnings performance across firms. They also find higher earnings response coefficients using their approach than analysts' forecasts, suggesting that the earnings forecasts from their cross-sectional model represent a better proxy for market expectations of future earnings.

Gebhardt et al., (2001) is one of the first few studies to compute a market implied cost of capital using a discounted residual income model and market prices.[2] Consistent with Claus and Thomas, (2001), they find that the average implied risk premium for stocks in the U.S. equity market during the 1979–1995 period was much lower than the ex post risk premium. Gebhardt et al., (2001) also document that certain industries have a higher discount rate, but that this effect disappears when realised returns are used to proxy for expected returns. Finally, they find that, after controlling for industry effects, firms with lower market-to-book ratios, higher forecasted growth rates, and lower dispersion in analyst forecasts are assigned a higher risk premium by the market.

5. Conclusions and future implications

Capital markets research in accounting has come a long way. From its roots in examining the relation between earnings and stock prices based on market efficiency to newer ways of thinking and testing based on challenges to market efficiency and more advanced tools and datasets, this stream of research covers a vast literature spanning many topics. Researchers on this topic have generated insights based on their respective beliefs pertaining to whether the capital market is efficient or not. Thus, there is no "correct" choice between conflicting insights; instead the insights depend on the assumptions pertaining to how the capital market behaves. In this review, I have discussed what I believe to be topics on the relation between earnings and firm value of interest to a finance audience. The review is structured in such a manner so as to give the reader a high-level picture of the journey taken by capital markets researchers in accounting from its inception in the late 1960s.

What is evident from the advances in the literature on capital markets research in accounting is a widening of the definition of the

[2] The residual income model is equivalent to the dividend discount model with an indefinite horizon. The reader is referred to Ohlson, (1995) and Feltham and Ohlson, (1995) for a more detailed discussion of the residual income valuation model.

usefulness of earnings over time. With an ever changing world, especially one where firm assets are mainly of an intangible nature, and where firms operate in a volatile, uncertain, complex, and ambiguous (V.U.C.A.) environment, the hurdle is becoming higher for earnings to display its usefulness in influencing firm value. Although much research has focused on the usefulness of earnings in determining firm value via stock prices, a broader notion of firm value is gaining traction in the literature. Recent assertions by Baruch Lev and his co-author, Feng Gu, that traditional financial reporting has lost its relevance is a wake up call to researchers who previously took for granted earnings usefulness in influencing firm value. Lev and Gu show and argue in their book titled “The End of Accounting and the Path Forward for Investors and Managers” (Lev and Gu, 2016) that financial statements have lost their usefulness in providing necessary information to investors to make necessary investment decisions. According to these authors, the financial report only provides 5% of the information that investors base their decisions on. They propose a “Value Creation Report” that provides information on the strategic, value-enhancing resources (assets) like patents, brands, technology, natural resources, operating licences, customers, business platforms available for add-ons, and unique enterprise relationships, rather than on the commoditised plant, machines, or inventory that are reported on corporate balance sheets but are based on a traditional view of the corporation based on the industrial age that does not accurately consider intangible and intellectual assets. While Lev and Gu's assertions are bold and paints a bleak picture of current capital markets research in accounting, and more research needs to be conducted to verify their claims, it is clear that more research needs to be conducted on enhancing the usefulness of accounting information reported in financial statements for investment decisions. For example, it is conceivable that a “one-size-fits-all” approach to the valuation role of earnings is misguided and that there is a contextual aspect to earnings usefulness for valuation purposes. It is likely that earnings may not be as useful for valuation purposes in certain firms or industries (e.g., growth firms or industries where intangible and intellectual assets, or innovation, matter). More research is needed on a broader notion of earnings usefulness to capture a firm's intangibles, and even competitiveness in the industry, to more comprehensively and accurately reflect market value.

Related to the above declining usefulness of earnings under the traditional financial reporting framework, an important development in the post-global financial crisis (GFC) world is the gaining importance of a multistakeholder perspective. Prior to the GFC, firms have largely catered more to, and at times fixated on, the shareholder relative to other stakeholders. With an ever empowered community, employee, supplier, and customer, firms are seeing the need to balance different major stakeholder interests. An implication of this is that financial reports should be as complete and comprehensive enough that all these different stakeholders see the value of the reported information related to their interests in the firm and to help their investing decisions. It is a challenge for researchers to adopt this broader notion of earnings usefulness in influencing firm value.

Integrated reporting is another response along this vein that appears to be gaining mileage in the literature. It adds value to a firm by highlighting how non-financial aspects of the firm can drive long-term growth in firm value. Investors are increasingly demanding non-financial data to gauge a firm's valuation prospects as such data provides useful information about the firm's sustainable growth based on its appeal to a broad spectrum of stakeholders. Integrated reporting is principally aimed at the long-term investor and advances the mission of the firm from that of one which is financially driven (e.g., profits) to one that has a higher purpose that benefits the wider community. Such a perspective may entail sacrificing short-term financial capital to increase a firm's profit potential in the long term. It also embraces a wider notion of value, shared value – rather than focus on a firm's value, the firm focuses on shared value between the firm and its key stakeholders whereby every stakeholder's value, including the firm's, is maximised in the long term via sustainable relationships among each other. This would be consistent with initiatives by the United Nations (UN) via its UN 2030 Sustainable Development Goals (SDGs), based on which 193 countries agreed in 2015 to work towards these 17 goals. This increases the likelihood that firms have a responsibility to contribute towards attaining these goals and hence broadening their activities, which in turn increases the relevance of accounting information for a broader notion of firm value. Thus, I encourage researchers to examine these issues which tie earnings usefulness to societal welfare.

Relatedly, further research should be conducted on examining social media to obtain additional useful accounting information in addition to that provided in financial reports. Social media has empowered different stakeholders in that a firm's value could be significantly influenced by the information conveyed through social media by a firm's stakeholders that could influence the market's estimate of how the future cash flows would be influenced by the disclosed information. Similarly, a firm could disclose important information in a timelier manner through social media to its key stakeholders, which could influence the nature of its relationships with the stakeholders, and which in turn could signal to the market future cash flow consequences. Hutton et al., (2015) find that the negative stock price reaction to announcements about product recalls is less pronounced for a firm with interactive social media. They also find that the negative stock price reaction to a recall is attenuated with the number of tweets by the firm but exacerbated with the number of tweets by other users. More research on the relation between social media use as a disclosure channel and firm value could yield useful insights.

Disaggregated line items in financial statements are potentially useful in impacting a broader notion of firm value that also considers multiple stakeholder perspectives. Such line items (e.g., revenue) also related more to processes that precede the reporting of earnings and hence are timelier than bottom-line earnings. Furthermore, focusing on these line items can enable a firm to determine how value can be created or enhanced from the perspectives of its different key firm stakeholders, (e.g., employees, customer, and suppliers). An implication of this assertion is that multiples such as price-per-customer, price-to-sales, and other similar disaggregated measures may be more useful in determining firm value than the much touted price-earnings ratio. Significant progress has made on fundamental analysis research pertaining to how different line items can influence firm value. I encourage researchers to extend this stream of research.

5.1. Capital market implications for the Pacific Basin region

While regulations like the International Financial Reporting Standards (IFRS) seek to maintain uniformity worldwide, this poses a challenge in regions that are clearly different to each other. This calls for a more nuanced and context-specific reporting format in financial reports. The Pacific Basin is one example of a region where there is rich diversity in the environment in which firms operate. For brevity, I will discuss implications for two major economies in this region, China and India. China with its emphasis on manufacturing whereas India with its emphasis on services is one important difference between these two large emerging economies in the Pacific Basin. Another key difference is the higher proportion of foreign institutional ownership in the Indian economy compared to the Chinese economy. The Chinese stock market is relatively young and therefore likely more volatile compared to the mature Indian stock market. Consequently, the Chinese stock market does not play as prominent role in the Chinese economy as the Indian stock market does in the Indian economy. According to the Brookings Institution, only 5% of corporate financing is funded by equity in China, where there is much reliance on bank loans and retained earnings. Given these differences in the investor profile, type of industries, age of the market, and the importance of equity financing between the Chinese and Indian economies, more research needs to be conducted on the usefulness of accounting information, like earnings, for determining firm value in these two markets.

Much of the capital markets research in accounting has been conducted based on the U.S. equity market. It is possible that the Pacific Basin could yield additional insights beyond what have been generated in the current literature. For example, it would be useful to examine the role played by state ownership on earnings usefulness. Additionally, government protection via state ownership could influence accounting conservatism. It is also conceivable that the equity investor may not be as important in China as in the U.S. Consistent with this notion, other firm stakeholders like debtholders or even the government, could be more associated with accounting information like earnings than in the U.S. This could lead to less earnings usefulness for the equity investor in China compared to the U.S., and an appeal to a broader stakeholder base. These issues could be examined by researchers. Finally, the greater proportion, and importance, of family ownership in China, with its longer horizon, could yield different findings to empirical tests of relations conducted based on the U.S. stock market, which is dominated by more institutional investors, who have a shorter horizon. An implication of this difference between the U.S. and China is that earnings could be more related to short- than long-term firm value in the U.S. and vice versa for China. Whether anomalies documented in the literature (e.g., the accruals anomaly and PEAD) based on U.S. data are more pronounced in an emerging economy like China is worthy of empirical investigation. Similarly, possible behavioural biases such as the underreaction or overreaction to accounting information by developing capital markets in the Pacific Basin are also worthy of examination.

In conclusion, capital markets in accounting research has generated valuable knowledge on the concept of firm value. The traditional premise that cash flows are superior to earnings, or other accounting information, in influencing firm value can be dispelled based on important findings in the literature. The role of non-financial information in capital markets should also not be underestimated. Given that the world is changing at a fast pace, and becoming increasingly diverse along many different dimensions, this stream of research promises attractive future opportunities for finance researchers.

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Insider Trading, Informativeness, and Price Efficiency Around the World*

Donghyun Kim
School of Business Administration, Chung-Ang University, Republic of Korea

Lilian Ng
Schulich School of Business, York University, Canada

Qinghai Wang
College of Business Administration, University of Central Florida, United States

Xiaoqiong Wang**
School of Business, Indiana University Kokomo, United States

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Abstract

This paper provides the first *direct* evidence of the impact of enforcing insider regulations on the informativeness of insider trades and stock price efficiency across 44 countries with varying levels of insider trading regulations. Results suggest that insider purchases earn abnormal profits, especially in countries with active enforcement of insider trading regulations. We further show that while insiders trade less before earnings announcements in countries with active enforcement, their stock prices react more to earnings news than those in countries without active enforcement. Overall, our results support the view that effective insider trading regulation promotes price efficiency.

Keywords Insider trading; Market efficiency; Regulation enforcement; Earnings announcements

JEL Classification: G11, G23, G32

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**Corresponding author: School of Business, Indiana University Kokomo, United States. Tel: +1-765-455-9470, Fax: +1-765-455-9348, email: xw55@iu.edu.

1. Introduction

Whether or not insider trading should be regulated has been the subject of a long-standing debate among researchers and policymakers. Opponents of insider trading regulation contend that allowing insiders to benefit from their information advantage in trading promotes more informationally efficient financial markets (Manne, 1966; Carlton and Fischel, 1983; Leland, 1992; George and Seyhun, 2002). Proponents of insider trading regulation, however, argue that unrestricted insider trading can adversely affect the incentives of outside investors to acquire and produce information, hence making stock prices less informationally efficient (Fishman and Hagerty, 1992; Khanna *et al.*, 1994). Bhattacharya and Daouk (2002) make the first attempt to look at varying enactments and first-time prosecution of insider trading laws across 103 countries. They find that only first-time legal prosecution of insider trading laws can reduce a country's cost of equity, thereby lending support to insider trading regulation.[1] However, their study provides no direct evidence on the informativeness of insider trades across different regulation regimes, the potential tradeoff between the informational benefit of insider trading and the cost of reduced information acquisition, and the overall impact of insider trading regulation on price efficiency. Thus, the purpose of our study is to address all these important issues and provide evidence that helps settle the debate.

Our research represents the first to directly evaluate and compare the information contents of insider trading activities across different regulation and enforcement regimes. We exploit a newly available global dataset that contains information of global insider transactions of senior corporate executives and corporate directors from 44 countries over the period of 2007 to 2013. By examining insider trading activities in this large number of countries with varying levels of insider trading enforcement, we seek to provide the first comprehensive evidence on insider trading activities and their informativeness across different markets, to understand the role of insider trading regulation in determining insider trade informativeness, and to assess the relation between insider trading regulation and stock price efficiency.

We start by examining insider trading activities and their informativeness across different insider trading regulation regimes. All 44 countries in our sample have insider trading laws, but enforcement of insider trading laws varies widely across these countries. To measure the extent to which a country enforces its insider trading regulation consistently and rigorously, we construct an "Active Enforcement" variable that is based on the prosecution of insider trading in a country during the sample period of 2007–2013.[2] Active Enforcement is a binary variable that equals

[1]Our unreported results show that first-time prosecution has no effect on the informativeness of insider trading.

[2]We have also constructed the same variable using information 5 years prior to 2007. Both measures yield qualitatively similar results. Given varying start years of the availability of insider transactions for the sample of countries, we choose to report the results based on the construct for the sample period.

one if the country is actively enforcing its insider trading regulation in that it has at least one insider trading prosecution case during the sample period; otherwise, it is zero. We measure the informativeness of insider trades based on abnormal stock returns subsequent to insider transactions. For each country, we compute the average cumulative returns of stocks traded by insiders for buys and sells, separately, in excess of the country index return for varying periods of 5–120 days following the day of insider trades.

Several results emerge from the comparison of the large number of insider trades across the countries. First, corporate insiders trade actively, and their trades, particularly their buy transactions, are informative, and the effect is more pronounced in countries with active enforcement of insider trading regulations than in countries without.[3] Abnormal returns associated with insider buy transactions over the different periods from 5 to 120 days subsequent to insider transaction dates are positive and highly significant, while those associated with sell transactions show no robust evidence. Furthermore, insider trading informativeness is related to various country-level economic and legal characteristics, but the legal characteristic variables such as the rule of law, the general effectiveness of law enforcement, investor protection, and the quality of government do not substitute for the effects of enforcement of insider trading regulation. Second, insider trading regulations do not seem to affect the level of insider trading activities. The results show no significant difference in overall insider trading activities (scaled by a country's stock market capitalization) between countries with and without active enforcement of insider trading regulations.

Why does active insider trading regulation result in more, not less, informative insider trades? How does insider trading regulation affect stock price efficiency? To answer these questions, we examine insider trading activities around an important corporate event – corporate earnings announcements – and also investigate the relation between insider trading regulation, insider trading activity, and market reaction to earnings news. In countries with active enforcement of insider trading regulations, insiders trade less actively before corporate earnings announcements, but market reactions to earnings news are stronger. These findings suggest that active enforcement of insider trading regulation deters insiders from exploiting non-public and material corporate information in their stock trading, but seems to facilitate market efficiency. Furthermore, insiders trade actively before earnings announcements in countries without active enforcement of insider trading but with lockout period requirements, implying that active enforcement of insider trading regulation, not insider trading regulation itself, determines insider trading activity around earnings announcements. All these results are robust after controlling for various country, market, and institutional characteristics.

[3]U.S. studies such as Ravina and Sapienza (2010) and Cohen *et al.* (2012) also find that insiders still have the ability to trade on private information, in spite of the U.S.'s rigorous enforcement of insider trading regulations.

Finally, to further corroborate the informativeness of insider trades, we examine insider profits around earnings announcement dates. If insiders are able to exploit their information advantage, they should be able to make more profits from trading prior to earnings announcements. We find that insider trading profits are larger before earnings announcements in countries with active enforcement of insider trading regulation, but no difference in insider profits before and after earnings announcements in countries without enforcement. Therefore, these findings indicate that insider trading activities are informative only in countries that enforce their insider trading regulations. In other words, insiders from countries without enforcement could exploit their information advantage, such as corporate earnings news, in their trades, but market reactions to such news are weak, thereby resulting in noisier stock prices, which in turn, reduce the potential information advantage of insiders and subsequently lower the informativeness of their trades.

Our study makes several contributions to the literature. First, the newly available insider trading database from a broad spectrum of countries affords us the opportunity to empirically examine and compare insider trading activities and the informativeness of insider trading under different regulation regimes. Our analysis not only expands the extensive literature that focuses mainly on insider trading in a single country or in a small group of countries, but also provides the first direct comparison of insider trading activities and their informativeness across countries. These comparisons allow us to assess the effects of insider trading regulations on insider trading activities and the informativeness of insider trades.

Second, our findings offer important insights on the opposing views regarding the effects of insider trading regulation on price informativeness and market efficiency. We present the first and direct evidence that insider trading regulation improves both the informativeness of insider trades and the efficiency of stock prices. The evidence provides support to the argument that insider trading regulation improves stock price efficiency. Several previous studies show that insider trading restrictions lead to greater information acquisition efforts (Bushman *et al.*, 2005) and that the first enforcement of insider trading laws improves stock price informativeness (Fernandes and Ferreira, 2009). Our results are consistent with the findings of the two studies, but we provide direct evidence of the mechanism of how insider trading regulation can improve the informativeness of stock prices. Specifically, we show that allowing insiders to freely exploit their information advantage over the investor public has substantial adverse effects that can easily overwhelm any informational benefits from insider trading. Such adverse effects not only lead to noisier and less informative stock prices, but also reduce the informativeness of insider trades (and hence their information advantage).

Our study thus fills the gap of existing findings on insider trading regulation and stock price efficiency in different countries. Bhattacharya *et al.* (2000) examine shares trading on the Bolsa Mexicana de Valores and find that share prices do not react to company news in the Mexico stock market. They argue that because insider trades may have already transmitted such information to the market, company announcements do not add new information. Such arguments implicitly assume that insider trades in unregulated markets are informative and that stock prices, if fully reflecting insider information, could be efficient even if they do not respond to company announcements. While our sample does not include Mexico, our evidence suggests that insider trades in Mexico may not convey much information because their stock prices may not fully respond to any corporate news, either through corporate announcements or insider trades.

The remainder of the paper is organized as follows. In the next section, we provide a brief discussion of the related literature. Section 3 describes the data, and Section 4 evaluates the informativeness of insider trades and the impact of insider trading regulation on insider trade informativeness. Section 5 employs a corporate event – corporate earnings announcements – to examine the impact of insider trading regulation on stock price efficiency, and the final section concludes.

2. Related Literature

Over the past few decades, the economics of insider trading has remained a highly controversial topic among securities authorities and academics. The main issue is whether insider trading is economically inefficient and hence, ought to be subject to regulation. Critics of insider trading regulation argue that without regulation, inside information will be efficiently allocated to investors who value the information the most, and that the benefit of more efficient prices is a more efficient allocation of resources (Coase, 1960; Manne, 1966). Carlton and Fischel (1983) further argue that increased price efficiency can reduce investor uncertainty and better protect corporation information. Subsequent theoretical models (such as Dye, 1984; Leland, 1992; Shin, 1996; Noe, 1997) also suggest that insider trading makes stock prices more responsive to changes in the market. In other words, unimpeded insider trading facilitates the incorporation of information into stock prices, thereby improving price informativeness.

Proponents of insider trading regulation, however, argue that under certain circumstances, the adverse effects of insider trading could lead to less efficient stock prices. Manove (1989) shows that insider trading increases trading costs of liquidity traders and, hence, discourages liquidity trading and decreases market liquidity. This liquidity discount can be incorporated into a firm's stock price, thereby increasing the firm's cost of capital. Fishman and Hagerty (1992) put forth two adverse effects of insider trading. First, insider trading discourages non-insiders from obtaining information and trading, and this reduces the number of informed investors in the market. Second, in the presence of better informed insiders, the information gets unevenly distributed across investors in the market. As a result, the market becomes less competitive and stock prices become less efficient.

It is worth pointing out that both the opponents and proponents of insider trading regulation hold the view that unrestricted insider trading is more informative than regulated insider trading. For the opponents, more informed insider trading leads to more efficient prices. For the proponents, the highly informed insider trading, through its adverse effects on other market participants, leads to less efficient prices.

There is an extensive empirical literature that examines the informational value of insider trading. Given the widely available U.S. insider trades data, many existing, especially earlier, studies focus on U.S. markets and find that insider trades are informative (Jaffe, 1974; Finnerty, 1976; Seyhun, 1988; Lakonishok and Lee, 2001; George and Seyhun, 2002; Brochet, 2010). Non-U.S. studies also reach the same conclusion for Canada (Baesel and Stein, 1979), the U.K. (Pope *et al.*, 1990), Hong Kong (Wong *et al.*, 2000), South Korea (Lee *et al.*, 2009; Cheon *et al.*, 2011), Germany (Betzer and Theissen, 2009), Switzerland (Zingg *et al.*, 2007), Australia (Hotson *et al.*, 2007), Thailand (Budsaratragoon *et al.*, 2012), the Netherlands (Cziraki *et al.*, 2014; Degryse *et al.*, 2014), and European countries (Fidrmuc *et al.*, 2012). But other studies find that insider purchases contain no informational value in Norway (Eckbo and Smith, 1998), Spain (Del Brio *et al.*, 2002), and Australia (Brown *et al.*, 2003).

These empirical studies are primarily based on a single country or a small group of countries within a region. The findings do not offer systematic evidence on the informativeness of insider trades across countries, and these studies do not attempt to compare and explain the differences in the informativeness of insider trades across the countries. Because these studies typically investigate insider trading under the same regulatory regime, they also do not address the core question of the debate on insider trading regulation, that is, whether or not insider trading regulation helps to improve stock price efficiency.

Several recent studies have examined some aspects of the effects of insider trading regulation on the financial market. For example, Bushman *et al.* (2005) show that restriction of insider trading leads to greater information acquisition efforts by financial analysts. Min (2010) concludes that the insider trading sanctions reduce insider trading on average, and result in larger noise trading on M&A-related news and rumors. Chung and Zhang (2010) find that American Depositary Receipts (ADR) from countries that have enforced insider trading laws have better market liquidity and lower information asymmetry than ADR from countries that have not enforced insider trading laws. Bhattacharya and Daouk (2002) find that the first legal prosecution of insider trading can help to lower a country's cost of equity, presumedly because of improved information efficiency. Studying the effects of the first enforcement of insider trading laws, Denis and Xu (2013) find similar results for executive compensation, and Chen *et al.* (2017) show similar effects for corporate investment. Fernandes and Ferreira (2009) examine the impact of first enforcement of insider trading laws on the informativeness of stock markets. They find that price informativeness is substantially improved after the first enforcement of insider trading laws in developed markets.

These recent studies provide some evidence of the potential effects of insider trading regulation on stock price efficiency. However, none of these studies examine the effects of insider trading regulation on insider trading activities and the informativeness of insider trades. Without such direct evidence, we cannot study the mechanism through which insider trading regulation affects stock prices and address the core question of the debate on insider trading regulation. The purpose of our study is to address these issues.

3. Data and Summary Information

3.1. Insider Transactions

Our global insider transactions data are obtained from Director Deals, a specialist global market data company that monitors and analyzes share transactions made by directors and top executives of firms. Director Deals gathers information of share transactions by insiders of about 40 000 firms from 56 countries globally. The source of its data comes from company announcements made public under disclosure regulations and from stock exchanges. For a given transaction, this dataset includes stock identifiers (ISIN and SEDOL), market capitalization at the time of the transaction in U.S. dollars, company information, the country where the trade took place, ticker symbol, personal information of the insiders (name, title, date of birth), transaction type (award, buy, sell, transfer, exercise, given away, etc.), transaction date, price and number of shares traded, total value of transaction (in British pounds, euros and U.S. dollars), and the date an insider trade was announced or reported.

Our sample focuses on insider transactions in the home country where the firm's headquarter is located and where the transaction occurred and was reported.[4] We exclude countries with fewer than five firms with reported insider transactions for the entire sample period, and also exclude one major developed market, Japan, where insider trades are not required to be reported by law. Furthermore, our analysis is restricted to open-market insider buys and sells as other types of transactions are more likely attributable to liquidity and portfolio diversification considerations (Ofek and Yermack, 2000; Carpenter and Remmers, 2001). As a result, our final sample consists of 44 countries with varying start years when information on insider transactions becomes available. In Director Deals, the U.K., Ireland, and the Netherlands have the longest sample period from 1999 to 2013, whereas most emerging markets (such as Brazil, Chile, Indonesia, and Pakistan) have data starting from 2013. As a result, our sample period is from 2007 to 2013.

Table 1 presents the sample period for each country. The table reports the number of unique firms with reported insider transactions, average annual number of transactions, average annual value of transactions (in U.S. dollars), and average annual number of shares traded. The number of unique firms with reported insider transactions varies from five in Czech Republic to 6501 in the U.S., and the total number of unique firms employed in this study is 24 135. The average annual

[4]These transactions include the vast majority of insider trades in the database.

Table 1 Insider trading activity, regulation, and enforcement around the world

This table provides by country, the market type (developed [DEV] or emerging [EMG]), start year of insider trades at Director Deals, number of unique firms that report insider trades, average annual number of insider trades, average value of trades in millions $, average annual trade value relative to market capitalization in %, the year the insider trading (IT) law was established, the year IT law was first enforced, and a dummy variable (Active Enforcement) that equals 1 if insider trading prosecution occurred during the sample period, and 0 otherwise.

					Insider trades				
Country	Market type	Start year	No. of firms	No. of trades	Value (mil $)	Value (%)	IT laws existence	First enforcement	Active enforcement
Australia	DEV	2008	1723	3044	1116.36	0.085	1991	1996	1
Austria	DEV	2008	63	181	319.03	0.331	1993	2000	1
Belgium	DEV	2007	116	352	751.88	0.229	1990	1994	0
Brazil	EMG	2013	103	421	463.26	0.005	1976	1978	1
Canada	DEV	2009	2517	14 440	4609.26	0.218	1966	1976	1
Chile	EMG	2013	60	394	636.26	0.240	1981	1996	0
China	EMG	2010	1228	3750	3670.44	0.098	1993	2000	1
Croatia	EMG	2008	24	76	10.75	0.046	1995	no	0
Cyprus	EMG	2008	25	42	13.10	0.184	1999	2000	0
Czech Republic	EMG	2007	5	25	9.28	0.016	1992	1993	0
Denmark	DEV	2007	177	429	330.12	0.108	1991	1996	1
Egypt	EMG	2009	75	283	68.03	0.113	1992	2012	1
Estonia	EMG	2007	18	54	26.90	0.824	1996	2009	1
Finland	DEV	2013	54	379	335.84	0.111	1989	1993	0
France	DEV	2007	582	2026	4548.90	0.210	1967	1975	1
Germany	DEV	2007	516	1261	1658.31	0.031	1994	1995	1
Greece	DEV	2008	193	2941	1386.44	1.723	1988	1996	0
Hong Kong	DEV	2009	848	3254	5714.20	0.197	1991	1994	1
Hungary	EMG	2009	11	20	10.66	0.047	1994	1995	1
India	EMG	2008	1363	3759	865.09	0.067	1992	1998	1
Indonesia	EMG	2013	28	130	113.30	0.033	1991	1996	0

Table 1 (*Continued*)

Country	Market type	Start year	No. of firms	No. of trades	Insider trades Value (mil $)	Value (%)	IT laws existence	First enforcement	Active enforcement
Ireland	DEV	2007	47	69	99.37	0.100	1990	2000	1
Israel	EMG	2010	247	716	280.84	0.151	1981	1989	1
Italy	DEV	2007	281	1656	1667.62	0.184	1991	1996	1
Luxembourg	DEV	2010	7	31	15.31	0.007	1991	2000	0
Malaysia	EMG	2009	832	4270	1574.94	0.361	1973	1996	1
Netherlands	DEV	2007	116	281	245.89	0.023	1989	1994	1
New Zealand	DEV	2008	105	199	95.10	0.033	1988	2000	0
Norway	DEV	2007	262	737	748.27	0.277	1985	1990	1
Pakistan	EMG	2013	57	414	26.33	0.045	1995	no	0
Philippines	EMG	2009	167	979	1132.32	0.614	1982	1994	1
Poland	EMG	2010	374	1086	756.27	0.322	1991	1993	1
Portugal	EMG	2009	38	226	819.94	0.502	1986	2000	0
Singapore	DEV	2008	542	1268	807.30	0.093	1973	1978	1
South Africa	EMG	2008	308	942	570.57	0.068	1989	2000	1
South Korea	EMG	2011	1197	2650	1968.77	0.166	1976	1988	1
Spain	DEV	2007	132	719	2009.44	0.206	1994	1998	0
Sri Lanka	EMG	2010	154	397	89.71	0.474	1987	1996	0
Sweden	DEV	2007	289	1573	1302.90	0.196	1971	1990	1
Switzerland	DEV	2007	228	1529	1854.53	0.155	1988	1995	1
Thailand	EMG	2010	378	2299	867.61	0.101	1984	1993	0
Turkey	EMG	2010	160	1064	682.89	0.268	1981	1996	1
United Kingdom	DEV	2007	1984	3630	2316.78	0.046	1980	1981	1
United States	DEV	2007	6501	45 588	44 812.71	0.044	1934	1961	1

number of transactions ranges from 20 for Hungary to 45 558 for the U.S. For example, in Australia, the total number of insider trades is $3044 \times 6 = 18\ 264$ during the entire sample period. The average ratio of the annual total value of transactions relative to total market capitalization varies from 0.005% for Brazil to 1.723% for Greece.

3.2. Insider Trading Laws

Table 1 also reports the year in which insider trading laws came into existence in a country and the year of first insider trading prosecution under insider trading laws. Information on the enactment of insider trading laws is obtained from Bhattacharya and Daouk (2002). All countries in our sample have adopted insider trading laws starting from 1934 (the U.S.) to 1999 (Cyprus). Bhattacharya and Daouk (2002) also provide information on the first insider trading prosecution in a country up to 1998. We use the same source and supplement the first enforcement information for our sample of countries. The year that the initial prosecution under insider trading laws took place is between 1961 and 2012, and only two countries in the sample have not enforced their insider trading laws. With the exception of Egypt (2009) and Estonia (2012), the first enforcement of insider trading laws in most countries occurred much earlier than our sample period. Our analysis has found that the first-time enforcement variable exhibits no impact on the informativeness of insider trades and, hence, we do not report the results in the subsequent tables.

In this paper, we develop a new measure of insider trading regulation based on how rigorously and actively one country enforces insider trading laws. Even though most countries in our sample have had at least one insider trading prosecution (e.g. the initial prosecution), many countries do not pursue such cases rigorously. During our sample period of 2007–2013, there was not a single case of insider trading litigation in 15 countries in the sample.[5] We thus define a variable "Active Enforcement" to measure the extent to which a country enforces its insider trading regulation consistently and rigorously. "Active Enforcement" is a dummy variable that equals 1 if the country has a prosecution event under insider trading laws within the sample period, and 0 otherwise. We collect information on such prosecution events from three major data sources: (i) the market regulator's official announcements and direct communication with the regulatory authorities; (ii) news search; and (iii) the Capital IQ Key Development database. Capital IQ provides corporate events internationally, and we manually check the events that have a key word of insider(s) to ensure that the reported event is an insider trading prosecution event. The results are shown in Table 1. Among the 44 countries in our sample, 29 have recent enforcement of insider trading laws over the sample period, while 15 countries do not have any active enforcement events.

[5]The results remain qualitatively similar even if we construct our enforcement variable based on a 5-year period prior to 2007.

3.3. Other Variables

Our analysis includes several country-level variables relating to legal, institutional, and economic development characteristics of the sample of countries. These variables could affect insider trading regulation and the enforcements, or could potentially serve as substitutes for the more specific insider trading regulation enforcement variable we constructed above.

Legal Origin is a binary indicator that takes the value of 1 if the origin of the country's legal system is common law and 0 otherwise, and such information is from table II of La Porta *et al.* (1998). Anti-self-dealing is obtained from Djankov *et al.* (2008) and is a measure of investor protection against expropriation by corporate insiders.[6] The table also presents time-series averages of three law or regulation enforcement variables, namely the rule of law (Rule of Law), government effectiveness (Effectiveness), and regulatory quality (RegQuality), from 1999 to 2013. These three variables are obtained from the Worldwide Governance Indicators (WGI) project, 2014 Update. These aggregate indicators combine views and survey results and intend to measure governance quality at the country level. Rule of law reflects the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement and property rights. Government effectiveness reflects the quality of public services, the quality of the civil service, and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. RegQuality reflects the ability of the government to formulate and implement policies and regulations. The value of all these variables ranges from -2.5 to 2.5. As shown in the table, Pakistan has the lowest governance indicators: -0.851 for Rule of Law, -0.574 for Effectiveness, and -0.636 for RegQuality. Finland, on the other hand, has the highest Rule of Law (1.946) and Effectiveness (2.152), and Singapore maintains the highest RegQuality of 1.927.

The sample of countries is divided into developed and developing countries based on World Bank classifications. We use the ratio of country-level stock market capitalization to annual GDP to measure the level of stock market development in a country. Our data source for the time-series annual GDP is the World Bank's World Development Indicators (WDI) database. The stock market development variable and the developed country status serve as additional control variables in our empirical analysis.

[6]The anti-self-dealing index was constructed to measure minority shareholder protection based on private enforcement mechanisms, such as disclosure and litigation, that govern a hypothetical self-dealing transaction. It does not cover insider trading. See Djankov *et al.* (2008) for detailed description of the construction of the index.

4. Regulation Enforcement and Insider Trading

In this section, we study insider trading activities across 44 countries and evaluate their informational contents. We first document insider trading profits of varying time horizons in the sample of countries and then examine whether insider trading regulation enforcement has any influence on both insider trading activities and the informativeness of insider trades around the world.

4.1. Insider Trading Profits

We obtain daily stock prices from Compustat Global and North America, and further supplement stock return information from DataStream to compute insider trading profits. Drawn from the existing literature, for each country, we measure insider trading profits for insider buys and sells, separately, and we compute the profits based on the cumulative returns of the traded stocks in excess of the country index return over 5, 10, 20, 30, 60, 90, and 120 days after insider transaction dates.[7] To conserve space, Table 2 reports the overall results on insider trading profits estimated over 5, 10, 20, 60, and 120 days after transaction dates by country.

As Table 2 indicates, average cumulative excess returns associated with insider buys are mainly positive and those related to insider sells are primarily negative. For example, the 5-day cumulative excess returns for insider buys are positive in 38 countries, and 29 of them are statistically significant at the 5% level. On the other hand, 32 of the 44 countries yield negative 5-day average cumulative excess returns for insider sells, and about half of these returns are statistically significant at the 5% level. For insider buys, average cumulative excess returns range from −0.759% in Luxembourg to 1.530% in Ireland, and for insider sells, they are between −0.954% in Hungary and 1.550% in the Czech Republic. Similar patterns are observed in cumulative returns computed over longer horizons up to 120 days. Insider profits are higher for most countries when measured over longer horizons, but they also vary vastly across the countries.

Our findings are broadly consistent with the results of most prior studies based on some of the individual countries, but they contradict the evidence shown in a few studies. For example, our findings of profitable insider purchases are consistent with the findings of numerous studies on insider purchases, such as Seyhun (1988), Lakonishok and Lee (2001), and Jeng *et al.* (2003) on U.S. firms, Baesel and Stein (1979) on Canadian firms, Pope *et al.* (1990) on U.K. firms, Wong *et al.* (2000) on Hong Kong firms, Betzer and Theissen (2009) on German firms, Zingg *et al.* (2007) on Swiss firms, Hotson *et al.* (2007) on Australian firms, Budsaratragoon *et al.* (2012) on Thai firms, and Degryse *et al.* (2014) on Dutch firms. Our finding is also in line with Del Brio *et al.* (2002) on Spanish firms; the authors find no profitability in insider purchases or sales in Spain.

[7]The reporting requirements of insider trading differ across countries. For our sample period, the majority of the countries require reporting within two days of transaction.

Table 2 Insider trading profits over 5–120 days from transaction dates

This table reports insider trading profits for insider buys (Buy) and sells (Sell), separately, over varying periods from the transaction dates. Insider trading profits are the average cumulative excess returns (i.e. the return of a stock in excess of its country-level index) over 5, 10, 20, 60, and 120 days after the insider transaction date. Insider trading profits are expressed in percentage with their statistical significance at the 5% level denoted by an *.

	5-Day		10-Day		20-Day		60-Day		120-Day	
Country	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell	Buy	Sell
Australia	0.613*	−0.160	0.718*	−0.185	0.573*	0.114	0.728*	1.079*	2.646*	1.359*
Austria	0.727*	0.262	0.899*	−0.465	1.603*	−0.217	3.805*	1.640	7.708*	5.833*
Belgium	0.671*	−0.237	0.934*	−0.062	0.958*	−0.227	1.822*	−0.063	1.608*	−0.415
Brazil	−0.021	−0.531*	0.462	−0.930*	−0.606	−1.780*	−1.898	−2.232*	−4.167	−6.050*
Canada	0.664*	0.061	1.109*	0.232*	1.985*	0.705*	4.000*	2.014*	6.944*	3.416*
Chile	0.583*	−0.087	0.837*	−0.984*	1.463*	−0.903	2.999*	−2.997	−2.077	−7.759*
China	0.455*	−0.652*	0.892*	−0.643*	1.138*	−0.433*	3.070*	1.147*	4.871*	3.167*
Croatia	0.023	0.116	0.066	−0.556	−0.298	−1.098	−1.124*	−1.025	−1.910*	−1.812
Cyprus	0.799	0.744	0.121	−1.280	−1.214	−2.745*	4.195	−6.905*	4.897	−7.742*
Czech Republic	1.434	1.550*	1.414	0.144	0.863	−0.625	1.706	−1.255	5.222*	3.786
Denmark	0.586*	0.277	0.798*	0.429	0.473	0.859*	0.341	1.445*	3.515*	1.762
Egypt	0.049	−0.430*	−0.017	−0.724*	−0.602	−0.920*	−0.060	−3.414*	1.348	−0.555
Estonia	0.624	−0.559	0.600	−0.558	2.034*	−0.981	0.603	−2.557	0.080	−3.969
Finland	0.099	−0.520*	−0.527	−0.599	−1.481*	−1.894*	−4.528*	−5.533*	−5.283*	−6.061*
France	0.247*	−0.263*	0.434*	−0.358*	0.675*	−0.499*	1.170*	−0.818*	1.138*	−1.472*
Germany	1.319*	−0.386*	1.818*	−0.439*	2.150*	−0.500*	3.010*	−0.926*	4.232*	−0.370
Greece	0.326*	−0.208	0.644*	−0.296	1.217*	−0.924*	2.314*	−3.713*	4.641*	−5.238*
Hong Kong	0.566*	−0.277*	0.843*	−0.283	1.009*	−0.020	1.644*	0.184	3.446*	2.159*
Hungary	1.139	−0.954*	2.922	−1.132*	3.591	−1.443*	2.939	−2.105*	5.534	−1.541
India	0.120*	−0.110*	0.186*	−0.094	0.345*	0.352*	0.861*	1.179*	1.420*	2.376*

Table 2 (*Continued*)

Country	5-Day Buy	5-Day Sell	10-Day Buy	10-Day Sell	20-Day Buy	20-Day Sell	60-Day Buy	60-Day Sell	120-Day Buy	120-Day Sell
Indonesia	−3.333	0.202	−4.054	2.744	0.476	3.036	2.911*	2.679	−2.697*	6.756
Ireland	1.530*	0.490	1.466*	0.302	1.432*	0.360	1.927	4.361*	−0.152	4.559
Israel	0.779*	0.022	0.977*	0.651*	1.217*	0.317	2.283*	1.177	0.229	1.742
Italy	0.220*	−0.237*	0.432*	−0.418*	0.523*	−0.679*	0.334	−1.786*	0.510*	−3.413*
Luxembourg	−0.759*	−0.209	−1.186*	0.555	−0.927	0.488	−4.292*	2.590	−5.192*	−0.551
Malaysia	0.187*	−0.374*	0.405*	−0.554*	0.868*	−0.863*	2.225*	−1.108*	3.918*	−2.928*
Netherlands	−0.162	−0.578*	0.112	−0.605*	−0.099	−0.797*	−0.657	−3.783*	0.485	−5.160*
New Zealand	0.610*	0.594*	0.712*	0.445	1.029*	0.365	0.941	0.517	4.876*	4.868*
Norway	0.911*	−0.308	1.017*	0.100	0.835*	0.494	0.888*	0.954	1.520*	1.948
Pakistan	0.301	0.664	1.124	0.698	−0.183	0.452	1.028	2.358*	−7.652*	−0.432
Philippines	0.198	−0.106	0.293	−0.304*	0.635*	−0.592*	1.212*	−0.948*	1.647*	−0.262
Poland	0.430*	−0.144	0.527*	−0.501*	0.893*	−0.641*	0.951*	−0.975*	−0.137	−4.093*
Portugal	−0.006	−0.583	−0.016	−0.763	−0.102	−1.320*	−0.493	0.444	0.352	−2.202
Singapore	0.245*	−0.292	0.538*	−0.729*	0.799*	−0.653*	2.117*	1.068*	3.021*	2.693*
South Africa	0.614*	−0.142	0.777*	−0.200	1.135*	0.076	2.277*	0.007	6.382*	2.490*
South Korea	0.787*	−0.322*	1.270*	−0.233	2.789*	−0.135	4.187*	1.806*	8.540*	5.750*
Spain	−0.002	−0.261*	−0.174	−0.751*	−0.396*	−1.547*	−0.925*	−2.870*	−3.130*	−7.819*
Sri Lanka	1.302*	−0.187	1.050*	−1.103	2.314*	−0.613	2.977*	−1.019	5.594*	2.228
Sweden	0.337*	−0.323*	0.452*	−0.461*	0.558*	−0.745*	1.086*	−0.517	1.489*	−1.184*
Switzerland	0.040	−0.009	−0.028	−0.002	−0.029	−0.106	−0.165	−0.987*	−0.336	−2.312*
Thailand	0.303*	−0.102	0.541*	0.102	0.454*	0.128	1.002*	0.452	−0.917	0.863
Turkey	0.323*	−0.946*	0.718*	−1.041*	1.073*	−1.392*	1.172*	−4.260*	−1.350*	−9.266*
United Kingdom	1.146*	0.064	1.327*	0.039	1.297*	−0.111	1.578*	0.390	2.291*	1.407*
United States	1.384*	−0.037*	1.796*	0.092*	2.449*	0.397*	5.062*	1.189*	8.695*	2.424*

Our evidence differs from the findings of a few studies, such as Eckbo and Smith (1998) on Norwegian firms and Brown *et al.* (2003) on Australian firms. Using a similar methodology, Eckbo and Smith (1998) find insider sales but not purchases, are profitable, whereas our analysis delivers the opposite results. Eckbo and Smith's study is based on insider trades of stocks in 197 companies from 1985 to 1992, whereas ours looks at insider trades of 262 Norwegian stocks between 2007 and 2013. Brown *et al.* (2003) find that directors' sales, but not purchases, are profitable during the 1996–2000 period. On the contrary, our analysis shows that insider purchases are profitable over the 2007–2013 period.

In summary, the above results broadly suggest that insider trades, particularly insider buys, are informative in the global stock markets. Insiders exploit their information advantage and profit from their trades. There also seem to be substantial variations in the profits of insider trades across the countries, as well as over different time horizons. We next turn to the analysis on the determinants of the informativeness of insider trades by exploiting the different insider trading regulation enforcement regimes and the different institutional characteristics across our sample of 44 countries.

4.2. Active Enforcement and Insider Trading Profits

In this subsection, we investigate whether active enforcement of insider trading regulation influences insider trading activities and their informativeness as measured by insider trading profits over varying horizons. We also examine how insider trading regulation enforcement relates to the legal environments in a country and whether any enforcement effects on informativeness and insider trades are driven by country-specific characteristics and general regulatory environments.

In our analysis, we estimate the following multivariate panel regression with various combinations of country-specific variables that are described above.

$$\begin{aligned} IT\ Profits_{i,t} = {} & \beta_1 + \beta_2 Active\ Enforcement_{i,t} + \beta_3 Legal\ Origin_{i,t} \\ & + \beta_4 Rule\ of\ Law_{i,t} + \beta_5 Effectiveness_{i,t} + \beta_6 RegQuality_{i,t} \\ & + \beta_7 Anti - Self - Dealing_{i,t} + \beta_8 Stock\ Dev_{i,t} + \beta_9 Dev_{i,t} + \varepsilon_{i,t}, \end{aligned} \tag{1}$$

where IT Profits denote profits associated with insider transactions in year t. We first compute insider trading profits separately for insider buys and insider sells over different time horizons. For each country and each year, we then compute the average insider trading profits for buy and sell transactions for the different horizons. Active Enforcement is the indicator variable as defined earlier. In our discussion below, we use active enforcement and enforcement interchangeably if the context is clear. We include several legal environment variables in the analysis to see whether insider trading regulation enforcement plays any unique role in different legal environments. These legal environment variables are more broadly defined and they could encompass the effects of insider trading regulation enforcement; they are Rule of Law, Effectiveness, and RegQuality as defined in the previous section. Anti-Self-

Dealing is a proxy for investor protection against corporate insider self-dealing in business decisions. The correlations among three law and regulation variables are greater than 0.9. The high correlation is not surprising as the three variables substantially measure similar quality of a country's regulatory environment. Hence, in our subsequent analyses, our regression model only incorporates these variables one at a time.

Additionally, we include several broad country-level characteristics in our baseline model. Legal Origin equals 1 if a country has a common law origin, 0 otherwise. Stock Dev is defined as the ratio of a country's stock market capitalization to its annual GDP, and proxies for the level of stock market development. The countries in the sample are divided into developed and developing countries, and we include a developed country indicator (Dev) in the regressions. We control for year fixed effects and cluster standard errors at the country level.[8]

We estimate model (1) using insider trading profits measured over varying horizons as separate dependent variables. To conserve space, Table 3 reports results based on insider trading profits measured over 5, 10, 20, and 120 day intervals for insider buys and sells, separately. Our unreported results, based on other time horizons, are qualitatively similar to those reported in Table 3.

Several results emerge from the table. First, the results show strong evidence that informativeness of insider buys measured over both short (5-, 10-, 20-day) and long horizons (120-day) correlates highly with active enforcement of insider trading regulation. The coefficients of Active Enforcement are robustly significant across the model specifications in columns (1)–(9) and across the four panels spanning the different time horizons. In contrast, the results for insider trading profits based on sell transactions in columns (10)–(18) produce significantly weaker evidence of informativeness. For example, the Active Enforcement coefficients are significantly positive for buy transactions across varying horizons. In contrast, not all of the Active Enforcement coefficients associated with sell transactions are statistically significant. We find some significant, though weaker, results for insider sells for the short-horizon of 5 days. However, moving beyond the 5-day horizon, the significant insider-sell results disappear completely. The different results for buy and sell transactions are not surprising, given the well-documented evidence in the literature that insider buy transactions are informative while insider sell transactions are not. In general, the evidence reveals that active insider trading regulation enforcement is associated with more, not less, informative insider trading.

Second, the results show that other variables that measure the broad legal environments do not subsume the effects of insider trading regulation enforcement. Because of the high correlation among the three legal environments variables, we include them separately, along with Active Enforcement in the regressions. Rule of Law, Effectiveness, and RegQuality are significantly related to insider trading profits

[8]Our results remain materially unaffected when the standard errors are clustered at the year level.

Table 3 Insider trading regulation enforcement and insider trading profits

This table presents panel regressions of aggregate insider trading profits (IT Profits) on Active Enforcement and country-level control variables, as well as year-fixed effects for insider buys and sells, separately. IT profits are computed by first cumulating stock returns in excess of country-level indexes over *N* days and then taking an average of the profits within each year for each country. Active Enforcement is a dummy variable that equals 1 if there is an IT law prosecution event within the sample period of the countries in our sample, 0 otherwise. Legal Origin identifies the legal origin of the company law or commercial code of each country (common law or civil law). It equals 1 if the law origin of a country is common law and 0 otherwise. Rule of Law reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement and property rights. Effectiveness reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. RegQuality reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. The definition of these three variables are obtained from the *2014 Worldwide Governance Indicators*. Anti-Self-Dealing is a proxy for investor protection and is obtained from Djankov *et al.* (). Stock Dev is defined as the ratio of country-level stock market capitalization to GDP and is a proxy for stock market development. Dev dummy equals 1 if the country is developed, 0 otherwise. *t*-statistics, based on clustered standard errors at the country level, are reported in parentheses. Statistical significance is denoted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Panel A: 5-Day IT Profits								
	Insider buys								
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Active Enforcement	0.005	0.004	0.003	0.004	0.004	0.004	0.003	0.003	0.003
	(2.73)***	(2.60)**	(2.16)**	(2.30)**	(2.22)**	(2.19)**	(2.18)**	(2.24)**	(2.28)**
Legal Origin		0.004	0.004	0.004	0.004	0.005	0.004	0.004	0.004
		(2.93)***	(3.03)***	(2.87)***	(2.92)***	(1.49)	(2.95)***	(3.11)***	(3.06)***
Rule of Law			0.002				0.002	0.001	0.001
			(2.33)**				(2.35)**	(0.43)	(0.43)
Effectiveness				0.002					
				(1.80)*					
RegQuality					0.002				
					(1.69)*				

Table 3 (*Continued*)

	Panel A: 5-Day IT Profits								
	Insider buys								
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Anti-Self-Dealing						−0.001			
						(−0.23)			
Stock Dev							0.000		−0.000
							(0.01)		(−0.40)
Dev								0.003	0.003
								(1.33)	(1.37)
N	226	226	226	226	226	213	226	226	226
Adjusted R^2	0.052	0.079	0.089	0.085	0.083	0.088	0.085	0.091	0.087
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Panel A: 5-Day IT Profits								
	Insider sells								
Variable	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Active Enforcement	−0.002	−0.002	−0.003	−0.003	−0.003	−0.002	−0.003	−0.003	−0.003
	(−1.46)	(−1.63)	(−2.10)**	(−2.01)*	(−2.11)**	(−1.30)	(−2.00)*	(−2.21)**	(−2.08)**
Legal Origin		0.002	0.002	0.002	0.002	0.004	0.003	0.002	0.003
		(2.36)**	(2.50)**	(2.38)**	(2.44)**	(2.53)**	(3.07)***	(2.41)**	(2.78)***
Rule of Law			0.001				0.001	0.002	0.002
			(1.78)*				(2.02)*	(1.73)*	(1.78)*
Effectiveness				0.001					
				(1.66)					

Table 3 (*Continued*)

	Panel A: 5-Day IT Profits								
	Insider sells								
Variable	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
RegQuality					0.002				
					(2.24)**				
Anti-Self-Dealing						−0.004			
						(−0.97)			
Stock Dev							−0.000		−0.000
							(−2.21)**		(−1.79)*
Dev								−0.001	−0.001
								(−0.66)	(−0.43)
N	225	225	225	225	225	214	225	225	225
Adjusted R^2	0.000	0.012	0.018	0.014	0.020	0.013	0.019	0.015	0.016
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Panel B: 10-Day IT Profits								
	Insider buys								
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Active Enforcement	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
	(2.32)**	(2.16)**	(1.88)*	(1.88)*	(1.85)*	(1.71)*	(1.85)*	(1.87)*	(1.84)*
Legal Origin		0.003	0.003	0.003	0.003	0.005	0.003	0.004	0.003
		(2.17)**	(2.18)**	(2.13)**	(2.15)**	(1.69)*	(1.79)*	(2.23)**	(1.83)*
Rule of Law			0.001				0.001	0.001	0.001
			(0.89)				(0.81)	(0.53)	(0.53)

Table 3 (*Continued*)

	Panel B: 10-Day IT Profits								
	Insider buys								
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Effectiveness				0.001					
				(0.75)					
RegQuality					0.00				
					(0.78)1				
Anti-Self-Dealing						−0.003			
						(−0.42)			
Stock Dev							0.000		0.000
							(0.36)		(0.31)
Dev								0.001	0.001
								(0.32)	(0.25)
N	226	226	226	226	226	213	226	226	226
Adjusted R^2	0.049	0.056	0.054	0.053	0.053	0.052	0.050	0.050	0.046
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Panel B: 10-Day IT Profits								
	Insider sells								
Variable	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Active Enforcement	−0.000	−0.001	−0.001	−0.001	−0.001	−0.002	−0.001	−0.002	−0.002
	(−0.14)	(−0.23)	(−0.55)	(−0.46)	(−0.57)	(−0.98)	(−0.59)	(−0.63)	(−0.64)
Legal Origin		0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002
		(1.21)	(1.21)	(1.19)	(1.16)	(0.82)	(0.93)	(1.34)	(1.15)

Table 3 (*Continued*)

	Panel B: 10-Day IT Profits								
	Insider sells								
Variable	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Rule of Law			0.002				0.002	−0.000	−0.000
			(2.14)**				(1.85)*	(−0.17)	(−0.17)
Effectiveness				0.001					
				(1.39)					
RegQuality					0.002				
					(1.85)*				
Anti-Self-Dealing						0.001			
						(0.12)			
Stock Dev							0.000		−0.000
							(0.35)		(−0.07)
Dev								0.004	0.004
								(1.16)	(1.19)
N	225	225	225	225	225	214	225	225	225
Adjusted R^2	0.013	0.016	0.021	0.017	0.020	0.018	0.016	0.028	0.023
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Panel C: 20-Day IT Profits								
	Insider buys								
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Active Enforcement	0.008	0.008	0.007	0.007	0.007	0.006	0.006	0.007	0.006
	(2.63)**	(2.42)**	(2.01)*	(2.03)**	(1.96)*	(2.08)**	(2.05)**	(2.06)**	(2.08)**

Table 3 (*Continued*)

	Panel C: 20-Day IT Profits								
	Insider buys								
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Legal Origin		0.003	0.003	0.003	0.003	0.008	0.003	0.004	0.003
		(1.28)	(1.27)	(1.25)	(1.26)	(1.80)*	(0.84)	(1.36)	(0.92)
Rule of Law			0.002				0.001	0.001	0.001
			(1.13)				(0.89)	(0.29)	(0.29)
Effectiveness				0.001					
				(0.57)					
RegQuality					0.002				
					(0.82)				
Anti-Self-Dealing						−0.007			
						(−0.82)			
Stock Dev							0.001		0.000
							(0.89)		(0.82)
Dev								0.002	0.002
								(0.58)	(0.45)
N	226	226	226	226	226	213	226	226	226
Adjusted R^2	0.045	0.046	0.045	0.043	0.044	0.036	0.042	0.042	0.038
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3 (*Continued*)

	Panel C: 20-Day IT Profits								
	Insider sells								
Variable	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Active Enforcement	0.003	0.003	0.001	0.002	0.001	0.001	0.001	0.001	0.001
	(0.77)	(0.64)	(0.31)	(0.39)	(0.28)	(0.23)	(0.29)	(0.26)	(0.26)
Legal Origin		0.004	0.004	0.004	0.004	0.007	0.004	0.004	0.004
		(1.48)	(1.45)	(1.44)	(1.38)	(1.47)	(1.12)	(1.59)	(1.35)
Rule of Law			0.003				0.002	−0.000	−0.000
			(1.96)*				(1.69)*	(−0.12)	(−0.12)
Effectiveness				0.002					
				(1.21)					
RegQuality					0.003				
					(1.71)*				
Anti-Self-Dealing						−0.002			
						(−0.27)			
Stock Dev							0.000		0.000
							(0.50)		(0.11)
Dev								0.006	0.006
								(1.11)	(1.12)
N	225	225	225	225	225	214	225	225	225
Adjusted R^2	0.023	0.027	0.029	0.026	0.029	0.012	0.025	0.033	0.028
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3 (*Continued*)

	Panel D: 120-Day IT Profits								
	Insider buys								
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Active Enforcement	0.035	0.034	0.034	0.034	0.037	0.028	0.034	0.034	0.033
	(3.45)***	(3.20)***	(3.12)***	(3.05)***	(3.21)***	(3.24)***	(3.16)***	(3.25)***	(3.25)***
Legal Origin		0.013	0.013	0.013	0.013	0.023	0.011	0.014	0.012
		(1.65)	(1.65)	(1.65)	(1.74)*	(1.66)	(1.28)	(1.78)*	(1.44)
Rule of Law			−0.000				−0.001	−0.005	−0.005
			(−0.09)				(−0.23)	(−0.57)	(−0.57)
Effectiveness				−0.000					
				(−0.02)					
RegQuality					−0.006				
					(−1.01)				
Anti-Self- Dealing						−0.013			
						(−0.51)			
Stock Dev							0.001		0.001
							(0.75)		(0.61)
Dev								0.009	0.008
								(0.72)	(0.63)
N	226	226	226	226	226	213	226	226	226
Adjusted R^2	0.041	0.043	0.039	0.039	0.041	0.079	0.035	0.035	0.031
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3 (*Continued*)

	Panel D: 120-Day IT Profits								
	Insider sells								
Variable	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Active Enforcement	0.028	0.026	0.021	0.022	0.022	0.014	0.020	0.020	0.020
	(1.52)	(1.34)	(0.99)	(1.01)	(1.03)	(1.07)	(1.00)	(0.97)	(0.98)
Legal Origin		0.020	0.019	0.019	0.019	0.020	0.018	0.020	0.019
		(1.37)	(1.35)	(1.33)	(1.33)	(1.45)	(1.04)	(1.43)	(1.17)
Rule of Law			0.010				0.010	0.003	0.003
			(1.72)*				(1.48)	(0.19)	(0.19)
Effectiveness				0.009					
				(1.16)					
RegQuality					0.008				
					(0.99)				
Anti-Self- Dealing						0.017			
						(0.65)			
Stock Dev							0.001		0.000
							(0.34)		(0.18)
Dev								0.015	0.015
								(0.49)	(0.49)
N	225	225	225	225	225	214	225	225	225
Adjusted R^2	0.009	0.017	0.020	0.017	0.016	0.029	0.016	0.019	0.014
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

in a small number of specifications for the short horizons, but neither of these variables substitutes the effects of Active Enforcement. Other broad measures of country characteristics, such as the Dev dummy and stock market development (Stock Dev), also do not materially alter the significance of the Active Enforcement effects. Our findings highlight the unique role of insider trading regulation and suggest that the main determinant of insider trading profits is the effectiveness of insider trading regulation and not the overall effectiveness of the legal system in a country.

We also examine the potential effects of insider trading regulation on overall insider trading activities. It is possible that a lax insider trading regulation could lead to rampant insider trading, thereby resulting in, on average, less informed insider trading. It is also possible that differences in the effectiveness of insider trading regulation may lead to differences in legal versus illegal insider trading and to differences in reported and unreported insider trading across the countries. We estimate regressions similar to those specified in model (1) with the dependent variable of insider trading activity, defined as insider buy or sell transactions in dollar value scaled by a firm's market capitalization. Regression results for insider buys and sells are presented separately in Table 4. We exclude the specifications with the two variables of Effectiveness and RegQuality from the table as these two variables are highly correlated with Rule of Law, and the results are qualitatively similar.

As shown in Table 4, insider trading regulation is not significantly related to reported insider trading activities. For both insider buys and sells, the coefficients of our main variable of interest, Active Enforcement, are not statistically significant across all 12 models. None of the other country characteristics are consistently and significantly associated with insider trading activities. The results suggest that there is no statistical difference between the level of insider trading activity in countries with and without active regulation enforcement. While the analysis here does not rule out the possibility that there could be systematic differences in insider trading reports, the evidence, and particularly our analysis on insider trading activity before corporate earnings announcements in the next section, indicates that such differences, if any, are unlikely to lead to systematic biases in our results.

To sum up, this section shows that total insider trading activities, based on the value of insider transactions to market capitalization, do not differ significantly across countries. But insider trades are more informative in countries that actively enforce insider trading laws. These results are surprising. If insiders could exploit less from their information advantage, they should earn greater profits in their trades, all things being equal. Opponents of insider trading regulation also stress that allowing insiders to freely use their information leads to more informative insider trading and consequently promotes market price efficiency. Our results contradict these views. There are a couple of possible explanations for the findings. First, with active enforcement of insider trading regulations, insiders will trade on private information only when the expected profit is large enough to outweigh the cost of potential legal enforcements by regulators. Second, our results may be driven by the fact that insiders in developing economies may trade on behalf of their children

Table 4 Insider trading regulation enforcement and aggregate insider trading activities

This table presents panel regressions of aggregate insider trade values on Active Enforcement and country-level control variables as well as year-fixed effects for insider buys and sells, separately. IT Value is computed by first summing up insider transaction values within each year scaled by country-level stock market capitalization. Active Enforcement is a dummy variable that equals 1 if there is an IT law prosecution event within the sample period of the countries in our sample, 0 otherwise. Legal Origin identifies the legal origin of the company law or commercial code of each country (common law or civil law). It equals 1 if the law origin of a country is common law and 0 otherwise. Rule of Law reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement and property rights. The definition of Rule of Law is obtained from the *2014 Worldwide Governance Indicators*. Anti-Self-Dealing is a proxy for investor protection and is obtained from Djankov *et al.* (2008). Stock Dev is defined as the ratio of country-level stock market capitalization to GDP and is a proxy for stock market development. Dev dummy equals 1 if the country is developed, 0 otherwise. *t*-statistics, based on clustered standard errors at the country level, are reported in parentheses. Statistical significance is denoted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Insider buys						Insider sells					
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Active	−1.027	−0.979	−0.931	−1.142	−0.923	−0.972	−0.195	−0.144	−0.029	−0.306	−0.006	−0.023
Enforcement	(−1.10)	(−1.09)	(−1.07)	(−1.20)	(−1.05)	(−1.10)	(−0.33)	(−0.25)	(−0.05)	(−0.53)	(−0.01)	(−0.04)
Legal Origin		−0.630	−0.622	0.452	−0.588	−0.583		−0.649	−0.622	−0.028	−0.527	−0.628
		(−1.46)	(−1.47)	(0.88)	(−1.31)	(−1.49)		(−1.85)*	(−1.91)*	(−0.08)	(−1.61)	(−1.90)*
Rule of Law			−0.194		−0.180	−0.645			−0.460		−0.423	−0.378
			(−0.97)		(−0.88)	(−0.79)			(−1.81)*		(−1.62)	(−0.58)
Anti-Self-				−2.119						−1.019		
Dealing				(−1.25)						(−0.85)		
Stock Dev					−0.023						−0.062	
					(−0.27)						(−0.85)	
Dev						0.940						−0.171
						(0.64)						(−0.14)
N	230	230	230	230	230	230	227	227	227	227	227	227
Adjusted R^2	0.037	0.046	0.045	0.056	0.041	0.053	0.011	0.009	0.034	0.006	0.033	0.030
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

(Berkman *et al.*, 2014) or through accounts insiders control on behalf of family, trusts, retirement accounts, and foundations (Goldie *et al.*, 2019), and such activity may not be reflected as insider trades. In the next section, we investigate how active insider trading regulation enforcement leads to more, not less, informative insider trading and more informative prices.

5. Regulation Enforcement and Insider Trading around Earnings Announcements

In the preceding section, we have established that informativeness of insider trades varies across countries with different insider trading regulation regimes. Specifically, insider trading informativeness is more pronounced in countries with active enforcement of insider trading laws. In this section, our research design focuses on insider trading activities around corporate earnings announcements to examine how insiders behave around earnings announcements across countries with varying degrees of enforcement in insider trading. This approach is in contrast to the recent work by DeFond *et al.* (2007), who find that earnings announcements are more informative in countries with higher earnings quality, stronger investor protection, or in countries that have implemented enforcement of their insider trading laws for the first time. Our analysis of insider trading around this important corporate event allows us to assess the effects of insider trading regulation on insider trading activities, the informativeness of insider trading, and how insider trading activities under different regulation regimes affect price efficiency.

5.1. Insider Trading Around Earnings Announcements

The global earnings announcement data are obtained from the I/B/E/S database, which provides extensive coverage on analyst recommendations and forecasts from brokerage firms across the world. I/B/E/S contains earnings announcement dates of firms covered by analysts, firm names, analyst earnings forecasts, and actual earnings.

We compute 10-, 20-, and 30-day insider buying and selling activities before and after earnings announcement dates, using information available from the I/B/E/S database. Due to data availability in the I/B/E/S database, we are only able to compute Pre-Buy or Pre-Sell ratios for 40 countries. For an N-day trading activity around earnings announcements, we calculate the Pre-Buy (Pre-Sell) ratio as follows. The Pre-Buy (Pre-Sell) ratio is the amount of insider buys (sells) over N days prior to an earnings announcement date divided by insider buys (sells) over N days before and N days after the announcement date. We measure insider buys (sells) based on the number of shares, or based on the share value traded. For example, the 10-day Pre-Buy ratio is the ratio of insider buy transactions in the 10-day period before earnings announcements to the sum of insider buy transactions in the 10-day period before and 10-day period after earnings announcements.

Table 5 reports Pre-Buy and Pre-Sell ratios over varying lengths of windows around earnings announcements and also highlights the Pre-Buy and Pre-Sell ratios

Table 5 Insider trading activities around earnings announcements

This table reports insider trading activities around earnings announcement dates by country. Pre-Buy (Pre-Sell) Ratios are computed over 10-, 20-, and 30-day insider buy (insider sell) activities surrounding earnings announcement dates (EA). For an *N*-day trading activity around earnings announcement dates, the Pre-Buy (Pre-Sell) Ratio is the insider buys (sells) over *N*-days prior to the announcement date divided by insider buys (sells) over *N* days before and *N* days after the announcement date. We measure insider buys (sells) based on the number of shares traded (Share), or on the share value traded (Value). * denotes a significant difference in insider buys (sells) between pre- and post-earnings announcement dates.

	10 Days Around EA				20 Days Around EA				30 Days Around EA			
	Pre-Buy ratio		Pre-Sell ratio		Pre-Buy ratio		Pre-Sell ratio		Pre-Buy ratio		Pre-Sell ratio	
	Share	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share	Value
Australia	0.091*	0.091*	0.153*	0.152*	0.127*	0.129*	0.183*	0.182*	0.159*	0.385*	0.290*	0.290*
Austria	0.179*	0.173*	0.100*	0.100*	0.302*	0.305*	0.244*	0.244*	0.383*	0.159*	0.221*	0.220*
Belgium	0.172*	0.173*	0.125*	0.126*	0.208*	0.209*	0.220*	0.219*	0.299*	0.297*	0.361*	0.359*
Brazil	0.140*	0.140*	0.196*	0.197*	0.261*	0.263*	0.369*	0.369*	0.323*	0.325*	0.357*	0.357*
Canada	0.176*	0.173*	0.190*	0.187*	0.238*	0.233*	0.241*	0.237*	0.301*	0.298*	0.304*	0.300*
Chile	0.169*	0.169*	0.433	0.433	0.214*	0.215*	0.519	0.520	0.312*	0.216*	0.191*	0.190*
China	0.283*	0.283*	0.135*	0.135*	0.299*	0.298*	0.161*	0.161*	0.384*	0.313*	0.553	0.555
Czech Republic	0.217	0.217	0.000	0.000	0.185*	0.187*	0.255*	0.256*	0.253	0.385*	0.310*	0.311*
Denmark	0.061*	0.061*	0.103*	0.103*	0.076*	0.077*	0.132*	0.132*	0.140*	0.255	0.262	0.262
Finland	0.162*	0.162*	0.176*	0.176*	0.174*	0.174*	0.268*	0.267*	0.218*	0.394*	0.397*	0.393*
France	0.179*	0.177*	0.191*	0.190*	0.293*	0.293*	0.284*	0.283*	0.368*	0.141*	0.154*	0.154*
Germany	0.276*	0.276*	0.319*	0.319*	0.346*	0.349*	0.322*	0.322*	0.393*	0.432*	0.425	0.428
Greece	0.445	0.444	0.371*	0.368*	0.432*	0.432*	0.492	0.489	0.480	0.223*	0.342*	0.345*
Hong Kong	0.080*	0.079*	0.138*	0.138*	0.088*	0.088*	0.114*	0.114*	0.159*	0.372*	0.356*	0.352*
Hungary	0.000	0.000	0.598	0.600	0.070*	0.069*	0.647	0.647	0.142*	0.066*	0.076*	0.076*
India	0.254*	0.253*	0.218*	0.216*	0.349*	0.347*	0.356*	0.356*	0.373*	0.485	0.507	0.508
Indonesia	0.093*	0.097*	0.500	0.500	0.166*	0.170*	0.197*	0.196*	0.313	0.156*	0.216*	0.213*
Ireland	0.039*	0.039*	0.000	0.000	0.041*	0.042*	0.022*	0.022*	0.055*	0.142*	0.437	0.436

Table 5 (*Continued*)

	10 Days Around EA				20 Days Around EA				30 Days Around EA			
	Pre-Buy ratio		Pre-Sell ratio		Pre-Buy ratio		Pre-Sell ratio		Pre-Buy ratio		Pre-Sell ratio	
	Share	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share	Value
Israel	0.247*	0.247*	0.109*	0.109*	0.311*	0.311*	0.155*	0.156*	0.329*	0.321	0.156*	0.156*
Italy	0.223*	0.218*	0.252*	0.253*	0.373*	0.372*	0.391*	0.389*	0.441*	0.055*	0.011*	0.011*
Luxembourg	0.042*	0.042*	0.000	0.000	0.103*	0.103*	0.100*	0.100*	0.256*	0.327*	0.267*	0.267*
Malaysia	0.162*	0.163*	0.251*	0.246*	0.166*	0.164*	0.235*	0.234*	0.284*	0.374*	0.402*	0.404*
Netherlands	0.151*	0.150*	0.158*	0.159*	0.183*	0.187*	0.174*	0.175*	0.253*	0.438*	0.443*	0.438*
New Zealand	0.097*	0.097*	0.083*	0.083*	0.095*	0.095*	0.105*	0.106*	0.115*	0.458*	0.498	0.493
Norway	0.092*	0.093*	0.094*	0.094*	0.161*	0.161*	0.196*	0.196*	0.220*	0.377*	0.396	0.399
Pakistan	0.333	0.333	0.195	0.193	0.549	0.550	0.347	0.345	0.531	0.256*	0.100*	0.100*
Philippines	0.439	0.432	0.373*	0.371*	0.452	0.450	0.438	0.436	0.438	0.283*	0.369*	0.368*
Poland	0.182*	0.182*	0.189*	0.187*	0.268*	0.270*	0.320*	0.319*	0.343*	0.255*	0.238*	0.238*
Portugal	0.261*	0.261*	0.162*	0.165*	0.400	0.401	0.263*	0.258*	0.457	0.219*	0.230*	0.231*
Singapore	0.038*	0.038*	0.019*	0.015*	0.168*	0.167*	0.208*	0.204*	0.269*	0.116*	0.149*	0.149*
South Africa	0.056*	0.056*	0.089*	0.089*	0.056*	0.056*	0.102*	0.099*	0.073*	0.436	0.488	0.484
South Korea	0.421*	0.422*	0.488	0.488	0.441*	0.443*	0.490	0.488	0.453*	0.534	0.320	0.319
Spain	0.243*	0.242*	0.319*	0.320*	0.350*	0.351*	0.415*	0.417*	0.431*	0.355*	0.362*	0.366*
Sri Lanka	0.264*	0.263*	0.381	0.381	0.355*	0.357*	0.377	0.374	0.376*	0.455	0.321*	0.315*
Sweden	0.038*	0.038*	0.057*	0.057*	0.055*	0.055*	0.097*	0.096*	0.200*	0.201*	0.213*	0.210*
Switzerland	0.142*	0.141*	0.106*	0.105*	0.169*	0.168*	0.149*	0.147*	0.214*	0.268*	0.331*	0.327*
Thailand	0.241*	0.239*	0.298*	0.290*	0.235*	0.229*	0.339*	0.337*	0.310*	0.302*	0.411*	0.410*
Turkey	0.325*	0.325*	0.443	0.443	0.334*	0.338*	0.455	0.451	0.365*	0.369*	0.511	0.505
United Kingdom	0.042*	0.042*	0.038*	0.038*	0.048*	0.048*	0.046*	0.045*	0.065*	0.156*	0.227*	0.223*
United States	0.072*	0.071*	0.165*	0.163*	0.106*	0.105*	0.184*	0.181*	0.156*	0.072*	0.121*	0.119*

that are significantly different from 0.5 at the 5% level by using an asterisk. Results show that insiders tend to buy or sell less prior to than after earnings announcements. Across all countries, their Pre-Buy and Pre-Sell ratios are mostly lower than 0.5. Based on the ratios computed over a 10-day period, 35 of the Pre-Buy ratios are statistically significant, whereas 30 of the Pre-Sell ratios are statistically significant at the 5% level. The Pre-Buy ratio based on shares ranges from 0 (Hungary) to 0.445 (Greece), while the Pre-Sell ratio varies between 0 (Czech Republic, Ireland, and Luxembourg) and 0.598 (Hungary); these ratios are 0.072 and 0.165, respectively, for the U.S. Note that none of the Pre-Buy and Pre-Sell ratios of >0.5 is statistically significant at conventional levels.

The results on insider trading reveal that insider trading regulation has substantial effects on insider trading activities around earnings announcements. The lower trading activity prior to earnings announcements could possibly indicate the joint effects of general insider trading regulation, insider trading lockout periods before earnings announcement imposed at the country level, and/or corporate internal policies prohibiting any insider from trading prior to earnings announcements.[9] On average, such regulations or policies deter insiders from trading on any material information available in the earnings reports prior to the release of such information to the public. However, we do observe considerable insider trading activities, even during the short 10-day window before earnings announcements, in most of the countries. Also, insider trading activities vary substantially across the countries. Based on the 10-day results, insiders in Sweden and the U.K. rarely trade before earnings announcements (with ratios of 0.038 and 0.042, respectively), but insiders in Greece and the Philippines trade almost as much before earnings announcements as after (with ratios of 0.445 and 0.439, respectively).

We perform the following multivariate regression to examine whether insider trading behavior around earnings announcements is related to insider trading regulation enforcement.

$$Pre - Buy_{i,t}\ (or\ Pre - Sell_{i,t}) = \beta_1 + \beta_2 Active\ Enforcement_{i,t} + Control\ Variables + \varepsilon_{i,t}, \tag{2}$$

where Pre-Buy and Pre-Sell are country-year observations. Active Enforcement, together with the control variables, are defined earlier. In this multivariate regression, we also include year fixed effects and report adjusted standard errors clustered at the country level. Table 6 reports regression results using Pre-Buy and Pre-Sell ratios calculated over 10, 20, or 30 days around earnings announcement dates as dependent variables.

The multivariate regression results corroborate the univariate ones shown in Table 5. Corporate insiders tend to buy less before earnings announcements in countries that actively enforce their insider trading laws. Enforcement actions deter

[9]We formally test the issue of lockout periods, but they are not included in the paper. Unlike the active enforcement, the existence of lockout periods is not a determinant of insider trading before earnings announcements.

Table 6 Insider trading regulation enforcement and insider trading activities around earnings announcements

This table presents panel regressions of aggregate *N*-day insider trading activities around earnings announcements (Pre-Buy or Pre-Sell) on Active Enforcement and country-level control variables as well as year-fixed effects for insider buys and sells, separately. Pre-Buy is defined as insider buy ratio before earnings announcements and is computed by taking the ratio of the total number of insider buy (in shares) before an earnings announcement to the sum of the total number insider buy (in shares) before and after earnings announcements. Active Enforcement is a dummy variable that equals 1 if there is an insider trading prosecution under the laws during our sample period, 0 otherwise. Legal Origin identifies the legal origin of the company law or commercial code of each country (common law or civil law). It equals 1 if the law origin of a country is common law and 0 otherwise. Rule of Law reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement and property rights. The definition of Rule of Law is obtained from the *2014 Worldwide Governance Indicators*. Anti-Self-Dealing is a proxy for investor protection and is obtained from Djankov *et al.* (2008). Stock Dev is defined as the ratio of country-level stock market capitalization to GDP and is a proxy for stock market development. Dev dummy equals 1 if the country is developed, 0 otherwise. The regression model is performed using 10-, 20-, and 30-day insider trading activities before earnings announcement for buy and sell, separately. *t*-statistics, based standard errors clustered at country level, are reported in parentheses. Statistical significance is denoted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Panel A: 10-Day insider trading activities around earnings announcements											
	Insider buys						Insider sells					
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Active Enforcement	−0.103	−0.093	−0.067	−0.094	−0.066	−0.067	−0.013	−0.005	0.022	−0.006	0.022	0.021
	(−2.43)**	(−2.27)**	(−2.19)**	(−2.53)**	(−2.18)**	(−2.21)**	(−0.31)	(−0.10)	(0.62)	(−0.15)	(0.61)	(0.57)
Legal Origin		−0.067	−0.074	0.018	−0.065	−0.075		−0.066	−0.071	0.033	−0.072	−0.072
		(−2.09)**	(−3.08)***	(0.32)	(−2.50)**	(−3.08)***		(−1.75)*	(−2.36)**	(0.72)	(−2.25)**	(−2.27)**
Rule of Law			−0.093		−0.090	−0.089			−0.096		−0.096	−0.085
			(−5.11)***		(−4.84)***	(−2.83)***			(−4.39)***		(−4.35)***	(−2.50)**
Anti-Self-Dealing				−0.195						−0.233		
				(−1.79)*						(−2.18)**		
Stock Dev					−0.006						0.001	
					(−1.15)						(0.11)	
Dev						−0.010						−0.024
						(−0.17)						(−0.36)
N	199	199	199	199	199	199	200	200	200	200	200	200
Adjusted R^2	0.077	0.122	0.340	0.153	0.342	0.337	0.024	0.010	0.203	0.050	0.199	0.201
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 6 (*Continued*)

Panel B: 20-Day insider trading activities around earnings announcements

	Insider buys						Insider sells					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Active Enforcement	−0.100	−0.085	−0.063	−0.085	−0.062	−0.063	−0.059	−0.044	−0.018	−0.045	−0.017	−0.019
	(−2.57)**	(−2.33)**	(−2.49)**	(−2.72)***	(−2.47)**	(−2.47)**	(−1.23)	(−0.94)	(−0.49)	(−1.14)	(−0.47)	(−0.52)
Legal Origin		−0.098	−0.105	0.007	−0.096	−0.105		−0.106	−0.111	0.034	−0.104	−0.112
		(−2.89)***	(−4.07)***	(0.14)	(−3.47)***	(−4.04)***		(−2.57)**	(−3.42)***	(0.72)	(−3.14)***	(−3.33)***
Rule of Law			−0.087		−0.084	−0.092			−0.100		−0.097	−0.093
			(−4.48)***		(−4.18)***	(−3.50)***			(−3.91)***		(−3.76)***	(−2.62)**
Anti-Self-Dealing				−0.243						−0.322		
				(−2.72)***						(−2.71)***		
Stock Dev					−0.005						−0.005	
					(−1.25)						(−1.03)	
Dev						0.010						−0.016
						(0.24)						(−0.25)
N	208	208	208	208	208	208	208	206	206	206	206	206
Adjusted R^2	0.054	0.147	0.321	0.197	0.322	0.318	0.009	0.100	0.297	0.176	0.296	0.294
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel C: 30-Day insider trading activities around earnings announcements

	Insider buys						Insider sells					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Active Enforcement	−0.102	−0.084	−0.065	−0.084	−0.064	−0.065	−0.081	−0.064	−0.040	−0.064	−0.039	−0.040
	(−2.30)**	(−2.16)**	(−2.27)**	(−2.39)**	(−2.23)**	(−2.24)**	(−1.76)*	(−1.51)	(−1.29)	(−1.63)	(−1.27)	(−1.29)
Legal Origin		−0.115	−0.121	−0.037	−0.116	−0.120		−0.111	−0.116	−0.026	−0.115	−0.117
		(−3.18)***	(−4.11)***	(−0.76)	(−3.65)***	(−4.08)***		(−2.73)***	(−3.69)***	(−0.53)	(−3.24)***	(−3.69)***
Rule of Law			−0.076		−0.074	−0.080			−0.094		−0.094	−0.086
			(−3.88)***		(−3.64)***	(−3.02)***			(−3.92)***		(−3.81)***	(−2.96)***
Anti-Self-Dealing				−0.179						−0.193		
				(−1.85)*						(−1.78)*		

Table 6 (*Continued*)

	Panel C: 30-Day insider trading activities around earnings announcements											
	Insider buys						Insider sells					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Stock Dev					−0.003						−0.001	
					(−0.66)						(−0.16)	
Dev						0.007						−0.018
						(0.16)						(−0.42)
N	209	209	209	209	209	209	209	209	209	209	209	209
Adjusted R^2	0.059	0.182	0.308	0.206	0.306	0.305	0.054	0.149	0.312	0.172	0.309	0.309
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

insiders from trading prior to earnings announcements. For example, the coefficient of Active Enforcement in columns (1)–(6) of Panel A is consistently negative and statistically significant at the 5% level, even after controlling for the country's legal origin, rule of law, anti-self-dealing, and stock market development. The Active Enforcement coefficient varies between −0.066 ($t = -2.18$) and −0.103 ($t = -2.43$). In contrast, for insider sells, almost all of the Active Enforcement coefficients are statistically insignificant, suggesting that insider trading regulation affects only insider buys but not sells. One possible explanation for the insider sell results is that in many countries insiders could schedule their transactions, mostly sell transactions, in advance and conduct transactions based on such schedules. These transactions are not affected by corporate events and are largely immune to concerns of illegal insider trading.

Furthermore, the variables, Legal Origin and Rule of Law, have a consistently negative impact on both Pre-Buy and Pre-Sell ratios computed over varying windows, and their coefficients are mainly statistically significant. Their negative effects on Pre-Buy suggest that in countries with strong investor protection and better law and order, insiders tend to buy significantly less before earnings announcements. We find similar results for anti-self-dealing regulations.

In summary, the results show that insiders from countries without rigorous enforcement of insider trading regulation are far more likely to exploit material corporate information in their trading decisions than insiders from countries with rigorous enforcement. Even though corporate earnings announcements are high profile events that are closely followed and observed by investors and regulators alike, the substantial differences in reported insider trading activities across the countries suggest that insiders in countries without active enforcement not only conduct but also disclose their trades before earnings announcements. The results further suggest that different reporting requirements across countries, if any, or non-reporting by insiders for sensitive trades are unlikely to systematically affect our findings in the paper.

5.2. Insider Trading and Price Reaction to Earnings News

The extant literature has shown that earnings announcements generate significant price reactions. Recent studies also find that market reactions to corporate news, including corporate earnings news, differ across markets (Bhattacharya *et al.*, 2000; DeFond *et al.*, 2007). We examine market price reactions to earnings announcements in our sample of countries and investigate the association between price reactions and insider trading regulations and between price reactions and insider trading activities before earnings announcements.

We compute three different measures of price reactions, namely the cumulative return difference, return difference standard deviation, and abnormal return variance. Following existing studies, we focus on the price reaction of the [−1, 1] event window, which is arguably less noisy. These three measures are defined as follows.

1 *Abnormal return variance*: The abnormal return variance is the stock return variance over the event window [−1, 1], scaled by stock return variance over the estimation window [−120, −21]. Stock return variance over the event window is the average of squared prediction errors from the market model during the event window [−1, 1], whereas the stock return variance over the estimation window is the variance of residuals from the market model estimated over the estimation period [−120, −21].
2 *Cumulative return difference*: The absolute value of the cumulative stock return in excess of the country index return over the event window [−1, 1].
3 *Return difference standard deviation*: Standard deviation of stock returns in excess of the country index return over the event window [−1, 1].

All the price reaction measures are computed first by taking an average of the variables for each firm and then averaging within each country.

Table 7 presents results of the three price reaction measures. These measures indicate that price reactions around earnings announcements vary widely across the sample of countries. The average price reaction is 2.317 for abnormal return variance, 6.758% for cumulative return difference, and 2.728% for return difference standard deviation. The abnormal return variance varies from 1.214 (Hungary) to 4.554 (U.K.), cumulative return difference ranges between 3.562% (Chile) and 11.430% (Indonesia), and return difference standard deviation is between 1.394% (Chile) and 5.746% (Indonesia). Similar to the findings of DeFond *et al.* (2007), our results suggest that developed countries such as the U.S. and U.K. have stronger price reactions, whereas emerging countries such as Chile and the Philippines have the weakest.

We now examine whether and how each price reaction measure is related to insider trading regulation and insider trading activities. We first regress price reactions on Active Enforcement, along with the control variables, and the results are shown in Table 8. We find a consistently positive relation between active insider trading regulation enforcement and market price reactions to earnings news. Independent of the price reaction measure employed, Active Enforcement has a positive and statistically significant effect on market price reaction. The coefficients on Active Enforcement are all positive and statistically significant mostly at the 5% level. These results are consistent with our earlier findings that active enforcement of insider trading laws enhances price informativeness. In countries that rigorously enforce insider trading regulation, corporate earnings announcements contain substantial information, and stock price reacts strongly to earnings news.

We next examine the link between insider trading activities and price reactions around earnings announcements. We have documented that insiders actively trade around earnings announcements. In countries without active regulation enforcement, insiders in fact trade actively before earnings announcements. A natural question to ask is whether such trading activities have any substantial influence on price

Table 7 Market price reactions to earnings announcements

This table reports price reaction around earnings announcements over the event window of [−1, 1] for the sample period from 2007 to 2013. Price reaction is measured in three ways: abnormal return variance, cumulative absolute return difference, and return difference standard deviation. Abnormal return variance is the stock return variance over the event window [−1, 1], scaled by the stock return variance over the estimation window [−120, −21]. Cumulative absolute return difference is computed by cumulating the absolute value of stock return in excess of country-level indexes over the event window [−1, 1]. Return difference standard deviation is defined as the standard deviation of stock return in excess of country-level indexes over the event window [−1, 1]. Stock return variance over the event window is the average of squared prediction errors from the market model during the event window [−1, 1]. The stock return variance over the estimation window is the variance of residuals from the market model estimated over the estimation period [−120, −21]. All the price reaction measures are computed first by taking an average of the measures for each firm and then average within each country. Cumulative absolute return differences and return difference standard deviation are expressed in percentage.

	Price reactions		
Country	Abnormal return variance	Cumulative return difference in (%)	Return difference standard deviation in (%)
Australia	2.636	8.747	3.441
Austria	2.093	6.053	2.311
Belgium	2.635	6.216	2.515
Brazil	1.630	6.826	2.774
Canada	2.204	6.417	2.563
Chile	1.399	3.562	1.394
China	1.561	6.184	2.326
Czech Republic	1.634	5.069	2.080
Denmark	2.965	7.827	3.175
Finland	3.624	7.988	3.156
France	3.024	6.577	2.661
Germany	2.115	10.327	4.667
Greece	1.512	6.375	2.452
Hong Kong	3.003	7.956	3.157
Hungary	1.214	5.824	2.146
India	2.163	7.371	2.825
Indonesia	1.969	11.430	5.746
Ireland	2.623	9.207	3.679
Israel	1.878	5.554	2.123
Italy	1.980	5.821	2.259
Luxembourg	2.439	7.284	2.870
Malaysia	1.750	5.466	2.244
Netherlands	4.236	6.985	2.754
New Zealand	2.830	5.327	2.176
Norway	2.584	8.771	3.539
Pakistan	1.661	5.226	1.823
Philippines	1.228	4.009	1.596
Poland	1.690	6.637	2.600

Table 7 (*Continued*)

Country	Price reactions		
	Abnormal return variance	Cumulative return difference in (%)	Return difference standard deviation in (%)
Portugal	1.676	5.136	2.045
Singapore	1.914	6.107	2.413
South Africa	2.314	5.743	2.264
South Korea	1.591	9.057	3.893
Spain	1.873	5.488	2.126
Sri Lanka	1.844	7.387	3.196
Sweden	3.870	8.973	3.591
Switzerland	3.052	6.060	2.381
Thailand	2.126	5.359	2.154
Turkey	1.611	5.275	2.016
United Kingdom	4.554	8.530	3.427
United States	3.994	6.158	2.546
Average	2.317	6.758	2.728

reactions to earnings announcements. We therefore estimate the following regression model.

$$Price\,Reaction_{i,t} = \beta_0 + \beta_1 BuyS_{i,t}(or\,BuyV_{i,t}) + Control\,Variables + \varepsilon_{i,t}, \qquad (3)$$

where Price Reaction is again measured by the abnormal return variance, cumulative return difference, and standard deviation of return difference. BuyV (BuyS) is the ratio of the total dollar value (the number of shares) of insider buys before earnings announcement dates to the sum of the total dollar value (the number of shares) of insider buys before and after earnings announcement dates. Both the price reactions and insider trading variables are country-year averages. Our regression models focus on insider buys as a measure of insider trading intensity before earnings announcements in the regression, because insider buys are generally more informative and also, insider buy ratios before earnings announcements are closely related to insider trading regulation.

Table 9 provides evidence on the relation between insider trading activity around earnings announcement (over a 10-day window) and market price reaction to earnings news. The main variables of interest are BuyS in columns (1)–(6) and BuyV in columns (7)–(12) with varying combinations of control variables. We find that insider trading activities before earnings announcements significantly dampen market price reaction to earnings news. The coefficients of BuyS and BuyV are consistently negative and highly significant across different measures of price reactions. Unreported results based on insider trading activities over different event windows (20- and 30-day) show similar results. Stock prices on average react less to earnings

Table 8 Insider trading regulation enforcement and price reactions to earnings announcements

This table presents panel regressions of earnings announcement price reaction on insider trading Active Enforcement and country-level control variables as well as year-fixed effects. Price reaction is measured in three ways: abnormal return variance, cumulative absolute return difference, and return difference standard deviation. Abnormal return variance is the stock return variance over the event window [−1, 1], scaled by the stock return variance over the estimation window [−120, −21]. Cumulative absolute return difference is computed by cumulating the absolute value of stock return in excess of country-level index return over the event window [−1, 1]. Standard deviation of return difference is defined as the standard deviation of stock return in excess of country-level index return over the event window [−1, 1]. Stock return variance over the event window is the average of squared prediction errors from the market model during the event window [−1, 1]. The stock return variance over the estimation window is the variance of residuals from the market model estimated over the estimation period [−120, −21]. The price reaction measures are computed first by taking an average of the measures for each firm and then average within each country. Active Enforcement is a dummy variable that equals 1 if there is an insider trading prosecution under the laws during our sample period, 0 otherwise. Legal Origin identifies the legal origin of the company law or commercial code of each country (common law or civil law). It equals 1 if the law origin of a country is common law and 0 otherwise. Rule of Law reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement and property rights. The definition of Rule of Law is obtained from the *2014 Worldwide Governance Indicators*. Anti-Self-Dealing is a proxy for investor protection and is obtained from Djankov *et al.* (2008). Stock Dev is defined as the ratio of country-level stock market capitalization to GDP and is a proxy for stock market development. Dev dummy equals 1 if the country is developed, 0 otherwise. *t*-statistics, based standard errors clustered at country level, are reported in parentheses. Statistical significance is denoted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Abnormal return variance						Cumulative return difference					
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Active Enforcement	0.688	0.650	0.483	0.650	0.469	0.493	0.009	0.010	0.008	0.010	0.008	0.008
	(2.65)**	(2.53)**	(2.53)**	(2.56)**	(2.41)**	(2.65)**	(2.33)**	(2.44)**	(1.94)*	(2.46)**	(1.98)*	(2.06)**
Legal Origin		0.242	0.289	0.188	0.198	0.313		−0.003	−0.002	−0.001	−0.001	−0.002
		(0.82)	(1.17)	(0.44)	(0.79)	(1.28)		(−0.63)	(−0.56)	(−0.20)	(−0.20)	(−0.50)
Rule of Law			0.656		0.621	0.346			0.007		0.007	0.003
			(5.59)***		(5.14)***	(2.31)**			(2.40)**		(2.54)**	(0.75)
Anti-Self- Dealing				0.123						−0.004		
				(0.12)						(−0.28)		
Stock Dev					0.055						−0.001	
					(1.03)						(−1.03)	
Dev						0.646						0.008
						(2.74)***						(1.58)

Table 8 (*Continued*)

Variable	Abnormal return variance (1)	(2)	(3)	(4)	(5)	(6)	Cumulative return difference (7)	(8)	(9)	(10)	(11)	(12)
N	210	210	210	210	210	210	210	210	210	210	210	210
Adjusted R^2	0.181	0.189	0.396	0.186	0.403	0.425	0.208	0.210	0.272	0.207	0.276	0.283
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Variable	Return difference standard deviation (13)	(14)	(15)	(16)	(17)	(18)
Active Enforcement	0.004	0.004	0.003	0.004	0.003	0.003
	(2.13)**	(2.17)**	(1.79)*	(2.18)**	(1.83)*	(1.86)*
Legal Origin		−0.001	−0.001	−0.001	−0.001	−0.001
		(−0.63)	(−0.58)	(−0.26)	(−0.26)	(−0.53)
Rule of Law			0.003		0.003	0.001
			(2.17)**		(2.31)**	(0.69)
Anti-Self-Dealing				−0.001		
				(−0.17)		
Stock Dev					−0.000	
					(−0.98)	
Dev						0.003
						(1.34)
N	210	210	210	210	210	210
Adjusted R^2	0.137	0.138	0.185	0.134	0.186	0.192
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 9 Earnings announcement price reactions and insider trading activity

This table presents panel regressions of earnings announcement price reaction on insider buy activities 10 days before earnings announcement dates and country-level control variables as well as year-fixed effects. Price Reaction is measured in three ways: abnormal return variance, cumulative return difference, and standard deviation of return difference. BuyS is defined as the insider buy ratio before earnings announcement dates in shares and is computed by taking the ratio of the total number insider buy (in shares) before earnings announcement dates to the sum of the total number insider buy (in shares) before and after earnings announcement dates. BuyV is defined as insider buy ratio before earnings announcement dates in dollar value and is computed by taking the ratio of the total insider buy (in dollar value) before earnings announcement dates to the sum of the total insider buy (in dollar value) before and after earnings announcement dates. Legal Origin identifies the legal origin of the company law or commercial code of each country (common law or civil law). It equals 1 if the law origin of a country is common law and 0 otherwise. Rule of Law reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement and property rights. The definition of Rule of Law is obtained from the *2014 Worldwide Governance Indicators*. Anti-Self-Dealing is a proxy for investor protection and is obtained from Djankov *et al.* (2008). Stock Dev is defined as the ratio of country-level stock market capitalization to GDP and is a proxy for stock market development. Dev dummy equals 1 if the country is developed, 0 otherwise. The regression model is performed using 10-day insider buying activities before earnings announcement dates. *t*-statistics, based standard errors clustered at country level, are reported in parentheses. Statistical significance is denoted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Panel A: Dependent variable: abnormal return variance											
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
BuyS	−3.746	−3.724	−2.185	−3.867	−2.110	−2.297						
	(−5.55)***	(−5.61)***	(−3.58)***	(−5.44)***	(−3.45)***	(−3.89)***						
BuyV							−3.729	−3.708	−2.169	−3.848	−2.093	−2.293
							(−5.49)***	(−5.54)***	(−3.55)***	(−5.39)***	(−3.42)***	(−3.94)***
Legal Origin		0.022	0.160	0.303	0.085	0.185		0.020	0.159	0.296	0.084	0.183
		(0.09)	(0.64)	(0.90)	(0.33)	(0.76)		(0.08)	(0.64)	(0.88)	(0.33)	(0.75)
Rule of Law			0.455		0.431	0.149			0.456		0.433	0.147
			(3.88)***		(3.77)***	(0.99)			(3.88)***		(3.77)***	(0.96)
Anti-Self-Dealing				−0.673						−0.663		
				(−0.75)						(−0.73)		
Stock Dev					0.047						0.047	
					(0.92)						(0.92)	
Dev						0.632						0.637
						(2.81)***						(2.83)***
N	198	198	198	198	198	198	198	198	198	198	198	198

Table 9 (*Continued*)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Dependent variable: abnormal return variance												
Adjusted R^2	0.358	0.355	0.420	0.359	0.424	0.445	0.357	0.353	0.419	0.358	0.424	0.445
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel B: Dependent variable: cumulative return difference												
BuyS	−0.030	−0.035	−0.014	−0.037	−0.015	−0.015						
	(−1.92)*	(−2.30)**	(−0.77)	(−2.45)**	(−0.85)	(−0.85)						
BuyV							−0.030	−0.034	−0.013	−0.036	−0.014	−0.014
							(−1.84)*	(−2.21)**	(−0.70)	(−2.34)**	(−0.78)	(−0.80)
Legal Origin		−0.005	−0.003	−0.001	−0.001	−0.002		−0.005	−0.003	−0.001	−0.001	−0.002
		(−0.96)	(−0.55)	(−0.11)	(−0.23)	(−0.48)		(−0.95)	(−0.53)	(−0.12)	(−0.22)	(−0.47)
Rule of Law			0.006		0.007	0.002			0.006		0.007	0.002
			(1.81)*		(1.89)*	(0.49)			(1.84)*		(1.92)*	(0.51)
Anti-Self-Dealing				−0.009						−0.009		
				(−0.73)						(−0.71)		
Stock Dev					−0.001						−0.001	
					(−0.96)						(−0.95)	
Dev						0.008						0.008
						(1.29)						(1.29)
N	198	198	198	198	198	198	198	198	198	198	198	198
Adjusted R^2	0.202	0.210	0.245	0.211	0.249	0.255	0.200	0.208	0.244	0.208	0.248	0.254
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel C: Dependent variable: return difference standard deviation												
BuyS	−0.011	−0.013	−0.004	−0.014	−0.005	−0.005						
	(−1.69)*	(−2.03)**	(−0.53)	(−2.13)**	(−0.59)	(−0.59)						

Table 9 (*Continued*)

	Panel C: Dependent variable: return difference standard deviation											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
BuyV							−0.011	−0.013	−0.004	−0.013	−0.004	−0.005
							(−1.63)	(−1.96)*	(−0.48)	(−2.05)**	(−0.54)	(−0.54)
Legal Origin		−0.002	−0.001	−0.001	−0.001	−0.001		−0.002	−0.001	−0.001	−0.001	−0.001
		(−0.91)	(−0.52)	(−0.22)	(−0.25)	(−0.46)		(−0.90)	(−0.50)	(−0.23)	(−0.23)	(−0.45)
Rule of Law			0.003		0.003 (1.64)	0.001			0.003		0.003	0.001
			(1.57)			(0.46)			(1.60)		(1.67)	(0.48)
Anti-Self- Dealing				−0.003						−0.003		
				(−0.49)						(−0.48)		
Stock Dev					−0.000						−0.000	
					(−0.86)						(−0.86)	
Dev						0.003						0.003
						(1.12)						(1.12)
N	198	198	198	198	198	198	198	198	198	198	198	198
Adjusted R^2	0.125	0.131	0.159	0.128	0.159	0.165	0.124	0.129	0.158	0.127	0.159	0.164
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

news when insiders trade actively before earnings announcements. These findings are consistent with our earlier evidence documented above: enforcement of insider trading regulation affects insider trading activity before earnings announcements, and such enforcements are also strongly associated with price reactions to earnings news.

5.3. Regulation Enforcement, Insider Trading, and Price Efficiency

We now examine the potential mechanism through which insider trading regulation affects insider trading and price efficiency. Do insider trading activities before earnings announcements reduce stock price informativeness without advancing price discovery, or do insider trades help incorporate earnings-related information into stock prices prior to the announcements, thus reducing stock price reactions to earnings announcements? In the former case, insider trades lead to less informative prices, as the trades themselves add little information to the market. In the latter, insider trades could affect when and what information gets impounded into stock prices, but may not affect the overall stock price efficiency.

In Table 10, we examine and compare gains associated with insider buys 10 days before and 10 days after earnings announcements in countries with and without active regulation enforcement. We use two variables to measure pre-announcement insider trading gains: insider trading gains over the period up to 1 day *before* earnings announcement and insider trading gains over the period up to 1 day *after* earnings announcement. The first variable measures the informativeness of insider trading excluding the public announcement of earnings information, and the second variable measures the informativeness of insider trading including the earnings information. For example, if an insider trade occurs on day -10 (where day 0 is the earnings announcement day), we compute the insider's trading profits from day -9 to day -2 by summing up the stock return in excess of the country return from day -9 to day -2. Then, we take the average of the profits of all insider transactions that occur within each year for each country. This represents the insider trading profits excluding earnings announcement returns. For profits including earnings announcement returns, we would compute the insider's trading profits from day -9 to day 1 by summing up the stock return in excess of the country return from day -9 to day 1. If an insider trade occurs on day 1, we compute the insider's trading profits from day 2 to day 11 by summing up the stock return in excess of the country return during this period, and then compute the average of the profits of all insider transactions that occur within each year for each country. All insider trading gains after earnings announcements are measured over the 10-day period after the transaction. We employ a "Before" dummy to denote insider trading gains from pre-announcement trading activities. The first six models use insider trading gains excluding earnings announcement abnormal returns. Such gains measure insider trading profits before earnings information becomes public.

Table 10 Enforcement and insider transaction profits around earnings announcements

This table presents panel regressions of insider trading profits for trading activities 10 days before and 10 days after earnings announcements on Active Enforcement and country-level control variables as well as year-fixed effects for insider buys including and excluding earnings announcement profits, separately. Insider trading profits (including earnings announcement profits, Include EA Profits) are computed by first cumulating stock returns of each insider trading transaction that occurs between 10 days before and 10 days after earnings announcements in excess of country-level indexes, including the return on the day of the earnings announcement, and then taking an average of the profits within each year for each country. Insider trading profits (excluding earnings announcement profits, Exclude EA Profits) are defined in the same way, with the exception of excluding the return on the earnings announcement day. Active Enforcement is a dummy variable that equals 1 if there is an insider trading prosecution under the laws during our sample period, 0 otherwise. Before dummy equals 1 if the profit is before earnings announcements, 0 otherwise. The regression model is performed using 10-day insider trading activities before earnings announcements. *t*-statistics, based standard errors clustered at country level, are reported in parentheses. Statistical significance is denoted by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

	Insider buys (exclude EA profits)						Insider buys (include EA profits)					
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Active Enforcement	0.006	0.006	0.005	0.006	0.005	0.005	0.006	0.006	0.005	0.006	0.005	0.006
	(2.57)**	(2.45)**	(2.08)**	(2.45)**	(1.87)*	(1.96)*	(2.70)**	(2.78)***	(2.42)**	(2.83)***	(2.11)**	(2.45)**
Before	0.000	0.000	0.001	0.000	0.001	0.001	−0.005	−0.005	−0.004	−0.005	−0.004	−0.004
	(0.10)	(0.10)	(0.17)	(0.05)	(0.22)	(0.18)	(−1.29)	(−1.29)	(−1.24)	(−1.31)	(−1.15)	(−1.24)
Active Enforcement* Before	0.000	0.000	−0.000	0.000	−0.000	−0.000	0.007	0.008	0.007	0.008	0.007	0.007
	(0.04)	(0.02)	(−0.01)	(0.07)	(−0.07)	(−0.02)	(1.72)*	(1.73)*	(1.71)*	(1.76)*	(1.58)	(1.71)*
Legal Origin		−0.001	−0.001	−0.007	−0.003	−0.001		0.003	0.003	−0.002	0.001	0.003
		(−0.43)	(−0.37)	(−1.94)*	(−0.94)	(−0.45)		(0.79)	(0.85)	(−0.71)	(0.19)	(0.86)
Rule of Law			0.002		0.002	0.004			0.002		0.001	0.001
			(1.11)		(0.83)	(1.67)			(1.00)		(0.56)	(0.63)
Anti-Self-Dealing				0.013						0.012		
				(1.84)*						(1.68)		

Table 10 (*Continued*)

	Insider buys (exclude EA profits)						Insider buys (include EA profits)					
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Stock Dev					0.001						0.001	
					(3.07)***						(2.25)**	
Dev						−0.003						0.001
						(−1.65)						(0.30)
N	353	353	353	353	353	353	365	365	365	365	365	365
Adjusted R^2	0.003	0.001	0.004	0.004	0.006	0.002	0.038	0.038	0.038	0.041	0.045	0.036
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The results show that independent of whether or not we include the 3-day stock returns around earnings announcements, insider trading around earnings announcements is more informative in countries with active enforcement of insider trading regulation than in those without. Based on insider trading gains that include earnings announcement abnormal returns, the interaction of Active Enforcement and “Before” dummies is positive and mainly significant at the 10% level. The implication is that in countries where insider trading regulation is actively enforced, insider trades are more informative before earnings announcements and the insider information is reflected in the stock prices during earnings announcements. However, in countries with lax regulatory environments, active insider trading before earnings announcements reduces stock price informativeness without advancing earnings news or helping to incorporate earnings information into stock prices.

To summarize, our results suggest that active enforcement of insider trading regulations leads to more informative insider trading and greater stock price efficiency. Even though insiders from countries with weak insider trading regulations could exploit their information advantage, such as corporate earnings news, in their trades, market reactions to corporate news are weaker, resulting in noisier stock prices. At the same time, the noisier stock prices reduce the potential information advantage of insiders and hence, lower the informativeness of insider trades.

6. Conclusion

This study offers direct evidence that active insider trading enforcement engenders more, and not less, informative insider trades. These findings are in stark contrast to the arguments that insider trading regulation reduces the informativeness of insider trades and hinders price efficiency. These results remain robust after controlling for various country-level institutional characteristics that include the rule of law and the general effectiveness of law enforcement. Our analysis of insider trading activities around corporate earnings announcements provides insights into why active insider trading enforcement results in more informative insider trades and more efficient stock prices. In countries with active enforcement of insider trading regulations (i) insiders trade significantly less prior to corporate earnings announcements over 10- to 30-day intervals, (ii) insiders tend to refrain from trading on material non-public information, and (iii) stock price reactions to corporate earnings announcements are stronger. In countries without active insider trading enforcement, insiders trade more before earnings announcements, but their trades do not help to incorporate earnings-related information into stock prices, and stock prices also react less to earnings announcements.

Perhaps our most striking finding is that enforcement of insider trading regulation leads to both more informative insider trading and greater stock price efficiency. Opponents of insider trading regulation argue that unrestricted insider trading leads to more informed trading and to more efficient prices; however, our results show no support for this argument. While proponents of insider trading regulation contend that unrestricted insider trading could lead to less informationally efficient stock prices, they also tend to hold the view that such insider trades can be highly informative. Our results show that less informative prices render less informative insider trades. The evidence suggests that informativeness of insider trades and stock price efficiency are simultaneously determined, parallel results.

Our research has additional public policy implications. Enforcement of insider trading laws, not the establishment of the insider trading laws, facilitates stock market efficiency and promotes informative insider trading. Bhattacharya and Daouk (2002) and several subsequent studies find that initial enforcement of insider trading regulation could significantly affect price efficiency. Our study shows that continuous and active enforcement of insider trading regulation could help to achieve regulators' primary goal of monitoring insider trading activities and improving stock market efficiency.

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Working capital management and firm's valuation, profitability and risk

Evidence from a developing market

Ben Le
College of Business and Public Management, Kean University, Union, New Jersey, USA

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Abstract

Purpose – The purpose of this paper is to examine the effects of working capital management on firm valuation, profitability and risk.

Design/methodology/approach – The paper uses a panel data set of 497 firms covering the period 2007 to 2016. The authors test the effects of working capital management on firm valuation, profitability and risk using the panel data methodology that includes firm and year fixed effects regressions.

Findings – The authors find a significantly negative relationship between net working capital (NWC) and firm valuation, profitability and risk. The results suggest that, in managing working capital, firm managers must make a trade-off between their objectives for profitability and risk control. Working-capital management is of particular importance in firms with less access to capital; it is also important when firms are expanding their investments during periods of economic recovery.

Originality/value – This paper contributes to the literature in several ways. First, to my knowledge, it provides the most comprehensive investigation, to date, on the relationship between working capital management and firm valuation, profitability and risk in an emerging market. Second, this study documents the existence of an optimal level of NWC in an emerging market. Third, firm performance, as measured in both market and accounting value, can be improved with efficient working capital management. Finally, the study includes the impact of the business cycle in an analysis of the effects of working capital management on firm performance.

Keywords Vietnam, Firm performance, Business cycle, Risk, Working capital management, Access to capital

Paper type Research paper

1. Introduction

The literature on working-capital management (WCM) has found that efficient management can enhance profitability and increase firm value. Shin and Soenen (1998) are one of many studies that have found a negative relationship between the cash conversion cycle (CCC) and firm profitability. The results imply that a reduction in the CCC is directly associated with an increase in profitability. Havoutis (2003) argues that firms have control over their WCM and that, with efficient control, they can increase their economic value. One measure of firm value is the total present value of its expected future free cash flows (FCF). Net working capital (NWC) is a determinant of FCF. Berk *et al.* (2009) note that efficient WCM can increase FCF, and consequently enhance the value of a firm. Few studies investigate the relationship between NWC and firm value. Wasiuzzaman (2015) documents a negative relationship between the level of NWC and firm value for firms in Malaysian markets. Aktas *et al.* (2015) find a negative relationship between firm value and excess NWC in firms with abnormally high levels of NWC in US markets. However, this relationship is positive in firms with low levels of NWC.

Jensen Michael (2001) notes that a firm's goal is to maximize its total market value, and that it is impossible for a firm to have multiple goals. Maximizing a firm's value is not always the same as maximizing its profits. Unfortunately, current studies only test the influence of WCM on either a firm's profitability or its value by using separate data sets.

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There is a lack of research that examines the effects of WCM on firm profitability and firm valuation, using the same data set. Further, few studies address the effect of a change in NWC on firm risk.

The results of existing studies imply that a firm can increase its profitability by reducing its CCC. A lower CCC is usually associated with a lower level of NWC. This paper attempts to answer the following questions: in a market, if the CCC is negatively related to profitability, then will a decrease in NWC be associated with a higher firm value? What is the effect on firm risk of reducing NWC?

On a global equity-investment perspective, emerging markets have been attracting considerable attention from international investors. This paper aims to extend the research of WCM on an emerging economy and provide to the literature new evidence on the impact of WCM on firm value. In particular, this study uses a panel data set from stock markets in Vietnam over the period 2007 to 2016 to investigate the effects of WCM on firms' value, profitability and risk over the most recent decade for which data is available. Vietnamese stock exchanges present a unique opportunity for a case study on WCM. Over this period, current assets represent 62.06 percent of firms' total assets and current liabilities represent 80.78 percent of their total liabilities; these values, in turn, are equal 98.00 percent of their total equity. Vietnamese firms are heavily dependent on short-term financing and short-term assets account for the major portion of these firms' balance sheets. Hence, appropriate WCM and financing policies are tools a firm can use to increase their valuation.

Campos and Kinoshita (2003) note that former communist countries provide an extremely valuable but are underutilised opportunity for research. As a former communist country, Vietnam opened its economy in the early 1990s, which was a decade of market liberalization globally. The country now has two stock exchanges: the Ho Chi Minh Stock Exchange, which was established in 2000, and the Hanoi Stock Exchange, which was launched in 2005. Demigurc-Kunt and Maksimovic (2002) find that the development of a country's legal system as it pertains to capital markets predicts its firms' access to external capital: "[T]he development of securities markets is related more to the availability of long-term financing, whereas the development of the banking sector is related more to the availability of short-term financing." Vietnam's securities markets have only recently been established. The country's firms have limited alternative sources of external capital, a situation that is consistent with their very high percentages of short-term liability to total liability.

In November 2006, Vietnam joined the World Trade Organization. Since 2007, the country's firms have become more integrated into global markets. The market-value-weighted foreign ownership of Vietnamese listed firms was 27.56 percent, on average, during the period 2007 to 2016, the US ranking second among the countries investing in Vietnamese stock markets[1]. Foreign investment provides an important source of capital to domestic firms. Their integration into global markets provides benefits but also pushes these firms' management to improve their firms' performance. In addition to foreign investors providing financing, the government also finances several Vietnamese listed firms. During the period 2007 to 2016, the government-owned 50.00 percent or more of the total shares outstanding of over 36 percent of all listed firms, accounting for an important source of these firms' capital.

This paper contributes to the WCM literature in several ways. First, to my knowledge, it provides the most comprehensive investigation, to date, on an emerging market and the relationship between working capital management and firm performance as measured by firm valuation, profitability and risk. Second, this study documents the existence of an optimal level of NWC in an emerging market. This finding is comparable with Baños-Caballero *et al.* (2014) and Aktas *et al.* (2015), who documented the existence of optimal working-capital-investment levels in UK and US markets, respectively. However, this paper uses different research methods.

First, whereas Aktas *et al.* (2015) use abnormal returns as a measure of firm value, this paper uses the market-to-book ratio; it also tests for the effects of NWC on firm profitability. Second, whereas Baños-Caballero *et al.* (2014) utilize a non-linear model to examine the effects of the net trade cycle on a firm's market-to-book ratio, this paper uses a linear model that includes firm and year fixed effects in all of the regression analyses.

Third, this paper indicates that firm performance, as measured in both market and accounting value, can be improved with efficient WCM. Finally, the study includes the impact of the business cycle in an analysis of the effects of WCM on firm performance.

The remainder of the paper is organized as follows: Section 2 reviews the existing literature. Section 3 includes the models and hypotheses, Section 4 provides a description of the data. Section 5 discusses the results and Section 6 concludes.

2. Literature review

WCM is important to a firm's overall management. The level of NWC influences a firm's profitability and value; it is determined by the inventory level, the value of accounts receivable and accounts payable. Blinder and Maccini (1991), Fazzari and Petersen (1993) and Corsten and Gruen (2004), among others, argue that a high inventory level (thus, a high NWC) increases profits by lowering supply costs and the potential loss of sales due to stock outages; it also provides a hedge against variations in the prices of inputs. With respect to the management of accounts receivable, on the one hand, Brennan *et al.* (1988), Long *et al.* (1993) and Summers and Wilson (2002), among others, propose that granting credit to customers and, thus, increasing the level of accounts receivable can foster long-term relationships with customers, which can potentially increase sales and profits. On the other hand, Kieschnick *et al.* (2013) argue that an increase in NWC requires additional financing. Firms that hold too much working capital may incur high-interest expenses and potentially the risk of bankruptcy (see, Aktas *et al.*, 2015). Eljelly (2004) includes the concept of an efficient WCM that requires a current asset level that is sufficient to meet short-term obligations but also to avoid excessive investment in current assets. Berk *et al.* (2009) imply that efficient WCM redeploys FCF or underutilised resources to pursue higher-value projects so as to create value for the firm.

The effects of the CCC, and its components, on profitability are well documented. Most studies find a negative relationship between CCC and the profitability of firms around the world, for example, for the USA (see Jose *et al.*, 1996; and Shin and Soenen, 1998); for Japan and Taiwan (see Wang,2002); for Greece (see Lazaridis and Tryfonidis, 2006); for Spain, during the period 1996 to 2002 (see García-Teruel and Martínez-Solano, 2007); for Pakistan (see Raheman and Nasr, 2007); for Turkey (see Karaduman *et al.*, 2010; and for Germany, see (Wöhrmann *et al.*, 2012). Deloof (2003) finds a negative relationship between CCC and profitability in Belgian markets; however, these results are insignificant. He also finds a negative impact on profitability of days sales outstanding (DSO), days sales inventory (DSI), and days payable outstanding (DPO). However, Baños-Caballero *et al.* (2012) use data on Spanish firms for the period 2002 to 2007 and Baños-Caballero *et al.* (2014) use data on UK firms for the period 2001 to 2007 and find a concave relationship between CCC and profitability and argue that there exits an optimal level of NWC that maximizes a firm's value.

Cash holdings is a component of NWC. Existing studies provide different effects of cash holdings on firm value. On the one hand, Luo and Hachiya (2005), Pinkowitz *et al.* (2006), Kalcheva and Lins (2007), Harford *et al.* (2008) and Lee and Lee (2009) find a negative relationship between cash holdings and firm value. On the other hand, Faulkender and Wang (2006), Bates *et al.* (2009) and Isshaq *et al.* (2009) find positive results from cash holdings on firm value. Martinez-Sola *et al.* (2013) find a concave relationship between cash holdings and firm value, and verify the existence of an optimum level of cash holdings.

Although there are numerous studies on the effects of cash holdings on firm value, there is little research related to the effects of NWC on firm value. Wang (2002) finds that, in the Japanese and Taiwanese markets, higher-valued firms invest less in NWC than lower-valued firms. Wasiuzzaman (2015) finds that a reduction in NWC increases firm value in Malaysian markets. In US markets, using a model similar to that in Faulkender and Wang (2006), Kieschnick *et al.* (2013), Wasiuzzaman finds that the incremental dollar held in cash is worth more than the incremental dollar invested in NWC. For US markets, Aktas *et al.* (2015) show that, among firms that underinvest in working capital, there is a positive relationship between the level of NWC and stock performance. However, for firms with abnormally high levels of NWC, excess NWC is negatively related to stock performance.

3. Model and hypotheses

Firm value can be estimated by discounting its expected future FCF. Brigham *et al.* (2015) note that firm value can be estimated by discounting the FCF the firm generates, as follows:

$$V_0 = \sum_{t=1}^{\infty} \frac{\mathrm{FCF}_t}{(1+\mathrm{WACC})^t}, \tag{1}$$

where $\mathrm{FCF}_t = \mathrm{EBITDA}_t - \mathrm{CAPEX}_t - \Delta\mathrm{NOWC}_t$. WACC is the weighted average cost of capital. CAPEX is the total cost of long-term assets and ΔNOWC is the change in net operating working capital. Wasiuzzaman (2015) notes that "NWC is an important component of free cash flow." Existing studies typically measure firm value, using either the market-to-book ratio (Fama and French, 1998, among others) or the stock's excess return (Faulkender and Wang, 2006, among others). In this paper, I modify the models used by Fama and French (1998) and Wasiuzzaman (2015), and use the market-to-book ratio as the dependent variable that measures firm valuation as follows:

$$\begin{aligned} \mathrm{MTB}_{i,t} = {} & \beta_0 + \beta_1 \mathrm{CAPEX}_{i,t} + \beta_2 \mathrm{INTEREST}_{i,t} + \beta_3 \mathrm{CASHD}_{i,t} + \beta_4 \mathrm{GROWTH}_{i,t} \\ & + \beta_5 \mathrm{CFOSALES}_{i,t} + \beta_6 \text{ LOG (SIZE)}_{i,t} + \beta_7 \mathrm{WC}_{i,t} + \beta_8 fe_{i,t} + \varepsilon_{i,t}, \end{aligned} \tag{2}$$

where MTB is the market-to-book ratio and WC is the interest variable that is either NWC = (accounts receivable + inventory – accounts payable)/total book assets or CCC. Table I presents the descriptions and calculations of the variables.

In Equation (2), the MTB is the ratio between the year-end market value per share and the book value per share. A firm's goal is to maximize its market value. In this model, I focus on the effects of a change in NWC on a firm's value. The CAPEX is capital expenditure scaled by total book assets; INTEREST represents the interest expenses a firm incurs during a year, scaled by total book assets; CASHD is the total cash dividends paid out during a year, scaled by total book assets; GROWTH represents the growth rate of sales; CFOSALES is the operating cash flow, divided by sales for the year; SIZE is the total book value of assets that controls for firm size. Cash dividends, cash flows from operations, and sales growth rate represent the firm's generated cash flows. In all of the regressions, I include $fe_{i,t}$, which represents firm and year fixed effects, to control for the time-invariant firm characteristics and to reduce issues related to missing variables (see also, Aktas *et al.*, 2015). The focus of my model is the effects of NWC and CCC on firm value.

In order to examine the effects of WCM on a firm's profitability, this paper uses the following model:

$$\begin{aligned} \mathrm{ROIC}_{i,t} = {} & \beta_0 + \beta_1 \mathrm{CAPEX}_{i,t} + \beta_2 \mathrm{GROWTH}_{i,t} + \beta_3 \mathrm{LEV}_{i,t} + \beta_4 \text{ LOG (SALES)}_{i,t} \\ & + \beta_5 \mathrm{VOL}_{i,t} + \beta_6 \mathrm{WC}_{i,t} + \beta_7 fe_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{3}$$

Variable	Description	Unit	n	Mean	SD
AGE	The number of months from IPO to date	Months	3,358	57.905	36.291
CAPEX	Capital expenditure. Total amount spent for purchasing capital assets	Percent	3,358	6.047	7.891
CASHD	Total cash dividend paid during the year scaled by total book assets	Percent	3,358	2.574	4.385
CCC	Cash conversion cycle = DSO+DSI−DPO	Days	3.358	143.94	138.08
DPO	Days payable outstanding = (Accounts payable × 365)/cost of goods sold	Days	3,358	52.91	50.04
DSI	Days sales inventory = (Inventory × 365)/ cost of goods sold	Days	3,358	108.935	103.088
DSO	Days sales outstanding = (Accounts receivable × 365)/sales	Days	3,358	87.911	89.404
DUMMY	Equal 1 for period 2007–2012 (financial crisis period), 0 otherwise		3,358	0.558	0.497
CFOSALES	Net operating cash flows scaled by sales	Percent	3,358	7.98	14.596
GOV	Government ownership = Percentage of shares owned by the government	Percent	3,358	28.77	23.48
GROWTH	Growth rate of sales = (Current year sales−previous year sales) × 100/previous year sales	Percent	3,358	13.338	36.713
INTEREST	Total interest expenses of the year scaled by total book assets	Percent	3,340	2.2605	2.1098
LEV	Leverage = (Debt/equity) × 100	Percent	3,358	98.015	149.88
MTB	Market to Book ratio = Market value/Book value per share		3,358	1.175	1.32
NWC	Net working capital scaled by total book assets. Net working capital = accounts receivable + inventories − accounts payable	Percent	3,358	32.27	19.26
OWN[a]	Percentage of shares owned by foreigners	Percent	3,358	9.458	13.047
ROIC	Return on invested capital = (Net income + interest expenses) × 100/(total capital + short term debt + current portion of long term debt)	Percent	3,358	11.487	9.545
SALES	Total revenue of a year	VND billion	3,358	1,416.14	3,370.96
SIZE	Firm size, equal total book assets	VND billion	3,358	1,574	5,604
VOL	Stock return volatility = Standard deviation of stock return	Percent	3,079	11.984	5.775

Notes: This table summarizes the statistics all of the variables used in this paper. The sample includes non-financial firms from DataStream over a decade from 2007 to 2016. The data are obtained from DataStream. The data are winsorised at the 1 percent level for the following variables: NWC, CCC, DSO, DSI and DPO. The final data set includes 497 unique firms over 10 years, with a total of 3,358 firm-year observations, except for interest expenses (3340 observations) and stock return volatility (3,079 observations). [a]This is the equally weighted average foreign ownership. The market capitalization value weighted average of foreign ownership is 27.56 percent. The evidence shows that foreigners invest more in firms with large market capitalization

Table I. Summary statistics

In Equation (3), the dependent variable is the return on invested capital (ROIC); WC is the focused variable, that is, CCC, NWC or the components of CCC, including DSO, DSI and DPO (where CCC = DSO + DSI −DPO). Shin and Soenen (1998) and Baños-Caballero *et al.* (2014), among others, use CCC to test the effects of WCM on firm profitability. Stock-return volatility (VOL) is utilized to control for firm risk. Following Deloof (2003), I use total revenue (SALES) to control for firm size. Table I provides descriptions and calculations of these variables:

H1. A lower NWC and CCC positively affect firm performance.

Firm performance is measured using either market value (in this paper, I use market-to-book ratio) or accounting value (profitability). I expect that a reduction in NWC or CCC is associated with an increase in MTB and ROIC. WCM is related to a firm's management of its FCF, inventory and accounts payable; thus, WCM affects firm value and profitability. A higher FCF increases firm value. Current research has found significant effects of CCC on firm profitability and also effects of NWC on firm value. In markets in Vietnam, I also expect that CCC and NWC have significant influences on firm profitability and value.

There is a direct relationship between NWC and CCC. Controlling for other information, an increase in inventory and accounts receivable, and/or a decrease in accounts payable are associated with an increase in DSI and DSO and a decrease in DPO. Consequently, both NWC and CCC increase. Suppose a firm has excessive NWC; that is, levels of inventory and accounts receivable are higher and/or accounts payable are lower than necessary. In either case, both NWC and CCC are too high. We may expect a negative relationship between the level of NWC and firm value and a negative association between firm profitability and CCC. A firm can improve its performance by reducing the level of its NWC level and its CCC:

H2. For firms with better access to capital, firm value is less sensitive to changes in NWC.

Wasiuzzaman (2015) uses firm size as a proxy for constraints on financing. He argues that large firms are more reputable and, therefore, have better access to capital markets than small firms. In this paper, I utilize the total percentage of government and foreign ownership (GOVOWN = foreign ownership + government ownership) of a firm as a proxy for ease of access to sources of financing. Sun and Tong (2003) find for China and Le *et al.* (2018) find for Vietnam that the cost of borrowing is lower for state-owned enterprises (SOEs) (either implicit or explicit cost) than for other firms because SOEs carry government guarantees. Blenman and Le (2014) find that foreigners that invest in Vietnam target a long-term horizon, thereby helping provide financing to the firms they invest in. However, Teach notes the negative effect of easy capital access; he coins the term barely working: "The availability of cheap debt has reduced companies' incentive to improve working-capital management" (2015). Hence, I expect firm value is less sensitive to changes in NWC in firms that have higher GOVOWN.

The following model is used to test the effects of NWC on firm risk:

$$\mathrm{VOL}_{i,t} = \beta_0+\beta_1\ \mathrm{LOG\ (SIZE)}_{i,t}+\beta_2\mathrm{MTB}_{i,t}+\beta_3\ \mathrm{LOG\ (AGE)}_{i,t}+\beta_4\mathrm{NWC}_{i,t}+\beta_5\mathrm{OWN}_{i,t}$$
$$+\beta_6\mathrm{GROWTH}_{i,t}+\beta_7\mathrm{LEV}_{i,t}+\beta_8\mathrm{DUMMY}+\beta_9 fe_{i,t}+\varepsilon_{i,t}, \quad (4)$$

In Equation (4), the volatility of daily stock returns (VOL) is the dependent variable; AGE is the number of months, to date, since a firm's IPO; OWN is the percentage total ownership of foreign investors at year end; NWC is scaled by the book value of total assets. Table I provides descriptions and calculations of the variables:

H3. The relationship between stock-return volatility and the level of NWC is negative.

As discussed in studies, a high inventory level can reduce potential stock outages, provide protection against input price variations and foster long-term relationships with customers by granting them credit (Blinder and Maccini, 1991; Fazzari and Petersen, 1993; Corsten and Gruen, 2004; Brennan *et al.*, 1988; Long *et al.*, 1993; Summers and Wilson; 2002). I also expect a negative relationship between volatility and firm size and age.

In the above equations, the subscript i means firm i, and t means year t.

4. Description of the data

The sample data were obtained from DataStream, which consists of financial information for the Vietnamese companies listed on the Ho Chi Minh and the Hanoi stock exchanges. The Hanoi Stock Exchange launched in 2005 with only seven listed stocks; its number of stocks increased to 105, in 2007. The sample data cover the period 2007 to 2016. Financial institutions are excluded from the sample. The data are winsorised at the 1.00 percent level for the following variables: NWC, CCC, DSO, DSI and DPO. The final data set includes 497 unique firms, over 10 years, with a total of 3,358 firm-year observations, except for interest expenses (3,340 observations) and stock-return volatility (3,079 observations).

Table I summarizes the statistics of all of the variables used in the paper. I refer to the period 2007 to 2012 as it was a period of financial crisis and stock markets in Vietnam saw prices drop over these six years. The stock market then started to recover in 2013, so I refer to 2013 to 2016 as the recovery period. The ratio of NWC to sales, on average, is 37.15, 35.33 and 39.45 percent, for the full sample, the crisis period, and the recovery period, respectively. Among the 3,358 observations, 3,279 firm-years show positive NWCs, and 79 firm-years show negative NWCs. NWC over sales amounted to 38.16 and −4.54 percent for the positive and negative NWC firm-years, respectively. In comparison with total assets, over the period 2007 to 2016, on average, NWC was 32.37 percent. The average NWC was 33.18 percent for positive NWC firms, and −5.77 percent for negative NWC firms.

Figure 1 presents the variations of the CCC and its components, from 2007 to 2016. On average, DSI and DSO are significantly higher than DPO, causing CCC to almost triple DPO. Among the three components of CCC, DSI is the longest. The CCC tends to increase from 2007 to 2013 and then decrease in 2013.

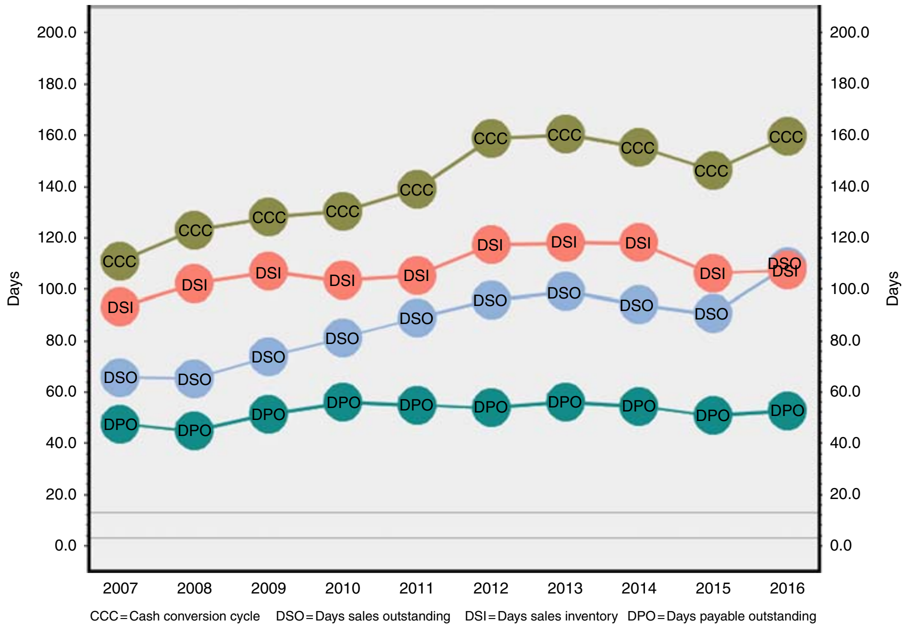

Figure 1. Cash Conversion Cycle and Its Components 2007–2016

Notes: This figure presents yearly average CCC, DSO, DSI and DPO. The sample includes 497 unique non-financial firms with 3,358 firm-year observations, obtained from DataStream over a decade from 2007 to 2016. The descriptions of CCC, DSO, DSI and DPO are summarised in Table I

5. Regression analysis

5.1 The effects of WCM on firm profitability and value

Table II reports the effects of NWC, CCC and other factors on the firm valuation for the period 2007 to 2016. Firm and year fixed effects are included in all models. The market-to-book ratio at year end is the dependent variable. The evidence shows that CASHD, GROWTH, CFOSALES and CAPEX have positive impacts on firm value. The coefficient of CASHD and CFOSALES are statistically significant at the one percent level, in all of the regression models. The results suggest that firms with higher cash flows have higher values. The interest variables NWC and CCC have negative coefficients that are significant at the one percent level, in all of the specifications. The empirical evidence suggests that a decrease in NWC is strongly associated with an increase in firm value. As a one-period lagged value of NWC is included in the model, this coefficient is also negative and significant at the one percent level, but the magnitude is lower than that of NWC. The R^2 is higher for the NWC models than for the NWC model with a one-period lag.

Table III documents the effects of NWC and CCC and its components on firm profitability. The dependent variable is ROIC. Table III shows evidence of a strong negative relationship between profitability and NWC, and CCC and its components, including DSO, DSI and DPO. On average, as a firm reduces its CCC by 100 days, its ROIC[2] increases by 1.05 percent. A reduction of 100 days in DSO, DSI and DPO is associated with an increase in ROIC by 1.35, 1.17 and 1.23 percent, respectively. A decrease of 1.00 percent in NWC is associated with an increase of 2.03 percent in ROIC.

The results in Tables II and III verify *H1*. The results are consistent with Shin and Soenen (1998), among others, in finding a negative association between firm performance and CCC. The results are also consistent with Aktas *et al.* (2015) in that this study finds a negative relationship between firm performance and NWC. More importantly, the evidence in this paper indicates that firm performance, as measured by either market or accounting value, is negatively associated with a firm's investment in NWC. The results imply a significant necessity of reducing the NWC level and the CCC in markets in Vietnam.

MTB	I	II	III	IV
CAPEX	0.19187 (0.129)	0.18276 (0.154)	0.174269 (0.174)	0.25655 (0.004)
INTEREST	−3.07332 (0.00)	−2.80802 (0.00)	−2.8668 (0.003)	−2.5585 (0.00)
CASHD	1.28688 (0.00)	1.37024 (0.00)	1.351732 (0.00)	1.7418 (0.00)
GROWTH	0.000062 (0.821)	0.000263 (0.330)	0.000251 (0.352)	0.000285 (0.074)
CFOSALES	0.00197 (0.005)		0.00197 (0.005)	0.00338 (0.00)
LOG(SIZE)	−0.02622 (0.068)	−0.035856 (0.013)	−0.03600 (0.013)	−0.02754 (0.015)
CCC	−0.04154 (0.00)			
NWC		−0.243358 (0.001)	−0.22856 (0.003)	
LAG (NWC)				−0.14875 (0.005)
Firm- and year-fixed effects	Yes	Yes	Yes	Yes
R^2	0.4123	0.4098	0.4088	0.2443
Number of observations	3,317	3,317	3,317	2,659

Notes: This table reports the fixed effects regression results of firm's market to book ratio against net working capital and other factors. MTB the market to book ratio = market value divided by book value per share at year-end. CAPEX total capital expenditure of the year scaled by total book assets. INTEREST the total interest expenses scaled by total book assets. CASHD total cash dividend paid during the year scaled by total book assets. GROWTH the growth rate of sales. CFOSALES the ratio of net operating cash flow over sales. SIZE the total book assets. CCC the days of cash conversion cycle divided by 100. NWC = (accounts receivable + inventory – accounts payable)/total book assets. LAG (NWC) is one period lagged value of NWC. Numbers in parentheses represent the *p*-value

Table II.
Net working capital and firm valuation

ROIC	I	II	III	IV	IV
CAPEX	2.47400 (0.168)	3.15070 (0.079)	3.01755 (0.092)	3.93997 (0.028)	3.07482 (0.095)
GROWTH	0.02769 (0.00)	0.02865 (0.00)	0.02996 (0.00)	0.03203 (0.00)	0.03225 (0.00)
LEV	−0.01353 (0.00))	−0.01369 (0.00)	−0.01324 (0.00)	−0.01345 (0.00)	−0.01393 (0.00)
LOG(SALES)	1.74468 (0)	1.77493 (0)	1.89166 (0)	2.00106 (0)	2.10945 (0)
VOL	0.28184 (0.00)	0.28482 (0.00)	0.28617 (0.00)	0.28837 (0.00)	0.27851 (0.00)
CCC	−1.048 (0.00)				
DSO		−1.345 (0.00)			
DSI			−1.167 (0.00)		
DPO				−1.231 (0.00)	
NWC					−2.02925 (0.057)
Firm- and year-fixed effects	Yes	Yes	Yes	Yes	Yes
R^2	0.2606	0.2523	0.2606	0.2515	0.2536
Number of observations	3,079	3,079	3,079	3,079	3,079

Notes: This table reports the fixed time effects firm's profitability regression. The dependent variable, ROIC is the return on invested capital. CAPEX total capital expenditure scaled by total book assets, GROWTH the growth rate of sales, LEV leverage. SALES the total revenue, VOL the standard deviation of firm's daily stock returns, CCC cash conversion cycle, DSO days sales outstanding, DSI days sales inventory, DPO days payable outstanding, and NWC = (accounts receivable + inventory − accounts payable)/total book assets. The days are divided by 100. Numbers in parentheses represent the *p*-value

Table III. Cash conversion cycle, net working capital and profitability

5.2 The effects of ease to capital and business cycle

In order to examine the effects of access to capital, I divide the full sample into two groups, based on the firm's total government and foreign ownership. Due to government support, firms with high government ownership have better access to capital and lower borrowing costs (see, Sun and Tong, 2003; Le *et al.*, 2018). In addition, foreign investment in Vietnam's listed companies targets a long horizon. The availability of combined government and foreign ownership (GOVOWN) provides firms with access to capital.

Table IV shows evidence of a strong negative effect of NWC and CCC on firm value for firms whose GOVOWN is less than 50.00 percent. In the sub-sample of these firms, the coefficient of CCC is negative and significant at the one percent level, and the coefficient of NWC is negative and marginally significant at the one percent level. Nevertheless, these coefficients are insignificant in models that consist of firms whose GOVOWN is equal to or more than 50.00 percent. The absolute magnitudes of these coefficients are significantly higher for models of firms with a GOVOWN level that is less than 50.00 percent. The results verify *H2* and are consistent with Teach (2015). The results in this paper are also similar to findings in Malaysian markets (see Wasiuzzaman, 2015).

Table V includes regression results for ROIC as it is influenced by the business cycle. Stock markets in Vietnam declined from 2007 to 2012, and then recovered beginning in 2013. DUMMY is a dummy variable equal to 1 for the period 2007 to 2012 and zero for the period 2013 to 2016. I examine the effects of the business cycle by multiplying all of the explanatory variables on Table III by DUMMY; the regression results are summarized on Table V. All of the coefficients except for CAPEX × DUMMY and NWC × DUMMY are significant at the one percent level. The absolute magnitudes of product variables NWC × DUMMY, and CCC × DUMMY and its components are lower in Table V than are the variables themselves on Table III. For instance, the evidence in Table III shows that a decrease in CCC by 100 days is associated with an increase of 1.05 percent in ROIC.

MTB	GOVOWN ⩾ 50% I	II	GOVOWN < 50% I	II
CAPEX	0.17660 (0.216)	0.19170 (0.183)	0.15657 (0.256)	0.13976 (0.318)
INTEREST	0.52999 (0.554)	0.52331 (0.56)	−2.78973 (0.00)	−2.66468 (0.00)
CASHD	0.81089 (0.00)	0.82395 (0.00)	2.19465 (0.00)	2.28025 (0.00)
GROWTH	0.00102 (0.01)	0.00112 (0.003)	−0.00021 (0.419)	−0.00003 (0.919)
CFOSALES	0.00008 (0.931)	0.00011 (0.906)	0.00091 (0.168)	0.00100 (0.133)
LOG(SIZE)	−0.12704 (0.00)	−0.12869 (0.00)	−0.02086 (0.188)	−0.02768 (0.08)
CCC	−0.01423 (0.345)		−0.03792 (0.00)	
NWC		0.03128 (0.781)		−0.20003 (0.012)
Firm- and year-fixed effects	Yes	Yes	Yes	Yes
R^2	0.5792	0.5794	0.4699	0.463
Number of observations	1,396	1,396	1,921	1,921

Notes: This table reports the fixed effects regression results of firm's market to book ratio against net working capital and other factors. The sample is divided in two groups to examine the effects of ease to capital. Due to the government's support, firms with high government ownership have much better access to sources of financing: easy access, lower cost of borrowing. GOVOWN is the total of government ownership and foreign ownership. MTB the market to book ratio = market value divided by book value per share at year end. CAPEX total capital expenditure of the year scaled by total book assets. INTEREST the total interest expenses scaled by total book assets. CASHD total cash dividend paid during the year scaled by total book assets. GROWTH the growth rate of sales. CFOSALES the ratio of net operating cash flow over sales. SIZE the total book assets. NWC = (accounts receivable + inventory − accounts payable)/total book assets. Numbers in parentheses represent the p-value

Table IV.
Net working capital and firm valuation: effects of ease to capital

ROIC	I	II	III	IV	IV
CAPEX × DUMMY	1.30522 (0.553)	2.03248 (0.353)	1.99627 (0.363)	3.00618 (0.169)	2.56458 (0.264)
GROWTH × DUMMY	0.02380 (0.00)	0.02373 (0.00)	0.02563 (0.00)	0.02651 (0.00)	0.02720 (0.00)
LEV × DUMMY	−0.01161 (0.00)	−0.01181 (0.00)	−0.01132 (0.00)	−0.01144 (0.00)	−0.01192 (0.00)
LOG(SALES) × DUMMY	0.68307 (0.00)	0.67620 (0.00)	0.75172 (0.00)	0.78281 (0.00)	0.83896 (0.00)
VOL × DUMMY	0.39241 (0.00)	0.40380 (0.00)	0.39673 (0.00)	0.40778 (0.00)	0.39684 (0.00)
CCC × DUMMY	−0.88672 (0.00)				
DSO × DUMMY		−1.31061 (0.00)			
DSI × DUMMY			−0.85900 (0.00)		
DPO × DUMMY				−1.11492 (0.01)	
NWC × DUMMY					−0.74658 (0.524)
Firm- and year-fixed effects	Yes	Yes	Yes	Yes	Yes
R^2	0.1816	0.1805	0.1786	0.1764	0.1767
Number of observations	3,079	3,079	3,079	3,079	3,079

Notes: This table reports the fixed effects of business cycle. In Vietnam, the financial crisis period started with stock value drop in 2007 until 2012, and the recovery period began in 2013. The dependent variable is the return on invested capital. CAPEX total capital expenditure scaled by total book assets, GROWTH the growth rate of sales, LEV leverage. SALES the total revenue, VOL the standard deviation of firm's daily stock returns, CCC cash conversion cycle, DSO days sales outstanding, DSI days sales inventory, DPO days payable outstanding, and NWC the net working capital scaled by total assets at year end. The days are divided by 100. NWC = (accounts receivable + inventory − accounts payable)/total book assets. DUMMY equal to one for the period 2007–2012 during which stock markets declined by time, and equal zero for the period 2013–2016 where stock markets recovered. Numbers in parentheses represent the p-value

Table V.
The effects of business cycles

The results on Table V suggest that, during a downturn, a reduction in CCC by 100 days is associated with an increase in ROIC of only 0.89 percent. The evidence implies that a reduction in NWC, CCC, operating cycle and DPO have a lower effect on profitability during a crisis than during a recovery.

5.3 *The effects of WCM on stock-return volatility*

Following Coles *et al.* (2006) and Aktas *et al.* (2015), I use the annualized standard deviation of a firm's daily stock returns as a proxy for firm risk. In this section, I run a regression of stock-return volatility against NWC and a set of determinants. In all of the models, firm size, foreign ownership and NWC have strong and negative influences on stock-return volatility. The results imply that an additional investment in working capital reduces firm risk. Therefore, *H3* is verified. The result of a strong negative effect of foreign ownership on volatility is broadly consistent with previous studies (see, e.g. Li *et al.*, 2011). Sales growth rate and market-to-book ratio show strong positive impacts on stock-return volatility. The results show a lower fluctuation in stock prices during periods of stock-price declines than during periods when stock prices increase. The negative effects of investment in NWC on stock-return volatility found in this paper are consistent with Aktas *et al.* (2015) (Table VI) .

6. Conclusion

This paper uses a panel data set on markets in Vietnam, for the period 2007 to 2016, to document comprehensive evidence of the relationship between WCM and firm value, profitability and risk in an emerging market. The findings of this paper are important to firms' managers, investors and researchers. The paper shows that, in managing working capital, a firm's managers must trade-off between the objectives of profitability and risk control. Similarly, each investor has different return objectives and levels of risk tolerance. Hence, the levels of NWC that affect firms' performance should be considered in investors' decision making process. The results also imply that there exists an optimal level of NWC that balances firm profitability and risk. Figuring out an optimal NWC level is worthy of future research.

The direct relationship between the effects of NWC and the CCC on firm profitability and valuation suggests that when the levels of NWC or the CCC are reduced, firm performance, as measured by either market value or accounting value, also improves. The results of this paper also confirm the importance of efficient WCM, particularly in firms with less access to external financing, or during periods of economic recovery when firms expand their investments. This is also consistent with Teach (2015). Barely working: "The availability of cheap debt has reduced companies' incentive to improve working capital management."

Volatility	I	II
LOG(SIZE)	−0.73705 (0.00)	−0.72076 (0.00)
MTB	0.10130 (0.06)	0.09800 (0.071)
LOG(AGE)	−0.38563 (0.132)	−0.38414 (0.134)
NWC	−1.61876 (0.002)	−1.61653 (0.002)
OWN	−0.03631 (0.00)	−0.03661 (0.00)
GROWTH	0.00497 (0.002)	0.00497 (0.002)
LEV		−0.00027 (0.648)
DUMMY		−13.3535 (0.00)
Firm- and year-fixed effects	Yes	Yes
R^2	0.6463	0.6454
Number of observations	3,078	3,078

Notes: This table reports the fixed effects regression results of stock volatility against net working capital and other factors. Stock volatility is stock return's standard deviation using daily return. SIZE the year-end total book assets. MTB the market to book ratio at year-end. AGE the months from firm's IPO to the date. NWC = (accounts receivable + inventory − accounts payable)/total book assets. OWN the percentage of shares owned by foreigners. GROWTH the growth rate of sales, LEV leverage. DUMMY equal to one for the period 2007-2012 during which stock markets declined by time, and equal zero for the period 2013–2016 where stock markets recovered. Numbers in parentheses represent the *p*-value

Table VI. Net working capital and firm risk

Notes

1. See Blenman and Le (2014).
2. To test for robustness, I also ran a fixed-effects regression of the net profit margin (net income/ sales) against NWC, and CCC and its components. The results also show a strong negative relationship between the net profit margin and NWC, CCC and DSO and DPO. The coefficient of DSI is negative but insignificant.

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About the author

Ben Le is Assistant Professor of Finance at Kean University. He received PhD in Finance from the University of North Carolina at Charlotte, NC. Ben is an active Wisconsin CPA and he passed CFA Level II exam. His research was presented at FMA Annual Meeting, American Real Estate and Urban Economics Association National Conference, American Real Estate Society Annual Meeting where he won the best real estate finance paper and Urban Economics Association Meeting. He has published articles in *Quarterly Journal of Finance and Accounting*. Ben Le can be contacted at: ble@kean.edu

Measuring impact of working capital efficiency on financial performance of a firm

An alternative approach

Punam Prasad and Narayanasamy Sivasankaran
Indian Institute of Management Ranchi, Suchana Bhawan, Ranchi, India
Samit Paul
Indian Institute of Management Calcutta, Joka Kolkata, West Bengal, India, and
Manoharan Kannadhasan
Indian Institute of Management Raipur, Sejbahar, Raipur, India

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Abstract

Purpose – The purpose of this study is to introduce working capital efficiency multiplier (WCEM) as a direct profitability measure of working capital management. The existing accounting measures in the literature establish an indirect approach to study the relationship between working capital efficiency and profitability of the firms.

Design/methodology/approach – Using the help of a set of companies from CMIE Prowess database, the study introduces WCEM as a direct profitability measure of working capital efficiency.

Findings – In this study, a new direct measure of working capital efficiency is introduced which is multiplicative in nature. WCEM is a product of three components, namely, WACC, ratio of the sum of trade receivables and inventories to trade payables and ratio of net working capital (NWC) to net sales.

Practical implications – The importance of direct measure like WCEM could be enormous in performance evaluation of a firm. It can be used as an indicator for choosing a suitable investment opportunity by an investor. This is due to the fact that the firm that is highly efficient in managing working capital is less exposed to liquidity risk. At the same time, the firm is less dependent on external financing. Therefore, such firms eventually create more value for their shareholders. Another indication that WCEM provides is to gauge the bargaining power of the firm and its competitive position in the market. Lower WCEM indicates higher bargaining power of a firm across the value chain, and its superior position relative to its competitors.

Originality/value – Most of the studies on WCM are of the empirical type and there is a complete dearth on theoretical framework. Researchers hereafter can consider WCEM as one of the financial performance variables in place of the existing measures such as return on asset (ROA), return on invested capital (ROIC), return on equity (ROE), gross operating income (GOI) and net operating income (NOI) and thereby can contribute new empirical insights through their research outcomes.

Keywords WCM, Direct profitability measure, WCEM, Working capital efficiency

Paper type Conceptual paper

1. Introduction

In today's ever-changing business environment, survival of the business is the driving force for a firm to excel among its peers. Survival in the modern world (continuing to be in business) is possible, only, when apart from other things, a firm has sufficient amount of financial resources to meet its long-term (fixed capital) and short-term commitments

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(working capital). The management of working capital is equally important as the management of long-term financial investment because efficient utilization of fixed assets is possible only when the company has adequate amount of working capital and it affects not only short-term financial performance, i.e. profitability (Raheman and Nasr, 2007; Samiloglu and Demirgunes, 2008), but also long-term financial performance, i.e. maximization of firm value (Samiloglu and Demirgunes, 2008). Working capital efficiency is a measure that indicates how a firm balances the amount of capital blocked in receivables and inventories with its payables on purchase of inventories. To be more specific, this measure differentiates the firms of similar nature (e.g. similar size, nature of business etc.) based on the portion of the funds mobilized to meet their day-to-day operating requirements (Dong and Su, 2010). Besides, working capital efficiency of a firm denotes the firm's creditworthiness and creates an investor's opinion on the firm's financial health. The firm with high working capital efficiency minimizes the need for borrowed capital in the short-run and thus helps the business to plan for long-term borrowing while expanding or investing in new projects.

Maintaining a desired level of working capital efficiency drives firm managers to take timely decisions relating to investment in current assets and short-term financing. Such decisions are important features of working capital management (WCM) (Nimalathasan, 2010). WCM has become one of the non-trivial issues in organizations, where many finance managers find it difficult to distinguish the important drivers of working capital and to decide on the optimal level of working capital (Smith, 1987; Lamberson, 1995). Most of the studies have focused on working capital practices of firms belonging to developed countries and very few studies reflect the same of firms operating in emerging economies, such as India (Saravanan *et al.*, 2017).

Cash conversion cycle (CCC) is the most popular and widely used measure of working capital efficiency. It is the sum of days' inventories and days' receivables minus days' payables. The longer the CCC, the larger is the investment in working capital (Deloof, 2003; Abuzayed, 2012). According to the WCM Report 2014, released by consulting firm Ernst & Young, the top 500 Indian companies had an average CCC of 67 days compared with 42 days for US firms, 41 days for European companies and 39 days for the firms in the rest of Asia. The report concludes that the top Indian firms might have increased their cash flows by Rs. 5.3tn in the financial year 2014 if they had effectively managed their working capital cycle. Therefore, it is imperative to find a suitable and innovative performance (outcome) measure which clearly and directly reports the impact of working capital efficiency of the firms.

As of now, there are a number of studies that have reported the impact of CCC on the profitability of companies (Wang, 2002; Deloof, 2003; Samiloglu and Demirgunes, 2008; Falope and Ajilore, 2009; Mathuva, 2009; Dong and Su, 2010; Banos-Caballero *et al.*, 2012; Saravanan *et al.*, 2017). These studies, in general, have used return on asset (ROA), return on invested capital (ROIC), return on equity (ROE), gross operating income (GOI) and net operating income (NOI) as a proxy for profitability of firms. It is quite logical to state that the profit earned by a firm is generated from its investment in both non-current assets and current asset or working capital. Therefore, if one needs to capture the relationship between working capital efficiency and profitability of a firm accurately, he/she needs to consider only that part of profit which is generated by efficient WCM. However, the above-stated profitability measures such as ROA, ROIC and ROE do not segregate the return earned by firms on their non-current assets and working capital. The other two measures (GOI and NOI) also fail to distinguish between the profit earned on net working capital (NWC) and that of using the non-current assets, and hence, there is a need to develop a direct outcome measure to exclusively assess the impact of a firm's investment in working capital.

We, in this study, introduce a direct performance measure of working capital efficiency, namely, working capital efficiency multiplier (WCEM). Contribution of this study to the existing literature is of many folds. Firstly, to the best of our knowledge, this is the first study which proposes WCEM as an effective direct measure of performance while expressing the logical relationship between firms' working capital efficiency and their working capital cost (WCC). Secondly, although the evidences in favor of this direct measure have been provided on the basis of Indian firms, it can be widely applied to firms from any other country. Lastly, the WCEM is easy to compute and hence not much expensive in decision making.

The remainder of the paper is structured in the following manner. Section 2 deals with a review of the literature on the management of working capital. Section 3 presents the rationale for the development of a direct performance measure to investigate the impact of working capital efficiency on the financial performance of firms. WCEM as a direct outcome measure of working capital efficiency is presented in Section 4. Finally, Section 5 concludes and provides the scope for future research.

2. Review of literature

A significant portion of earlier research on WCM has been extensively investigated at empirical levels (Singh and Kumar, 2014; Enqvist *et al.*, 2014; Aktas *et al.*, 2015). Corporate finance literature traditionally focuses on long-term financial decisions and their impact on the profitability of firms. However in recent years, WCM has gained importance, as managers and academicians have recognized the relevance of efficient management of working capital in the survival of a firm, especially after the global financial turmoil (Uremandu *et al.*, 2012; Ramiah *et al.*, 2014). Improper management of working capital is a major reason for the failure of small- and medium-sized firms compared to large firms in developed economies like USA and UK (Dunn and Cheatham, 1993; Peel and Wilson, 1996). Management of working capital involves the manager's time, attention and skills in handling short-term investments and the objective of WCM is to increase the liquidity and profitability of the firms and thereby increase their shareholders' value (Chang, Dandapani and Prakash, 1995; Nilsson, 2010; Aktas *et al.*, 2015).

Operational working capital is mainly used to measure the cycle times or turnover times of various components of WCM such as inventories, accounts receivables, accounts payables, etc. and is designed to assess managerial decision making (Filbeck and Krueger, 2005). The operational working capital measures can be used to quantify the working capital efficiency of firms and their managers (Hofmann and Kotzab, 2010). The CCC, as discussed earlier, is the basic measure of operational working capital (Richards and Laughlin, 1980). There are several variations of CCC in the academic literature. Richards and Laughlin (1980) calculate CCC as presented below:

$$\begin{aligned} CCC = {} & \frac{Inventories}{COGS} * 360 + \frac{Notes\ and\ accounts\ receivables}{Net\ sales} * 360 \\ & - \frac{Accounts\ payables - Salaries,\ benefits\ and\ payroll\ tax}{COGS + Selling,\ general\ and\ Administrative\ expense} * 360 \end{aligned} \tag{1}$$

Theodore Farris and Hutchison (2002) as well as Ding *et al.* (2013) use a simpler equation for CCC as presented below:

$$CCC = \frac{Inventories}{COGS} * 365 + \frac{Accounts\ receivables}{Net\ sales} * 365 - \frac{Accounts\ payables}{COGS} * 365 \quad (2)$$

The simplest variation of CCC is net trade cycle (NTC) which was developed by Shin and Soenen (1998). NTC uses net sales as the denominator for all the three components of working capital.

$$NTC = \frac{Inventories + Accounts\ receivables - Accounts\ payables}{Net\ Sales} * 365 \quad (3)$$

CCC deals with three major components of working capital, namely, inventory, accounts receivables and accounts payables, in such a way that it reveals composite performance of a firm in terms of its working capital efficiency. The weighted cash conversion cycle (WCCC) provides more detailed information than the original CCC (Gentry, 1990). WCCC connects the monetary values of operational working capital components to their cycle times. WCCC can be concluded as weighted operating cycle less weighted days in accounts payables. WCCC is extended into adjusted cash conversion cycle (ACCC) (Viskari *et al.*, 2012). The calculation logic of ACCC is based on WCCC, but it could be used on customer or product levels. The modifications present the efficiency of WCM in days which is similar to the original CCC.

The existing literature consists of a number of studies which employ CCC as the measure of working capital efficiency and conclude that a firm can improve its efficiency in WCM by reducing its CCC (Emery, 1987; Blinder and Maccini, 1991; Deloof and Jegers, 1996; Raheman and Nasr, 2007; Nobanee, Abdullatif and AlHajjar, 2011). Therefore, a firm can acquire competitive advantage through proper WCM.

Profitability is used as a measurement for financial performance because it evaluates the efficiency with which plant, equipment and net current assets are transformed into profits (Kamal and MohdZulkifli, 2004). There are a number of past studies that describe the relationship between working capital efficiency and profitability of firms using ROA as a proxy for profitability (Jose *et al.*, 1996; Shin and Soenen, 1998; Wang, 2002; Samiloglu and Demirgunes, 2008; Falope and Ajilore, 2009; Mohamad and Saad, 2010; Charitou *et al.*, 2010; Vahid *et al.*, 2012a, 2012b; Saravanan *et al.*, 2017). Instead of ROA, few studies prefer ROIC as a measure of profitability which reports the profits earned by the firms on their long term capital invested or long-term capital employed (Mohamad and Saad, 2010; Nobanee *et al.*, 2011). ROE which reports the profits earned by a firm for its equity shareholders is another widely used measure of profitability (Jose *et al.*, 1996; Wang, 2002). Moreover, researchers often use GOI which reveals the gross operating profits earned by a firm on its total assets (Deloof, 2003; Gill *et al.*, 2010; Dong and Su, 2010; Banos-Caballero *et al.*, 2012; Abuzayed, 2012). In addition, NOI which indicates the net operating profit earned by a firm on its total assets (Deloof, 2003 for the difference between GOI and NOI) has also been used for the same purpose (Shin and Soenen, 1998; Banos-Caballero *et al.*, 2012).

Academic research work carried on the relationship between CCC and profitability of firms have reported a mixed evidence where few of them have reported a positive relationship (Shin and Soenon,1998; Padachi, 2006; Mathuva, 2009; Dong and Su, 2010; Banos-Caballero *et al.*, 2010; Raheman *et al.*, 2010) and many of them have reported a negative relationship (Kim *et al.*, 1998; Wang, 2002; Deloof, 2003; Zariyawati *et al.*, 2009; Ching *et al.*, 2011; Akinlo, 2012; Abiodun and Samuel, 2014; Saravanan *et al.*, 2017) between the two variables.

Soenen (1993) investigates the relationship between NTC and return on investment in the US firms and find a negative relationship between the two variables. Jose *et al.* (1996) examine the relationship between CCC and profitability by considering a large number of the American firms and report a significant negative relationship between CCC and profitability. They also observe that more aggressive WCM is associated with higher profitability. Shin and Soenen (1998) report a strong negative relationship between NTC and the firm's profitability and they suggest that one possible way for managers to create shareholder value is to reduce their firms' NTC.

Wang (2002) examines the relationship between CCC and profitability (measured by ROA and ROE) of 1555 Japanese firms and 379 Taiwanese firms and concludes that reducing CCC enhanced operating performance in spite of differences in the structural characteristics of both these countries. Deloof (2003) used a sample of 1,009 large Belgium firms for the period of 1992 to1996 and concludes that firms can improve their profitability by reducing the number of days of accounts receivable and inventories to a reasonable minimum. This negative relationship between CCC and profitability is consistent with the view that more profitable firms are efficient in managing their working capital.

Lazaridis and Tryfonidis (2006) study the relationship between firms' profitability (through gross operating profit) and the working capital efficiency (through CCC) for the listed firms in Athens Stock Exchange and report that if CCC is kept at the optimal level it may positively affect the shareholders' wealth. Garcia-Teruel and Martinez-Solano (2007) analyze small and medium size European companies and observe that shortening the CCC improves a firm's profitability.

Falope and Ajilore (2009) analyze a sample of 50 Nigerian quoted non-financial firms using panel data regression and document a significant negative relationship between net operating profitability and CCC, the average collection period, inventory storage days and average payment period. Further, they show no significant variation in the effects of WCM between large and small firms. A significant and positive relationship between the CCC and firms' profitability has been established by Gill *et al.* (2010) using a sample of 88 firms listed on New York stock exchange. This means that longer the CCC, higher is the profitability of the firm.

From the above discussion, we can conclude that a firm can generate an additional amount of cash by reducing its CCC which in turn can be used for investment in operating assets and thereby increasing the profitability of the firm. Hence the studies reported in the literature on WCM postulate an indirect relationship between CCC and profitability of the firms as shown in Figure 1.

However, the literature is very silent about any sort of direct and explicit relationship between working capital efficiency and financial performance of firms which leads us to the following research question:

RQ. Is it possible for a firm *to directly measure the impact of* its working capital efficiently on its financial performance?

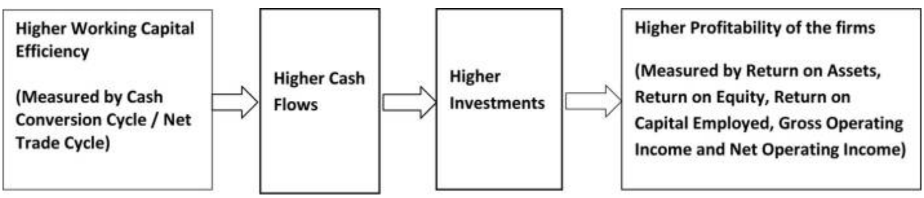

Figure 1.
Indirect relationship between working capital efficiency and profitability of the firms assumed by existing literature

3. Rationale for the development of a direct performance measure in assessing the impact of working Capital efficiency

Capital structure theories (Modigliani and Miller, 1958; Modigliani and Miller, 1963; Miller, 1977; Jensen and Meckling, 1976; Titman and Wessels, 1988; Myers and Majluf, 1984; Harris and Raviv, 1991) state that firms can optimally design their capital structure in order to increase their value. In other words, a firm can change its value by changing its financing mix.

It is logically apparent that if firms can have differences in their capital structure then they can also have differences in their asset structure i.e. proportion of non-current assets and NWC. If this is true, then the differences in the asset structure of firms in general, and the differences in the working capital efficiency of firms in particular, should lead to differences in financial performance of the firms. However, the existing profitability measures such as ROA, ROIC, ROE, GOI and NOI do not explicitly reveal the differences in the asset structure of firms in general and the differences in their efficiency in using investments in particular (see Table I). Hence, the question that comes to our mind is that whether the impact of working capital efficiency on financial performance of firms can be measured in a direct manner by developing a new financial outcome measure?

Table I. Rationale for development of new financial performance measure, WCEM

Profitability measure	Does the measure explicitly report the impact of working capital efficiency of firms	Reason for non-suitability in measuring the impact of working capital efficiency of firms
Return on Asset (ROA) Jose *et al.* (1996), Shin and Soenen (1998), Wang (2002), Samiloglu and Demirgunes (2008), Falope and Ajilore (2009), Mohamad and Saad (2010), Charitou *et al.* (2010), Vahid *et al.* (2012), Saravanan *et al.* (2017)	No	Reports the return made on employment of total assets and does not segregate the return on NWC and return on non-current assets from the composite measure of ROA
ROIC Mohamad and Saad (2010), Nobanee *et al.* (2011)	No	Reports the return on invested capital but does not decompose ROIC into return on NWC and return on non-current assets
Return on equity (ROE) Jose *et al.* (1996), Wang (2002)	No	Reports return on shareholders' funds but fails to report return on NWC and return on non-current assets
GOI Deloof (2003), Gill *et al.* (2010), Dong and Su (2010), Banos-Caballero *et al.* (2012), Abuzayed (2012)	No	Reports gross operating profit as a percent of total assets but fails to disclose the return on NWC and return on non-current assets
Net operating income (NOI) Shin and Soenen (1998), Deloof (2003), Banos-Caballero *et al.* (2012)	No	Reports net operating profit as a percent of total assets but fails to disclose the return on NWC and return on non-current assets

Notes: This table lists the existing literature that have used different profitability measures such as return on assets (ROA), return on invested capital (ROIC), return on equity (ROE), gross operating income (GOI) and net operating income (NOI); further it explains the reasons why such studies are not suitable in measuring the impact of working capital efficiency of firms

To verify our point presented in the preceding paragraph, we have collected the sample data from Prowess database, created by the Centre for Monitoring Indian Economy (CMIE). This database contains detailed information on the financial indicators of Indian firms, compiled from various sources such as profit and loss accounts, balance sheets, cash flow statements and annual reports. This is a reliable source of information which many researchers have used extensively in other empirical works in financial economics (Bertrand *et al.*, 2002; Sarkar and Sarkar, 2000; Saravanan *et al.*, 2016).

In this study, we have used NTC as the proxy for measuring the working capital efficiency due to the following reasons (Shin and Soenen,1998; Ganesan,2007 and Raheman *et al.*,2010). First, WCCC which is a modified version of CCC and developed by Gentry *et al.* (1990) scales the timing by the amount of funds tied up in each step of the cash cycle but the break-up of the components of inventories (raw materials, work-in progress and finished goods) is not readily available in the annual reports and hence we cannot calculate WCCC. WCCC is extended into ACCC (Viskari *et al.*, 2012). The calculation logic of ACCC is based on WCCC but it could be used on customer or product levels. Second, CCC is an additive measure and the denominators of days' inventories, days' accounts receivables and days' accounts payables are all different, making it difficult to compute. Whereas, NTC is basically CCC wherein all the three components (days' inventories, days' accounts receivables and days' accounts payables) are expressed as a percentage of sales. This measure is easy to compute and can be expressed as a function of the projected sales growth. Hence, NTC is used as a measure of working capital efficiency in this study.

We have computed the NTC, ROA, ROIC [or ROCE], ROE, GOI and NOI (please see Note at the end for formulae) for a pair of firms operating in the same industry as the working capital practices and the profitability of firms may get affected by the industry characteristics (Weinraub and Visscher, 1998). The results are presented in Table II.

From Table II, it is evident that two companies, namely JSW Energy Ltd. and RattanIndia Power Ltd., operating in the conventional electricity industry have reported the same ROA of 11 per cent. However, JSW Energy Ltd. has a NTC of 22 days while RattanIndia Power Ltd. has a NTC of 123 days. This indicates that the two firms operating in the same industry with same ROA figures differ with reference to their efficiency in managing working capital. Similarly, we spot differences in working capital efficiency (measured by NTC) between a pair of firms across industries in spite of reporting the same ROCE or ROE or GOI or NOI. For instance, Ambalal Sarabhai Enterprises Ltd. with a NTC of 64 days is relatively efficient in WCM compared to its competitor, Andrew Yule and Co. Ltd. (with a NTC of 90 days) even though both of these firms have generated the same GOI of 9 per cent.

From the above discussion, we can recognize that the existing profitability measures do not explicitly reflect the impact of working capital efficiency of firms. For instance, literature has used Return on Asset (ROA) (Shin and Soenen, 1998; Padachi, 2006; Mohamad and Saad, 2010), Return on Invested Capital (ROIC) (Vishnani and Shah, 2007; Mohamad and Saad, 2010) Return on Equity (ROE) (Afza and Nazir, 2008; Akoto *et al.*, 2013), gross operating income (GOI) (Deloof, 2003;Ganesan, 2007; Alipour, 2010) and net operating income (NOI) (Raheman and Nasr, 2007; Zairyawari *et al.*, 2009) as a proxy for profitability of firms (outcome measure of WCE of firms). Hence, there arises a need to replace the traditional measures of profitability with a new measure which can describe an explicit and direct relationship between working capital efficiency and financial performance of the firms as indicated in Figure 2.

From Figure 2, it can be stated that firms with higher working capital efficiency (lower NTC) may generate higher financial performance. Financial performance of firms could be

Table II. Comparison of traditional and naïve financial performance measures with NTC of sample firms

Company name	Industry group	Traditional performance measures	Performance (in %)	NTC (in days)	(a) RONWC using the contents of balance sheet and income statement: NWC (in Rs. million	CE (in Rs. million	NWC/CE	ROCE	RONWC = ROCE × (NWC/CE)
JSW Energy Ltd.	Conventional electricity	ROA	11	22	4,860	120,980	0.04	47	1.88
RattanIndia Power Ltd.	Conventional electricity	ROA	11	123	4,518	917,60	0.05	14	0.7
JK Lakshmi Cement Ltd.	Cement	ROCE	6	13	1,005	2,300	0.44	6	2.64
KCP Ltd.	Cement	ROCE	6	84	2,933	7,573	0.39	6	2.34
Parnax Lab Ltd.	Drugs and pharmaceuticals	ROE	8	57	150	263	0.57	4	2.28
Parenteral Drugs (India) Ltd.	Drugs and pharmaceuticals	ROE	8	128	775	5,572	0.14	3	0.42
Ambalal Sarabhai Enterprises Ltd.	Diversified	GOI	9	64	249	588	0.42	67	28.14
Andrew Yule and Co. Ltd.	Diversified	GOI	9	90	1,033	2,402	0.43	23	9.89
Prakash Constrowell Ltd.	Industrial construction	NOI	11	157	967	1,105	0.88	63	55.44
B L Kashyap and Sons Ltd.	Industrial construction	NOI	11	276	6815	10,835	0.63	24	15.12

Notes: This table compares traditional and naïve financial performance measures with net trade cycle (NTC) of sample firms. The four traditional measures which gauge the effect of working capital efficiency of firms are: (a) return on net working capital (RONWC) using the content of balance sheet and income statement; RONWC = ROCE × (NWC/CE) (b) return on net working capital (RONWC) using the content of balance sheet, income statement and annual report; RONWC = (working capital profit/NWC) × 100 (c) working capital expenses using the content of annual report; and (d) working capital cost (WCC) using contents from balance sheet and CMIE Prowess database; WCC = WACC × NWC; Log WCC is logarithm of WCC

(*continued*)

Table II.

Company name	(b) RONWC using the contents of balance sheet, income statement and annual report: Total operating revenue (in Rs. million)	Total operating revenue from working capital (in Rs. million)	WC loss/ profit (in Rs. million	RONWC	(c) Working capital expenses (in Rs. million)	WACC (in %)	(d) WCC WCC = WACC × NWC (Rs. million)	Log (WCC)
JSW Energy Ltd.	79,694	3,188	705	14.5	2,483	10.28	49960	4.70
RattanIndia Power Ltd.	53,315	2,666	1219	26.98	1,447	14.85	67107	4.83
JK Lakshmi Cement Ltd.	45,930	20,209	670	66.67	19,539	7.85	7887	3.90
KCP Ltd.	9,082	3,542	1288	43.92	2,254	12.10	35494	4.55
Parnax Lab Ltd.	2,820	1,607	17	11.63	1,590	9.80	1467	3.17
Parenteral Drugs (India) Ltd.	20,010	2,801	201	25.99	2,600	16.43	12733	4.10
Ambalal Sarabhai Enterprises Ltd.	4,949	2,079	179	71.69	1,900	14	3403	3.53
Andrew Yule and Co. Ltd.	5,047	2,170	590	57.16	1,580	18	18354	4.26
Prakash Constrowell Ltd.	7,115	6,261	823	85.09	5438	11.99	11595	4.06
B L Kashyap and Sons Ltd.	8,985	5,661	1271	18.64	4,390	20.43	139208	5.14

proxied by the cost of capital blocked in NWC of a firm which can be measured through WCEM as proposed by the authors in this study. We argue that firms with higher working capital efficiency have lower cost of capital for their investments in working capital. Lower the WCEM, lower is the cost of capital blocked in NWC and therefore higher is the financial performance of a firm (refer Table III).

4. Working capital efficiency multiplier as a direct outcome measure of working capital efficiency

In this section, we first present the naive approaches that may be used in quantifying the impact of the efficiency of firms in managing their investments in working capital. The naïve approaches have serious limitations such as being additive in nature besides not capturing behavioral impacts in an objective manner. We end our discussion with the formulation of WCEM, which we argue to be the right outcome measure of working capital efficiency of firms.

4.1 Naive approaches

To gauge the effect of working capital efficiency of firms, one may consider the following four alternatives:

(1) Return on net working capital (RONWC) using the content of balance sheet and income statement;

(2) Return on net working capital (RONWC) using the content of balance sheet, income statement and annual report;

(3) Working capital expenses using the content of annual report; and

(4) WCC using the content of balance sheet and annual report.

4.1.1 Return on net working capital using the contents of balance sheet and income statement. As discussed in the previous section, companies differ in their asset structures. In the extant literature, return on capital employed (ROCE) is used extensively as a proxy for profitability of firms. ROCE reflects the return on the total capital employed by firms, which can be decomposed into return on net working capital (RONWC) and return on non-current assets (RONCA). As a naive approach, we may compute the RONWC by multiplying the ROCE by the proportion of NWC in the total capital employed by a firm.

For instance, the ROCE of JK Lakshmi Cement Ltd. (Table II) is 6 per cent, NWC is Rs. 1,005m and capital employed is Rs. 2,300m, and its NWC/capital employed is 0.44 and then its RONWC = 6 × (0.44) = 2.64 per cent.

This is a very simple approach as we can easily get the ROCE and proportion of NWC in total capital used from the balance sheets of firms. However, this approach has a major drawback as the actual proportion of ROCE from the employment of NWC may differ substantially from the theoretical proportion (proportion of NWC in the total capital

Figure 2.
Proposed direct relationship between working capital efficiency and financial performance of the firms

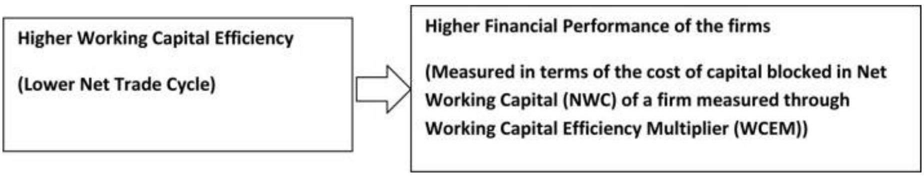

Table III. Comparison of traditional performance measures and WCEM with NTC of sample firms

Company Name	Industry group	Traditional performance measures	Performance (in %)	NWC (Rs. million)	NTC (in days)	WACC (in %)	Trade Receivables (Rs. million)	Inventories (Rs. million)	Trade Payables (Rs. million)	WCEM (in %)
JSW Energy Ltd.	Conventional electricity	ROA	11	4860	22	10.28	21827.5	5967.4	22934.5	0.74
RattanIndia Power Ltd.	Conventional electricity	ROA	11	4518	123	14.85	7915.9	833.8	4231.4	10.39
JK Lakshmi Cement Ltd.	Cement	ROCE	6	1005	13	7.85	924.6	3212	3132	0.36
KCP Ltd.	Cement	ROCE	6	2933	84	12.10	1034.6	2799.6	901.4	11.87
Parnax Lab Ltd.	Drugs and pharmaceuticals	ROE	8	150	57	9.80	201	79.4	130.8	3.31
Parenteral Drugs (India) Ltd.	Drugs and pharmaceuticals	ROE	8	775	128	16.43	750.2	450.5	425.8	16.21
Ambalal Sarabhai Enterprises Ltd.	Diversified	GOI	9	249	64	14	378.7	146.1	275.7	4.57
Andrew Yule and Co. Ltd.	Diversified	GOI	9	1033	90	18	1562	479.2	1008.6	8.84
Prakash Constrowell Ltd.	Industrial construction	NOI	11	967	157	11.99	516.9	822	371.5	18.56
B L Kashyap and Sons Ltd.	Industrial construction	NOI	11	6815	276	20.43	3966.6	4411.2	1562.9	82.91

Notes: This table compares traditional and proposed financial performance measures, i.e. working capital efficiency multiplier (WCEM), with net trade cycle (NTC) of sample firms. It also identifies trade receivables, inventories, trade payables, net trade cycle and weighted average cost of capital (WACC) as a determinant of WCEM. WACC has been calculated from cost of debt (COD) and cost of equity (COE) which are calculated from annual reports of the companies and using CAPM respectively. WACC = after-tax COD × proportion of Debt + COE × proportion of Equity. Pretax COD = (interest expenses/ (short-term borrowing + long-term borrowing) × 100. Posttax COD − pretax COD × (1 − tax rate). COE = risk-free rate + beta (market risk premium). Risk-free rate is taken as 6.9% and market risk premium is 6.06%. Beta values are taken from CMIE Prowess database for the firms. WCEM has been calculated as WACC × (trade receivables + inventories)/trade payables × (NTC/365)

$$Return\ on\ assets\ (ROA) = \frac{EBIT(1-t)}{Total\ assets}$$

$$Return\ on\ Capital\ Employed(ROCE) = \frac{EBIT(1-t)}{Invested\ Capital}$$

$$Return\ on\ Equity(ROE) = \frac{Profit\ after\ tax}{Owners'\ Equity}$$

$$Gross\ Operating\ Income\ (GOI) = \frac{Sales - Cost\ of\ sales + Depreciation\ \&\ Amortization}{Total\ Assets}$$

$$Net\ Operating\ Income\ (NOI) = \frac{Sales - Cost\ of\ Sales}{Total\ Assets}$$

employed using the balance sheet). This is due to the differences that may exist in the efficiency of managers in managing non-current and net-current assets of their firms, and it is not possible for us to trace out the same. Hence, this approach may not be the right one in our attempt to truly reflect the working capital efficiency of firms.

4.1.2 Return on net working capital using the contents of balance sheet, income statement and annual report. We may compute RONWC by dividing the amount of working capital profit of a firm by its investment in NWC. We may compute working capital profit as stated below:

$$\begin{aligned} \textit{Working capital profit} = {} & \textit{Operating revenue from usage of working capital} \\ & - \textit{Working capital expenses} \end{aligned} \quad (4)$$

where:

$$\begin{aligned} \textit{Operating revenue from working capital} = {} & \textit{Total Operating Revenue} \\ & * \left(\frac{NWC}{\textit{Total Capital Employed}} \right) \end{aligned} \quad (5)$$

$$\begin{aligned} \textit{Working Capital Expenses} = {} & (\textit{Raw material consumed} \\ & \pm \textit{Changes in work in progress and finsihed goods inventory} \\ & + \textit{consumption of stores and spare parts} \\ & + \textit{Damaged material, Obsolescence,} \\ & \quad \textit{write down of inventories} + \textit{Bad Debts}) \end{aligned} \quad (6)$$

$$\textit{Net Working Capital} = \textit{Inventories} + \textit{Trade Receivables} - \textit{Trade Payables} \quad (7)$$

We can collect the data for the above-stated variables from the annual reports of firms as well from CMIE Prowess database. For instance, total operating revenue of JK Lakshmi Cement Ltd. is Rs. 45,930m, its NWC/CE is 0.44, working capital expenses is Rs. 19,539m and NWC is Rs. 1,005m then its working capital profit is (45,930 $\times$ 0.44) $-$ 19,539 = Rs. 670m. The RONWC of the firm is [(670/1,005) $\times$ 100] = 66.67 per cent (Table II).

This approach considers the working capital expenses that are explicit and are related to inventories and trade receivables. However, we are finding out the revenue from working capital using the proportion of working capital in total capital employed which has the same drawback as that of the previous approach. Therefore, this is also an inappropriate approach to report the effect of the working capital efficiency of managers.

4.1.3 Working capital expenses using the contents of annual report. The limitation of the previously discussed naive approaches is that they are based on the theoretical proportion of NWC in the total capital employed by firms. Further, the second approach focuses on computing the profit from the employment of working capital which requires us to calculate the revenue and expenses related to a firm's investment in working capital. Instead of considering the revenue and profit as the outcome of the working capital efficiency of firms, we may consider the working capital expenses as the proxy for the financial performance of firms in our attempt to measure the impact of working capital efficiency of managers. The advantage of this approach is that one may easily get the data on the working capital expenses of firms from their annual reports or from the databases such as CMIE. Working capital expenses is computed as stated in equation (6) earlier:

$$\begin{aligned} \textit{Working Capital Expenses} = (&\textit{Raw material consumed} \\ &\pm \textit{Changes in work in progress and finsihed goods inventory} \\ &+ \textit{consumption of stores and spare parts} \\ &+ \textit{Damaged material}, \textit{Obsolescence}, \\ &\textit{write down of inventories} + \textit{Bad Debts}) \end{aligned}$$

For instance, the working capital expense of JK Lakshmi Cement Ltd. is Rs. 19,539m where the raw material consumed is Rs. 15,813m, changes in work in progress and finished goods inventory is Rs. 169.9m, consumption of stores and spare parts is Rs. 3,896m, damaged material, obsolescence, written-down inventories and bad debts is zero.

The drawback of this approach is that the working capital expenses is computed by collecting the expenses related to two of the working capital components, namely, inventories and trade receivables that are reported by firms in their annual reports and the cost of delaying payment to suppliers is implicit and not reported by firms in their annual reports. Hence, this approach may not be the right one to reveal the impact of working capital efficiency of managers.

4.1.4 Working capital cost using the contents of balance sheet and annual report. NWC is the excess of the sum of inventories and trade receivables over the trade payables of a firm. The amount of investment made by a firm in its inventories and receivables can be considered as wastage of capital (blockage of capital) by the managers of firms as these two current assets do not earn any return on their investments. However, a firm may reduce the ill-effect of its investments in inventories and trade receivables by increasing its dues to suppliers of materials and other services (trade payables). For instance, JK Lakshmi Cement Ltd. has the following figures: inventories at Rs. 805m, trade receivables at Rs. 600m and trade payables are at Rs. 400m. The amount of mobilized capital wasted by the firm is Rs. 1,005m = Rs. 805m + Rs. 600m − Rs. 400m.

This Rs. 1,005m investment made by a firm is sourced from short-term borrowings, long-term borrowings and equity capital of the firm. Every one rupee mobilized in the form of short-term borrowing, long-term borrowing and equity capital has a weighted cost. We may compute the weighted average cost of capital (WACC) of the firm using its annual reports (for computing cost of debt) and databases (for computing cost of equity using its equity beta from CMIE Prowess database, risk-free rate of 6.9 per cent and risk premium at 6.06 per cent) . For instance, the weighted average cost of capital for this firm is 7.85 per cent (Table II).

It is rational to state that the cost of the firm's investment in working capital is the product of its investment in working capital and its WACC. We may term this as working capital cost (WCC). For instance, the WCC for J K Lakshmi Cement Ltd. is Rs. 78.89m = Rs. 1,005m × 0.0785.

We can observe from Table II that two firms operating in the same industry with differences in their working capital efficiency (measured through NTC) have reported different WCC. For instance, Parnax Lab Ltd. is relatively efficient in its WCM (NTC of 57 days) compared to Parenteral Drugs (India) Ltd. (NTC of 128 days) operating in the same industry. Both the firms have reported same ROE of 8 per cent, while the absolute and log values of WCC of Parnax Lab Ltd. is quite lower (absolute WCC at Rs. 1,467m and log of WCC at 3.17) compared to that of Parenteral Drugs (India) Ltd. (with an absolute WCC of Rs. 12,733m and log of WCC at 4.10). Similarly, we can find differences among firms across industries in the working capital efficiency which is getting reflected in the absolute and log value of WCC of the respective firms.

Therefore a firm can reduce its working capital cost by reducing its NWC by improving its efficiency in managing NWC. However this measure gives us an absolute figure for WCC [say, for instance, Rs. 12,733m for Parenteral Drugs (India) Ltd.] and if we assume that the WCC for the same firm as Rs. 10,733m in the previous year, then we may conclude that the firm's WCC has increased in the current year compared to that of the previous year, that is all. We are unable to compare firms on inter-firm and intra-firm basis using WCC as it is an absolute figure. The problem still remains even after conversion of the absolute figure of WCC into logarithm form. Hence there is a need to look for an appropriate outcome measure for assessing the impact of working capital efficiency of firms.

4.2 Working capital efficiency multiplier – the right financial performance metric to measure the impact of working capital efficiency of firms

In this study we introduce a new and direct measure of working capital efficiency which is multiplicative in nature. It is similar like the DuPont multiplier. We term it as WCEM and express it as:

$$\begin{aligned} &\textit{Working Capital Efficiency Mutiplier}\ (\textit{WCEM}) \\ &= \textit{WACC} * \frac{\textit{Trade Receivables} + \textit{Inventories}}{\textit{Trade Payables}} * \frac{\textit{NTC}}{365} \end{aligned} \tag{8}$$

where:

WACC refers to weighted average cost of capital

NTC is:

$$NTC = \frac{\textit{Inventories} + \textit{Accounts receivables} - \textit{Accounts payables}}{\textit{Net Sales}} * 365$$

Substituting the value of NTC in WCEM, we get:

$$\begin{aligned} \textit{WCEM} = \textit{WACC} * &\frac{\textit{Inventories} + \textit{Trade Receivables}}{\textit{Trade Payables}} \\ &* \frac{\textit{Trade Receivables} + \textit{Inventories} - \textit{Trade Payables}}{\textit{Net Sales}} \end{aligned} \tag{9}$$

WCEM reflects the portion of WACC that is expensed by a firm for its investment in NWC. As formulated above, lower the value of WCEM of a firm, higher is its working capital efficiency. From Table III, we can observe that two firms, namely, JK Lakshmi

Cement Ltd. and KCP Ltd. have reported same ROCE at 6 per cent for their latest financial year (2017). However, we can observe the differences in their NWC investments and working capital efficiency measured through NTC. We argue that traditional performance measures are aggregates in nature which fail to segregate the profits earned by a firm from the employment of NWC, and these measures do not reflect the differences in their working capital efficiency of firms. The naïve approaches as described in the section do a comparatively better job to that of the traditional measures used by the extant literature. However the naïve approaches have serious limitations and hence may not use them in our attempt to assess the working capital efficiency of firms. WCEM for JK Lakshmi Cement Ltd. (with an NTC of 13 days) is computed to be 0.36 per cent, while that of KCP Ltd. is 11.87 per cent (with an NTC of 84 days). Similarly, we can find the WCEM for all other sample firms and see the reflection of differences in working capital efficiency of firms (see Table III).

Further, WCEM is simple to compute, and it is easy to explain the outcome of the working capital efficiency of firms. Hence, WCEM is a simple and flawless financial performance measure which reveals the true impact of the working capital efficiency of firms. Academics and practitioners may consider using WCEM in measuring the relationship between working capital efficiency and financial performance of firms in their empirical work.

4.2.1 Determinants of working Capital efficiency multiplier. From the above-stated formulation, we can arrive at the determinants of WCEM of a firm. They are: (Figure 3).

- trade receivables;
- inventories;
- trade payables; and
- WACC
- ratio of NWC to net sales

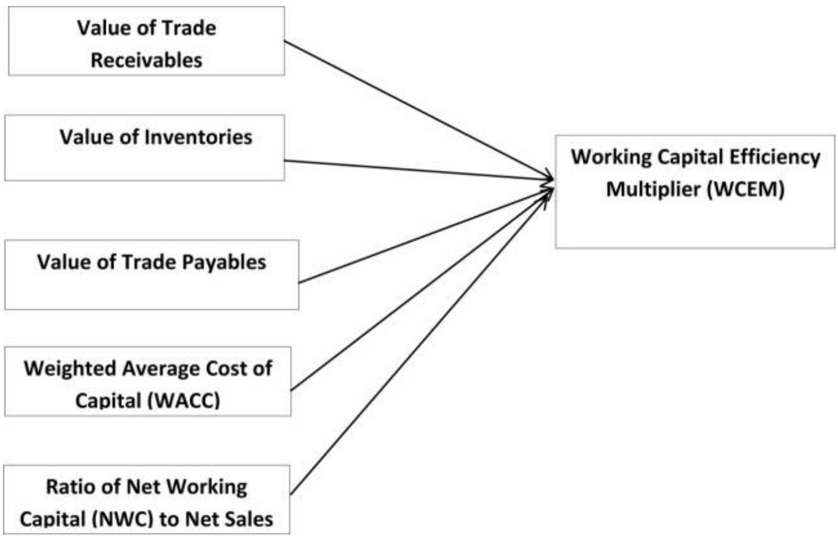

Figure 3. Determinants of WCEM

Keeping other variables constant, a decrease (increase) in trade receivables, inventories, WACC and ratio of NWC to net sales, decrease (increase) the WCEM for firms, while an increase (decrease) in trade payables, decrease (increase) the WCEM for firms.

5. Conclusion and scope for future research

Academic literature that explores the relationship between working capital efficiency and profitability of firms has so far considered CCC or NTC as a proxy for working capital efficiency, and accounting measures such as ROA, ROE, ROCE, GOI and NOI as the measure of profitability of the firms. The limitation of these studies is that the profitability (outcome) measure considered by them does not directly measure the impact of the working capital efficiency of firms as the measures (ROA, ROE, ROCE, GOI and NOI) report the aggregate return earned by firms from the employment of both the non-current assets and net current assets. Our study introduces WCEM as a direct financial performance (outcome) measure of working capital efficiency which can be widely used by academicians and practitioners.

If firms can change their profits by employing different proportion of financing mix, then they can also vary their profits by employing different proportion of asset mix and improve their financial performance by improving their efficiency in managing non-current and net current assets. In other words, asset structure and asset management efficiency determines the financial outcomes of a firm.

The importance of WCEM could be enormous in performance evaluation of a firm. It can be used as an indicator for choosing a suitable investment opportunity by an investor. This is due to the fact that the firm that is highly efficient in managing working capital is less exposed to liquidity risk. At the same time, the firm is less dependent on external financing. Therefore, such firm eventually creates more value for their shareholders. Another indication that WCEM provides is to gauge the bargaining power of the firm and its competitive position in the market. Lower WCEM indicates higher bargaining power of a firm across the value chain and its superior position relative to its competitors.

The researchers hereafter can consider WCEM as the financial performance variable in place of the existing measures and thereby contribute new theoretical insights through their research outcomes. Researchers can also test empirically the relationship between CCC/NTC and log of WCEM in both developed and developing markets. The relationship between the liquidity and WCEM and between working capital utilization and WCEM can also be studied by the researchers in the future.

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About the authors

Punam Prasad is a Doctoral Research Fellow in the area of Accounting and Finance at the Indian Institute of Management Ranchi,India. The core research work of the author is on working capital management. Punam Prasad is the corresponding author and can be contacted at: punam.prasad15fpm@iimranchi.ac.in

Narayanasamy Sivasankaran is an Assistant Professor in the area of Accounting and Finance at the Indian Institute of Management Ranchi, India. He teaches courses such as management accounting, financial reporting and analysis, corporate finance and business valuation.

Samit Paul is an Assistant Professor in the area of Finance and Control at the Indian Institute of Management Calcutta, India. He teaches courses such as managerial accounting and financial risk management.

Manoharan Kannadhasan is an Associate Professor of Finance at Indian Institute of Management Raipur, India. He teaches courses such as Financial Accounting, corporate finance, Security Analysis and Portfolio Management, Financial Derivatives and Fixed Income Securities. He has published research articles in the journals of repute, like Finance Research Letters, Management Decisions, International Journal of Managerial Finance, International Journal of Corporate Governance, Applied Economic Letters etc., and three cases published with Ivey Publishing, Canada.

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Working capital management and firm performance in China

Ting Ren and Nan Liu
HSBC Business School, Peking University, Shenzhen, China
Hongyan Yang
Lingnan University, Tuen Mun, Hong Kong
Youzhi Xiao
HSBC Business School, Peking University, Shenzhen, China, and
Yijun Hu
Phoenix Tree Capital, Beijing, China

Abstract

Purpose – The purpose of this paper is to examine the relationship between working capital management (WCM) and firm performance in the context of the Chinese economy. Specifically, it investigates the effects of ownership structures as an internal factor and of institutional environments (IE) as an external factor shaping this relationship.

Design/methodology/approach – The study applies two-way fixed effect regression models to a sample of Chinese listed manufacturing firms for the period of 2010 to 2017. WCM is measured by cash conversion cycles (CCC); profitability is measured by core profit ratios; ownership structures are classified based on state-owned enterprises (SOEs) and non-SOEs; and IEs are measured from dimensions of factor markets (FM) and legal systems (LS).

Findings – First, the results show a negative relationship between CCC and firm performance. Second, the negative relationship between CCC and profitability is significant for non-SOEs but not for SOEs. Third, both the FM and LS strengthen the negative association between CCC and profitability. Fourth, the moderating effect of FMs and LSs is evident for non-SOEs only. The results hold when using alternative measures of WCM and profitability and while controlling for additional variables.

Originality/value – The current study shows that while WCM has a significant effect on the profitability of Chinese firms, such an effect greatly depends on the ownership structures and IE involved. The results thus offer important implications in helping the Chinese government create better IEs and in allowing manufacturing firms to improve upon their WCM practices.

Keywords Profitability, Working capital management, Ownership, Institutional environment, Cash conversion cycle

Paper type Research paper

1. Introduction

Working capital is involved in firms' daily operations, such as those related to procurement, production and sales, and it is cyclically invested in various areas such as in accounts payable, inventory, accounts receivable and so on (Richards and Laughlin, 1980; Wang and Yan, 2007). Working capital management (WCM) is thus essential to a firm's daily operations and corporate finances. According to the Ernst & Young report in 2015[1], global large pharmacy companies successfully reversed a decline in performance from 2007 to 2012 through improvements in WCM. Consistent with anecdotal evidence, prior empirical studies have documented positive effects of WCM on firm profitability (Jose *et al.*, 1996; Shin and Soenen, 1998; Deloof, 2003).

The unique environment in China makes WCM particularly important for Chinese listed firms. First, Chinese firms have limited access to long-term capital markets, suggesting that firms need to rely more on savings from WCM (Ding *et al.*, 2013). Second, China covers a vast territory with considerable diversity in regional institutional environments (IE). The IE, which applies a series of political, legal and social rules, greatly influences the allocation of

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financial resources, costs of contracting, and thus firms' financial performance. Third, Chinese economy is characterized by the coexistence of both state-owned enterprises (SOEs) and non-SOEs. SOEs and non-SOEs differ in corporate missions, management mechanisms, financing abilities and operating efficiencies. All of these factors can affect the role of WCM on firm profitability.

Motivated by the importance of WCM for Chinese firms in such a unique setting, this paper examines IEs as an external factor shaping the relationship between WCM and profitability and whether this effect is influenced by ownership structures. We expect to find the IE to strengthen the association between WCM and profitability by improving the return on investment generated from cash savings of efficient WCM (Henisz, 2000; Chen *et al.*, 2015; Wang *et al.*, 2017). In addition, the effect of IEs should be more pronounced for non-SOEs, as their financial activities and returns on investment are more sensitive to cash savings generated from WCM (Hu *et al.*, 2006; Chen *et al.*, 2011; Chaney *et al.*, 2011; Boubakri *et al.*, 2012).

Following Jose *et al.* (1996) and Deloof (2003), we use the cash conversion cycle (CCC) to measure WCM, and we calculate CCC as days sales outstanding (DSO) plus days inventory outstanding (DIO) minus days payable outstanding (DPO). In addition, we measure IEs with an index for factor markets (FM) and legal systems (LS) developed by Wang *et al.* (2017), which is a widely recognized marketization index (Wang *et al.*, 2008; Chen *et al.*, 2011, 2015). In examining a sample of Chinese listed manufacturing firms obtained from the China Stock Market and Accounting Research Database (CSMAR) for 2010 to 2017, this paper documents the following findings. First, both FMs and LSs as proxies of IEs strengthen the negative association between CCC and profitability; second, the incremental effect of LSs and FMs on profitability is only evident for non-SOEs. Furthermore, our results are robust when using alternative measures of profitability and WCM and when including additional control variables in the model.

Our study makes several contributions to the literature. First, Hsieh and Wu (2013) find that ownership structures influence the relationship between WCM and the profitability of high- and mid-capitalization Chinese listed firms. We extend their findings by showing that in addition to ownership structures, the regional development of FMs and LSs influences the relationship between WCM and profitability. Due to China's unique IE, considerable variations in regional development are observed, thus highlighting a need to examine how such differences affect firm performance. Second, this paper is complementary to Singhania and Mehta (2017), who examine the WCM-profitability relationship across 11 countries. By using a regional index to examine the cross-sectional effects of a single country, we are able to measure different aspects of IEs and in turn avoid potential cross-country confounding effects (Wang *et al.*, 2008; Chen *et al.*, 2015). Third, the study combines IEs and ownership structures to examine their impacts on the associations between corporate WCM and corporate performance. Our findings suggest that the external IE is more important for non-SOEs, providing support for Ding *et al.* (2013), who propose that SOEs are not financially constrained. Finally, our results suggest that the Chinese government should develop policies to accelerate overall development of the country's IEs.

The structure of the paper is as follows. Section 2 proposes the theoretical framework and research hypotheses. Section 3 describes our data and methodology. Section 4 presents the empirical analysis. Section 5 presents the robustness check. Section 6 concludes the study.

2. Related literature and hypothesis development

2.1 Literature review

Working capital involves current assets and current liabilities and results from the time lag between the payment for purchases of productive resources and the recovery of cash inflows generated from product sales over the operating process (Richards and Laughlin, 1980; Shin and Soenen, 1998). The goal of WCM is to improve business performance, and the effectiveness of WCM should thus influence corporate profitability and liquidity (Shin and Soenen, 1998; Falope and Ajilore, 2009; Kong *et al.*, 2009).

Richards and Laughlin (1980, p. 34) argued that traditional measures of WCM, such as current ratio and quick ratio, fail to provide enough information on cash flow attributes of the transformation process, and a proper measure of WCM should thus recognize "the extent to which four basic activities – purchasing/production, sales, collection, and payment – create flows within the working capital accounts that are noninstantaneous and unsynchronized." They proposed the CCC calculated as DSO plus DIO minus DPO to capture the residual cash flow financing period. Since this innovation, many researchers have used CCC as a comprehensive measure of WCM to evaluate how WCM influences firm performance (Jose *et al.*, 1996; Deloof, 2003; Ding *et al.*, 2013; Ukaegbu, 2014; Singh *et al.*, 2017).

The effects of WCM on firm profitability are two-fold. On the one hand, increasing DSO, DIO and DPO can have positive effects on firm profits for several reasons. First, supplying trade credit to customers provides short-term financing to customers, allows for price discrimination, and serves as quality guarantees, which in turn leads to an increase in sales revenue (Brennan *et al.*, 1988; Long *et al.*, 1993). Second, large inventory stocks mitigate the likelihood of stock outs and allow for economies of scale (Blinder and Maccini, 1991; Fazzari and Petersen, 1993; Deloof and Jegers, 1996). Third, deferring payment to suppliers minimizes reliance on longer-term financing arrangements and the related interest expenses (Richards and Laughlin, 1980).

On the other hand, increasing DSO, DIO and DPO can have negative effects on profits. First, extending trade credit to customers and maintaining high inventory stock force firms to conserve additional reserves and to rely more on longer-term financing arrangements, which are associated with higher interest expenses and opportunity costs (Richards and Laughlin, 1980; Kieschnick *et al.*, 2013). Second, when asymmetric information between customers and firms is severe, this will increase bad debts and lower profits (Kong *et al.*, 2009). Third, maintaining high inventory stocks involves making additional expenditures on, for instance, warehouse rent, insurance and security (Baños-Caballero *et al.*, 2014). Fourth, deferring payment to suppliers forgoes the chance of taking the discount of earlier payments and increases the cost of goods sold (Raheman and Nasr, 2007).

Most prior studies document a significant negative correlation between CCC and firm performance. For example, Jose *et al.* (1996) found that lower CCC is associated with more profitability. Deloof (2003) investigated the relation between CCC and profitability for a sample of Belgian firms and documented a negative relationship between each component of CCC and firm profitability. Raheman and Nasr (2007), Kong *et al.* (2009) and Ukaegbu (2014) also found a negative association between CCC and profitability for Pakistani firms, Chinese listed firms and African firms, respectively. Furthermore, consistent with the view that CCC improves firm financial performance, Ding *et al.* (2013) find that for firms with low CCC, fixed capital investments are less sensitive to cash flow shocks.

In addition to CCC, scholars have proposed other measures of WCM. Gentry *et al.* (1990) proposed a weighted cash cycle while taking into account the implicit costs of cash outflows and inflows for different time points. However, Shin and Soenen (1998) argued that a weighted CCC is not needed when examining the relation between WCM and profitability. They proposed a variation of CCC and defined the net trade cycle (NTC) as accounts receivable plus inventory minus accounts payable multiplied by 365 and divided by sales, which captures "the number of 'days sales' the company has to finance its working capital under ceteris paribus conditions" (P38). While Shin and

Soenen (1998) found a negative association between NTC and profitability, Baños-Caballero *et al.* (2014) documented an inverted U-shaped relation between NTC and market to book value. More recently, Nobanee and Al Hajjar (2014) proposed the optimal cash conversion cycle (OCCC) to identify the optimal points of receivables, inventory and payables. Our paper contributes to this subset of literature by demonstrating that alternative measures of WCM provide consistent results for the association between WCM and operating performance.

Meanwhile, some scholars have begun to study the impact of internal and external factors on the association between WCM and firm performance. For example, Hsieh and Wu (2013) examine the ownership effect for a sample of large- and mid-cap Chinese firms for 2005–2011. They find that the relationship between CCC and profitability is weaker for firms exhibiting higher degrees of state ownership. Similarly, Ben-Nasr (2016) documented a differential effect of state and foreign ownership on the value-WCM relationship for a sample of 54 countries. He *et al.* (2017) investigated the WCM practices of listed Chinese firms before and after the adoption of the split share structure reform of 2005 and found that in the post-reform period, manufacturing firms significantly reduced their CCC and that such negative changes in CCC are associated with positive changes in firm performance. Singhania and Mehta (2017) also examine the effect of market dynamics on the WCM-profitability relationship based on data on 11 countries. We add to this subset of literature by providing evidence that the IE, in addition to firm ownership, significantly influence the relation between WCM and firm performance.

2.2 Hypothesis development

The studies presented above document a negative association between the CCC and profitability (Jose *et al.*, 1996; Deloof, 2003; Raheman and Nasr, 2007; Ukaegbu, 2014), suggesting that firms benefit from a shorter CCC which can either result from lowering financial costs or from pursuing more profitable investment opportunities.

Chinese firms exist in an IE characterized by considerable heterogeneity across regions. This IE, which applies a series of political, legal and social rules, greatly affects the development of the capital market and thus firms' financing and investment activities (Myers and Majluf, 1984). One well established theory on the effect of the IE is transaction cost theory, which proposes that social-political factors can reduce costs of bargaining, contracting, monitoring and enforcement and thus support a credible commitment to returns on investment (Henisz, 2000). Prior studies have documented the effect of IEs on Chinese firms' business performance. For example, Xia and Fang (2005) find that the IE mitigates the negative effect of governance control on firm value. Chen *et al.* (2015) find that a superior IE is associated with less IPO underpricing. However, the interesting question of how cross-sectional differences in the IE affect the WCM-profitability relationship remains unaddressed.

Following the prior literature (Wang *et al.*, 2008; Chen *et al.*, 2015), we examine levels of FM and LS development across localities in China. FM development involves the evaluation of the marketization of financial markets, the development of human resource markets and the marketization of technological achievements[2]. A stronger FM thus results in the more effective allocation of financial resources, in the involvement of more qualified professional experts and in more productive research expenditures, all of which improve firms' abilities to generate profits by shortening CCC.

Features of LS include the development of intermediary organizations, the extent to which legal environments are maintained, and the protection of intellectual property[3]. A sound LS ensures fair market competition and the legal rights of firms, shareholders and creditors (Wang *et al.*, 2017) and thus leads to reduced transaction costs and improved financial performance (Henisz, 2000; Chen *et al.*, 2015).

Therefore, firms operating under better FM and LS conditions are able to generate a higher return on investment and higher profits. We thus propose the following first hypothesis:

H1. A sound IE strengthens the negative relationship between WCM and profitability.

Our second hypothesis concerns the effect of ownership on the WCM-profitability relationship. Petersen and Rajan (1994) proposed that financing costs are greatly affected by the relationship between firms and creditors. In China, SOEs have strong political connections with the government, affording SOEs with high-quality resource and financial support (Shi, 2003; Wang, 2003). For example, SOEs can easily obtain loans from banks and waivers for enterprise liabilities (Cull and Xu, 2005; Chen *et al.*, 2011; Cull *et al.*, 2015). In addition, compared to non-SOEs, SOEs enjoy lower costs of debt and equity capital (Chaney *et al.*, 2011; Boubakri *et al.*, 2012). At the same time, SOEs emphasize both profitability and political objectives such as maintaining social stability (Liang *et al.*, 2015; Yang *et al.*, 2015), and their executives are evaluated through both firm profitability and political achievement. Social responsibilities such as those related to offering jobs increase SOEs' burdens and decrease SOEs' levels of operational efficiency and profitability (Wu, 2012).

On the other hand, most executives of non-SOEs are the founders or major shareholders of companies who emphasize long-term development and who exhibit stronger motivations to expand business operations and improve profitability (Chen *et al.*, 2011). Hu *et al.* (2006) found that compared to SOEs, non-SOEs are more productive and profitable.

Motivated by the unique characteristics of state ownership, the prior literature has examined how state ownership influences firm performance. For example, Chen *et al.* (2011) find that the sensitivity of investment expenditures to investment opportunities is weaker for SOEs in China, supporting their argument that ownership structures influence firm investment efficiency since SOEs help the government accomplish social and political goals. Ding *et al.* (2013) conclude that SOEs are not financially constrained as evidenced by the low sensitivity of fixed investments to cash flows.

While the above evidence suggests that SOEs have less financial constraints and may not operate as efficiently as non-SOE firms (Cull and Xu, 2005; Li and Jiang, 2006; Chen *et al.*, 2011; Ding *et al.*, 2013; Cull *et al.*, 2015), it remains unclear whether the ownership structure influences the effect of IE on the WCM-profitability relationship. Hsieh and Wu (2013) show that the WCM-profitability relationship weakens as levels of state ownership increase, suggesting that SOE profitability is less sensitive to WCM due to entrenchment effects and manager inefficiency. We thus expect to find that for SOEs, an improvement in the IE should not influence the WCM-profitability relationship since managers do not reinvest the savings generated from WCM efficiently.

However, for non-SOEs, the IE plays a more important role. Specifically, at the same CCC level, as the IE improves, non-SOEs can significantly increase their returns on investment and profits by adopting efficient investment practices and by lowering transaction costs. We thus expect to find the effect of IEs to differ among SOEs and non-SOEs. Stated formally, our second set of hypotheses is as follows:

H2a. The IE does not influence the relationship between WCM and profitability for SOEs.

H2b. The IE strengthens the relationship between WCM and profitability for non-SOEs.

3. Data and methodology

3.1 Sample and variables

Because we are interested in the relationship between WCM and firm performance after the financial crisis, we use data for the eight-year period of 2010–2017. Financial data on the listed companies examined in this paper mainly derive from the CSMAR. Data on the

FMs and LSs of each province are taken from the Marketization Index of China's Provinces: NERI Report 2016 (Wang *et al.*, 2017)[4]. We use manufacturing enterprises as our research sample because manufacturing enterprises account for a large proportion of all listed companies and engage in procurement, production and sales activities. To ensure the validity of the data, we exclude firms enjoying special treatment/particular transfers due to their abnormal financial performance. All variables are winsorized with the upper and lower 1 percent sample to minimize the influence of outliers (Aktas *et al.*, 2015). Our final sample for testing *H1* and *H2* covers 8,201 firm-years.

The dependent variable used in our study is firm performance. Qian and Zhang (2008) argue that under China's new accounting standards, core profits are a better measure of corporate performance. Following Penman and Zhang (2002) and Kong *et al.* (2009), we use the core profit margin of operating assets (*CorePR)* as a corporate performance indicator. As for manufacturing firms, profits are generated from operating assets; therefore, compared to other variables, the core profit margins of operating assets can serve as a better indicator of corporate performance. *CorePR* is calculated as:

$$\text{Core PR} = \frac{\text{Core Profit}}{\text{Operating Assets}} \times 100.$$

where Core Profit = Operating Income − Operating Costs − Cost of Sales − Business Taxes and Surcharges − Management Costs − Financial Costs and Operating Assets = Total Assets-Financial Assets. We also use the return on assets (ROA) as a proxy for firm performance as a robustness check.

Following most WCM studies (Joese *et al.*, 1996; Deloof, 2003; Lazaridis and Tryfonidis, 2006), we use CCC as our proxy for WCM. CCC equals DSO plus DIO minus DPO. As a robustness check, we also use the NTC (Shin and Soenen, 1998) as an indicator of WCM.

We use two measures of IE. One is the degree of FM development, and the other is level of LS development. Following prior literature (Wang *et al.*, 2008; Chen *et al.*, 2015; Ling and Wang, 2017; Yang *et al.*, 2015), we obtain data for FM and LS from the Marketization Index of China's Provinces: NERI Report (Wang *et al.*, 2017). The index for the FM includes three sub-indexes: financial industry development, human resource market development and the marketization of technological achievements. The LS index also includes three sub-indexes: the development of intermediary organizations, the extent of the legal environment and the protection of intellectual property. We also use nature of firm equity to identify whether a firm is an SOE or non-SOE.

Following Kong *et al.* (2009), we control for firm size, leverage and sales growth in our main model. Firm size has a significant impact on firm structures and corporate governance and then influences firm performance. Jose *et al.* (1996) also find that larger firms tend to pursue more profits and to adopt shorter cash cycles. Therefore, we use the logarithm of assets as an indicator of firm size (*SIZE*) to control the influence of scale on firm performance. Second, firm risks will have a significant influence on firm performance. We use financial leverage as a proxy for financial risk. DeAngelo and Masulis (1980) find that financial leverage always acts as a tax shield. For firms with less financial leverage, firm value will increase as financial leverage increases. Therefore, we control for the financial leverage (*LEV*) of firms to obtain robust conclusions[5]. Third, we use sales growth (*SGR*) to control the influence of growth on firm performance (Deloof, 2003). Table AI describes the specific variables used in this study.

3.2 Regression model

The following model is used to test *H1*. Because the sample includes financial data on different enterprises for multiple years, to control for individual effect differences of enterprises, a two-way fixed-effect regression (firm- and year-fixed) is used to analyze the studied relationship. The influence of the IE as a moderating variable of the relationship between WCM and firm performance is identified as β_3:

$$CorePR_{it} = \alpha + \beta_1 CCC_{it} + \beta_2 IE_{it} + \beta_3 CCC \times IE_{it} + \beta_4 SIZE_{it} + \beta_5 LEV_{it} + \beta_6 SGR_{it} + \varepsilon_{it}.$$

To test *H2a* and *H2b*, the sample is classified into SOEs and non-SOEs based on ownership to examine the combined effects of IEs and ownership on the relationship between WCM and firm performance.

4. Results

4.1 Descriptive statistics

The descriptive statistics and results of the Pearson correlation test are shown in Table I. In general, the core profit ratio is 4.261 percent for the sampled manufacturing firms. And the average sales growth rate is 17.6 percent, suggesting the listed manufacturing companies maintain a high sales growth rate. The average CCC is roughly 154 days.

Table I Panel B shows that *CorePR* is significantly negatively correlated with CCC at the 1 percent level. In addition, *CorePR* is significantly positively correlated with the sales growth rate (*SGR*) and with firm size (*SIZE*), which indicates that enterprises with more assets and high sales growth rates may enjoy better firm performance. *CorePR* is negatively correlated with financial leverage (*LEV*), indicating that the higher the degree of financial leverage, the lower a company's level of profitability.

The sample is then classified by ownership into SOE and non-SOE sub-groups as shown in Table II. As we can see from the table: the *CCC* of non-SOEs is 44 days longer than that of SOEs. The core profit margin of SOEs is 2.783 percent, which is lower than that of non-SOEs of approximately 5.123 percent. SOEs have higher levels of financial leverage, which shows

Table I. Descriptive statistics and spearman correlation of variables

Panel A descriptive statistics

Variable	Obs	Mean	SD	Min.	Median	Max.
CorePR	8,201	4.261	6.765	−125.572	3.920	51.618
CCC	8,201	153.565	209.470	−455.627	107.702	2,873.462
SIZE	8,201	21.917	1.217	19.341	21.739	27.062
SGR	8,201	0.176	0.396	−0.489	0.116	2.591
LEV	8,201	0.166	0.152	0	0.140	1.531
FM	8,201	6.264	2.277	0.370	6.040	15.230
LS	8,201	8.511	4.671	−0.410	7.540	17.770
ROA	8,201	4.401	5.675	−14.434	3.878	23.079
NTC	8,189	130.645	121.674	−52.907	102.583	639.024
CG	5,458	8.860	1.693	4	9	19
Fixed_Fin	5,458	0.080	0.832	0	0.014	51.781
Fin_Ratio	5,458	0.095	0.100	0	0.063	0.785
Variability	3,964	0.088	0.096	0.004	0.059	0.616

Panel B correlation matrix (n = 8,201)

	CorePR	CCC	SIZE	SGR	LEV	FM	LS
CCC	−0.051***						
SIZE	0.031***	−0.141***					
SGR	0.234***	−0.091***	0.039***				
LEV	−0.384***	−0.064***	0.330***	−0.005			
FM	0.026**	−0.003	0.098***	−0.029***	−0.128***		
LS	0.088***	−0.041***	−0.032***	−0.025**	−0.136***	0.590***	
ROA	0.821***	−0.063***	−0.004	0.254***	−0.383***	0.027**	0.084***

Notes: Variables are defined in Appendix. **,***Indicate significance at 5 and 1 percent level

		Obs	Mean	SD	Min.	Median	Max.
CorePR	SOEs	3,021	2.783***	6.830	−55.014	2.330	51.618
	Non-SOEs	5,180	5.123	6.576	−125.572	4.829	35.638
CCC	SOEs	3,021	125.217***	211.199	−298.339	75.039	2,611.758
	Non-SOEs	5,180	170.098	206.688	−455.627	123.884	2,873.462
SIZE	SOEs	3,021	22.434***	1.361	19.341	22.213	27.062
	Non-SOEs	5,180	21.615	1.008	19.341	21.494	26.237
SGR	SOEs	3,021	0.142***	0.374	−0.489	0.092	2.591
	Non-SOEs	5,180	0.196	0.406	−0.489	0.130	2.591
LEV	SOEs	3,021	0.198***	0.160	0	0.175	1.151
	Non-SOEs	5,180	0.148	0.145	0	0.121	1.531
FM	SOEs	3,021	6.110***	2.606	0.370	5.740	15.230
	Non-SOEs	5,180	6.355	2.057	0.370	6.420	15.230
LS	SOEs	3,021	6.936***	4.350	−0.410	5.640	17.770
	Non-SOEs	5,180	9.429	4.606	−0.410	9.650	17.770
ROA	SOEs	3,021	3.125***	5.835	−14.434	2.598	23.079
	Non-SOEs	5,180	5.146	5.443	−14.434	4.730	23.079
ROE	SOEs	3,021	5.581***	13.124	−42.580	5.624	39.910
	Non-SOEs	5,180	7.699	9.668	−42.580	7.411	39.910
NTC	SOEs	3,021	102.361	113.424	−52.907	74.320	639.024
	Non-SOEs	5,168	147.179	123.288	−52.907	117.604	639.024
CG	SOEs	2,442	9.279***	1.826	5	9	19
	Non-SOEs	3,016	8.520	1.493	4	9	17
Fixed_Fin	SOEs	2,442	0.075***	0.427	0	0.016	12.033
	Non-SOEs	3,016	0.084	1.051	0	0.013	51.781
Fin_Ratio	SOEs	2,442	0.097***	0.097	0.001	0.066	0.785
	Non-SOEs	3,016	0.093	0.102	0	0.060	0.772
Variability	SOEs	1,722	0.095***	0.100	0.004	0.065	0.616
	Non-SOEs	2,242	0.082	0.093	0.004	0.054	0.616

Notes: Variables are defined in Appendix. ***Indicate the mean difference between SOEs and non-SOEs is significant at 1 percent levels, respectively

Table II. Descriptive statistics by groups

that SOEs receive more external funds. The t-test reveals differences in mean values of *CorePR* and *CCC* among SOEs and non-SOEs.

4.2 Regression results

Before testing *H1*, we first examine the relationship between CCC and firm performance and the effect of ownership structures to verify whether Hsien and Wu's (2013) findings hold for all of the listed manufacturing firms. The results are reported in Table III. Column (1) shows that firm performance is significantly negatively correlated with CCC, showing that a shorter CCC is conducive to improving corporate profitability. From Column (1) we know that when CCC is extended by ten days, the *CorePR* will decrease by 0.03. However, given that the mean core profits of manufacturing firms amount to 300m RMB, lengthening CCC by 1 day will cause core profits to decrease by approximately 900 thousand RMB assuming that the operating asset does not change. Columns (2) and (3) show the results for SOEs and non-SOEs, respectively. Altogether, we show that CCC, as a comprehensive indicator reflecting the efficiency of WCM, has a significant effect on the profitability of non-SOEs but not on that of SOEs, showing that when non-SOEs shorten their CCC, they can significantly increase their profitability.

Table IV shows the influence of IE on the main relationships, thus testing *H1*. Column (1) shows that the coefficient on the interaction between CCC and FM is significantly negative, indicating that a superior FM strengthens the relationship between WCM and firm

Table III. The impact of working capital management on firm performance

	(1) CorePR	(2) SOEs	(3) Non-SOEs
CCC	−0.003*** (0.001)	−0.003 (0.003)	−0.004*** (0.001)
SIZE	1.758*** (0.459)	1.348** (0.578)	1.469** (0.698)
SGR	2.442*** (0.229)	2.204*** (0.387)	2.560*** (0.274)
LEV	−15.681*** (2.662)	−17.601*** (2.357)	−14.360*** (4.311)
Cons	−29.486*** (9.554)	−22.071* (12.538)	−22.223 (14.262)
Firm fixed-effect	YES	YES	YES
Year fixed-effect	YES	YES	YES
n	8,201	3,021	5,180
Adj. R^2	0.216	0.239	0.199
F-Statistics	50.868	23.278	33.320

Notes: Cluster standard errors are in parentheses. *,**,***Indicate the mean difference between SOEs and non-SOEs is significant at 10, 5 and 1 percent levels, respectively

Table IV. The impact of institutional environment on the relationship between WCM and firm performance

	(1) CorePR	(2) CorePR
CCC	−0.005*** (0.001)	−0.005*** (0.001)
FM	−0.068 (0.110)	
CCC×FM	−0.001*** (0.000)	
LS		−0.043 (0.061)
CCC×LS		−0.0005*** (0.000)
Control variables	Yes	Yes
Firm fixed-effect	Yes	Yes
Year fixed-effect	Yes	Yes
n	8,201	8,201
Adj. R^2	0.218	0.218
F-Statistics	44.521	46.548

Notes: Cluster standard errors are in parentheses. Control variables include SIZE, SGR and LEV. ***Indicate the mean difference between SOEs and non-SOEs is significant at 1 percent levels, respectively

performance. Column (2) shows that the interaction term for CCC and LS is significantly negative, indicating that a stronger LS reinforces the relationship between WCM and firm performance. Altogether *H1* is supported when using both FMs and LSs as measures of the IE.

We then examine *H2a* and *H2b* based on ownership classifications and report the corresponding results in Table V. In Column (1) the coefficient on CCC is insignificant, suggesting that WCM has no effect on the profitability of SOEs. In addition, the interaction effect of SOEs' FM is negative but insignificant. As discussed above, a stronger FM supports a mature capital market and includes high-quality talent; a poorly developed FM presents the opposite characteristics. When SOEs operate in areas with advanced FMs, they can attract excellent employees and secure loans easily. SOEs operating in undeveloped FMs can also easily secure high-quality staff and loans due to resource endowments. Consequently, the FM has no effect on SOEs' relationships between WCM and profitability. In contrast, the FM strengthens the relationship between WCM and corporate performance for non-SOEs as shown in Column (2). In an area where the FM is well developed, non-SOEs are faced with fewer financing constraints and can attract higher quality talent, causing the FM to strengthen the relationship between WCM and firm performance for non-SOEs.

	(1) SOEs CorePR	(2) Non-SOEs CorePR	(3) SOEs CorePR	(4) Non-SOEs CorePR
CCC	−0.003 (0.003)	−0.005*** (0.001)	−0.003 (0.002)	−0.006*** (0.001)
FM	−0.057 (0.158)	−0.025 (0.153)		
CCC×FM	−0.0005 (0.001)	−0.001*** (0.0003)		
LS			−0.073 (0.094)	0.024 (0.077)
CCC×LS			−0.0001 (0.0002)	−0.001*** (0.0001)
Control variables	Yes	Yes	Yes	Yes
Firm fixed-effect	Yes	Yes	Yes	Yes
Year fixed-effect	Yes	Yes	Yes	Yes
n	3,021	5,180	3,021	5,180
Adj. R^2	0.239	0.203	0.239	0.203
F-Statistics	19.798	29.373	21.973	29.887

Notes: Cluster standard errors are in parentheses. Control variables include SIZE, SGR and LEV. ***Indicate the mean difference between SOEs and non-SOEs is significant at 1 percent levels, respectively

Table V. The impact of ownership, institutional environment on the relationship between WCM and firm performance

Consistent with the results found for FM, Columns (3) and (4) show that the coefficient of CCC×LS for SOEs is insignificant, while that for non-SOEs is significantly negative. The results indicate that non-SOEs operating under a sound LS can improve their performance more by shortening the *CCC* than those operating under a weak LS. Overall, the results in Table V support *H2a* and *H2b*.

5. Robustness tests

We conduct three robustness tests to verify whether our results hold. First, we use *ROA*[6] as a proxy of firm performance (Jose *et al.*, 1996; Shin and Soenen, 1998) and report the results in Table VI. The results for *H1* are presented in Columns (1) and (2) and show that the interaction terms of CCC×FM and CCC×LS are significantly negative. These results are consistent with the results given in Table IV. We then test the difference between SOEs and non-SOEs and present the results in Columns (3) to (6). Consistent with the results shown in Table V, we find that the interaction terms are only significant for non-SOEs. Therefore, the results for *H1* and *H2* hold when using alternative measures of profitability.

Second, we usethe NTC (Shin and Soenen, 1998; Nobanee and Al Hajjar, 2014) as a proxy of WCM. Though the Weighted Cash Conversion Cycle (WCCC) (Gentry *et al.*, 1990) and OCCC (Nobanee and Al Hajjar, 2014) can also be used to measure WCM, we are not able to measure OCCC or WCCC due to China's disclosure policies. We thus use NTC to conduct a robustness check and calculate it as follows[7]:

$$NTC = 360 \times (\text{Average Accounts Receivable} + \text{Average Inventory})/\text{Annual Net Sales}.$$

The results are shown in Table VII. We report the results for *H1* in Columns (1) and (2) and the results for *H2* in Columns (3) to (6). We consistently find significant negative coefficients for CCC×FM and CCC×LS for the whole sample and for the non-SOE sample, supporting *H1* and *H2*.

Finally, we apply other control variables based on the prior literature. The size of our sample is decreased after applying these additional control variables. For example, Deloof (2003) control for fixed financial assets and variability in net operating income, and Raheman and Nasr (2007) control for financial assets in the model. More recently, Ukaegbu (2014) controls for corporate governance while examining the effect of CCC on

	(1) ROA	(2) ROA	(3) SOEs	(4) Non-SOEs	(5) SOEs	(6) Non-SOEs
CCC	−0.004*** (0.001)	−0.005*** (0.001)	−0.004* (0.002)	−0.005*** (0.001)	−0.004 (0.003)	−0.005*** (0.001)
FM	−0.008 (0.101)		−0.049 (0.137)	0.045 (0.144)		
CCC×FM	−0.001*** (0.0002)		−0.0005 (0.0003)	−0.0008*** (0.0002)		
LS		−0.083 (0.052)			−0.099 (0.080)	−0.025 (0.067)
CCC×LS		−0.0004*** (0.0001)			−0.0001 (0.0002)	−0.001*** (0.000)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed-effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed-effect	Yes	Yes	Yes	Yes	Yes	Yes
n	8,201	8,201	3,021	5,180	3,021	5,180
Adj. R^2	0.218	0.209	0.216	0.201	0.216	0.201
F-Statistics	44.521	54.816	27.633	32.840	27.832	32.693

Notes: Cluster standard errors are in parentheses. Control variables include SIZE, SGR and LEV. *,***Indicate the mean difference between SOEs and non-SOEs is significant at 10 and 1 percent levels, respectively

Table VI. Robustness check 1: the relationship between WCM and ROA

	(1) CorePR	(2) CorePR	(3) SOEs	(4) Non-SOEs	(5) SOEs	(6) Non-SOEs
NTC	−0.007*** (0.002)	−0.008*** (0.002)	−0.007* (0.004)	−0.007*** (0.002)	−0.006* (0.003)	−0.008*** (0.002)
FM	−0.033 (0.110)		−0.026 (0.153)	0.031 (0.155)		
NTC×FM	−0.001** (0.0003)		0.001 (0.001)	−0.001*** (0.0002)		
LS		−0.012 (0.059)			−0.060 (0.094)	0.066 (0.075)
NTC×LS		−0.0004** (0.0002)			0.0004 (0.0003)	−0.001*** (0.0002)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed-effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed-effect	Yes	Yes	Yes	Yes	Yes	Yes
n	8,189	8,189	3,021	5,168	3,021	5,168
Adj. R^2	0.219	0.219	0.243	0.202	0.243	0.202
F-Statistics	49.820	52.971	21.053	34.483	23.449	35.407

Notes: Cluster standard errors are in parentheses. Control variables include SIZE, SGR and LEV. *,**,***Indicate the mean difference between SOEs and non-SOEs is significant at 10, 5 and 1 percent levels, respectively

Table VII. Robustness check 2: the relationship between NTC and firm performance

profits. Regarding fixed financial assets, Deloof (2003) argued that such assets are shares invested in other (mainly affiliated) firms to contribute to the firm that holds them, by establishing a lasting and specific relationship and loans that were granted with the same purpose. While we could not find fixed financial assets directly from financial statements, long-term equity investment satisfies this definition, and thus we use long-term equity investment as a proxy for fixed financial assets. The results are reported in Table VIII. Columns (1) and (2) presents the results derived when considering fixed financial assets (*Fixed_Fin*), financial assets (*Fin_Ratio*) and corporate governance (CG). Columns (1) and (2) show that the interaction terms of CCC×LS and CCC×FM are still significantly negative.

Following Deloof (2003), we include the variability in net operating income (Variability) in the model and calculate it as the three years variance of operating income/operating assets using a moving window. The interaction terms of CCC×LS and CCC×FM are still significantly negative, supporting our previous results.

6. Conclusion

From our analysis on the relationship between WCM and firm performance among China's listed manufacturing companies for 2010 to 2017, we document that CCC is significantly negatively correlated with profitability and that both ownership and institutional ownership play important roles in this effect. These results hold when using alternative measures of profitability and WCM. Our results have important implications for practice.

First, the CCC should be controlled within a reasonable range. Managers should develop a reasonable accounts receivable policy to prevent the emergence of bad debts which can decrease firm profit; shorten DIO to save warehouse costs; and accelerate accounts payables outstanding to establish good relationships with suppliers and to take advantage of sales discounts. Anecdotal evidence shows that many Chinese firms, such as Giant Group, Sanjiu Group and Delong Group, went bankrupt after running out of cash. Second, due to differences in resource endowments, governance mechanisms, and economic efficiency, SOEs and non-SOEs present different relationships between WCM and profitability. SOEs ought to reform executive selection and evaluation systems to mitigate agency problems and improve decision-making processes and bureaucratic environments. Third, the documented evidence showing that IEs strengthen the relationship for non-SOEs indicates

	(1) CorePR	(2) CorePR	(3) CorePR	(4) CorePR
CCC	−0.005*** (0.002)	−0.005*** (0.002)	−0.007*** (0.002)	−0.007*** (0.002)
FM	−0.083 (0.122)		−0.048 (0.142)	
CCC×FM	−0.001** (0.0003)		−0.001** (0.0004)	
LS		−0.021 (0.088)		−0.021 (0.088)
CCC×LS		−0.0003** (0.0001)		−0.0003** (0.0001)
SIZE	2.349*** (0.635)	2.345*** (0.630)	2.046** (1.004)	2.014** (0.976)
SGR	2.478*** (0.296)	2.475*** (0.295)	2.228*** (0.355)	2.233*** (0.354)
LEV	−15.252*** (3.657)	−15.289*** (3.684)	−13.641*** (5.127)	−13.776*** (5.155)
Fixed_Fin	−0.124** (0.052)	−0.128** (0.052)	−1.518 (3.111)	−1.831 (3.096)
Fin_Ratio	1.325 (2.315)	1.417 (2.284)	−1.057 (2.814)	−0.924 (2.779)
CG	0.954 (0.809)	0.923 (0.813)	0.544 (0.882)	0.465 (0.887)
Variability			−0.862 (2.192)	−0.802 (2.183)
CONs	−46.089*** (13.549)	−45.850*** (13.278)	−40.220* (21.649)	−39.240* (20.949)
Firm fixed-effect	Yes	Yes	Yes	Yes
Year fixed-effect	Yes	Yes	Yes	Yes
n	5,458	5,458	3,964	3,964
Adj. R^2	0.229	0.228	0.187	0.184
F-Statistics	23.264	24.595	11.788	12.951

Notes: Cluster standard errors are in parentheses. *,**,***Indicate the mean difference between SOEs and non-SOEs is significant at 10, 5 and 1 percent levels, respectively

Table VIII. Robustness check 3: with more control variables that the government should accelerate marketization and create a fair and competitive marketplace for SOEs and non-SOEs.

This article analyzes the relationship between WCM and profitability under normal economic conditions and thus does not take economic crises into consideration. The conclusions presented can therefore not be extended to extreme events such as economic downturns. Further research may take the economic cycle into account when studying the effects of WCM on firm profitability.

Notes

1. *All Tied Up Working Capital Management Report 2015* published by Ernst & Young, www.slideshare.net/lesechos2/ey-all-tied-up-working-capital-management-2015.
2. The marketization of the financial market reflects the extent of market competition and the effectiveness of financial resource allocation. The human resource environment is evaluated as the availability of technicians, managerial staff and skilled workers. The marketization of technological achievements is the ratio of the trading volume of the technology market to the number of scientists.
3. The development of intermediary organizations is evaluated from services provided by lawyers, certified accountants and other industry associations. The legal environment of the market is measured as the fairness and efficiency of law enforcement, and the protection of intellectual property is the ratio of the number of approved patents to the number of scientists.
4. The latest data on factor market development and legal system environments are only recorded to 2014. We assume that factor market development and legal system environments did not change significantly after 2014 and following the extant literature (Wang *et al.*, 2008) the data on factor market development and legal system environments are kept constant for 2014 to 2017.
5. LEV = (Short-term Borrowings + Long-term Loans + Bonds Payable)/Total Assets. In the data set there are missing values for these three elements, and we remove an observation when any one of these three elements is missing. However, we apply an alternative treatment to the missing values by replacing all missing values with 0. After running the same regressions, the results remain robust.
6. ROA is another indicator commonly used as a proxy of firm performance. We also use ROE as a proxy of firm performance. The untabulated results show that our results hold when using this alternative performance measure.
7. However, under China's new accounting policies, *Net Sales* are not disclosed in financial statements. Therefore, we use *Sales* to replace *Net Sales* because the difference between *Net Sales* and *Sales* is not significant under China's new accounting policy.

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Appendix

Type	Name	Abbr.	Description
Dependent variable	Core profit margins of operating assets	CorePR	Core profit/Operating Assets × 100
Independent variable	Cash conversion cycle	CCC	Days sales outstanding (DSO) + days inventory outstanding (DIO) − days payable outstanding (DPO), where DSO = 360/(credit sales/average accounts receivable); DPO = 360/(cost of goods sold/average accounts payable); and DIO = 360/(cost of goods sold/average inventories)
Moderating variables	Factor market Legal system	FM LS	The degree of factor market and intermediary organization development and the legal system index, both of which are selected from Wang *et al.* (2016) as an indicator of the institutional environments
Control variables	Firm size	SIZE	The logarithm of sales revenue
	Sales growth rate	SGR	Increase in operating income/total operating income for last year
	Financial leverage	LEV	(Short-term borrowing + long-term loans + bonds payable)/total assets
Other variables used for robustness tests	Return on assets	ROA	Net profit/total assets
	Return on equity	ROE	Net profit/equity
	Fixed financial asset	Fixed_Fin	Fixed financial assets/total assets
	Financial assets ratio	Fin_Ratio	Financial assets/total assets
	Corporate governance	CG	The number of board directors
	Net trade cycle	NTC	360 × (average accounts receivable + average inventory − average accounts payable)/annual net sales
	The variance in income ratio	Variability	The variance in operating income/operating assets for three years

Table AI.
Variable definitions

Corresponding author
Nan Liu can be contacted at: nanliu@phbs.pku.edu.cn

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Does corporate governance influence firm performance? Evidence from India[1]

Rupjyoti Saha[2], *Kailash Chandra Kabra*[3]

Abstract: Corporate Governance (CG) in India has undergone major transformation in the recent past with the enactment of Companies Act, 2013 and revision of SEBI's Listing Agreement. Though some studies were undertaken in the Indian context few conventional aspects of CG have been repetitively addressed with conflicting results. The aim of this study is to examine the impact of some prominent CG attributes such as board size, board independence, role duality, board's gender diversity, ownership concentration and audit committee independence on both market as well as accounting based measures of firm performance (FP). To this end the study uses a sample of top 100 non-financial and non-utility firms listed on the Bombay Stock Exchange (BSE) for the period of 2014-2018 and employs two stage least square with instrumental variables technique of estimation which takes into account potential endogeneity in CG-FP relationship. The findings reveal a significant positive impact of board size, ownership concentration and audit committee independence on market based measure of FP while board independence is found to have a significant negative impact on accounting based measure of FP. Moreover role duality and gender diversity are not associated with FP. The outcome of this study highlights how the relationship between CG and FP works in the unique institutional setting of India and it should be of interest to regulators, practitioners and other market participants.

Keywords: corporate governance attributes, firm performance, endogeneity, India.

JEL codes: G34, K200, O160.

Introduction

In the wake of major corporate collapses such as Enron, Worldcom, Tyco, etc. corporate governance (CG) has emerged as a widely debated topic around the globe (Letza & Sun, 2002). Initially research relating to various aspects of CG

[1] Article received 21 October 2019, accepted 29 November 2019.

[2] Department of Commerce, North-Eastern Hill University, Shillong (Meghalaya) – 793022, India, rupjyoti.1122@rediffmail.com, ORCID: https://orcid.org/0000-0002-5666-061X.

[3] Department of Commerce, North-Eastern Hill University, Shillong (Meghalaya) – 793022, India, ORCID: https://orcid.org/0000-0003-0635-2341.

remains confined to developed countries (Gompers, Ishii, & Metrick, 2003). However with the integration of world economies it has also been discussed in the context of some major emerging countries such as India due to a significant inclination among corporate to be listed in the international stock market. Following the landmark amelioration of the Indian economy through measures, such as Liberalization, Globalization and Privatization (LPG), a series of reforms have been initiated in order to raise the benchmark of Indian CG at par with the international standard. These regulatory initiatives have necessitated Indian companies to become more transparent and ethical in their operation so as to increase their likelihood of attracting long-term investment in the international capital market.

According to the dominant theoretical paradigm of CG, e.g., agency theory, a better-governed firm performs better because it calls for intensive monitoring of individualistic behaviour of managers (Jensen & Meckling, 1976). This perspective basically focuses on the conflict of interest that arises due to separation of ownership and management. While this type of agency problem is prevalent in developed countries emerging countries like India, characterised by a closely held family ownership structure experiences a different type of agency problem, e.g., controlling shareholders generally having their representation on board attempt to expropriate the wealth of minority shareholders. This unique agency framework raises a question about the effectiveness of major CG reforms in India as those measures are largely imported from governance codes of developed countries having a different institutional setting. Moreover though the existing CG framework in India is comparable with other developed countries its compliance in a true spirit by companies is doubtful due to dominance of family ownership.

In the light of major CG reforms in India over the past two decades several researchers have endeavoured to examine the effectiveness of these reforms in influencing the performance of firms. However some inadequacies are encountered in existing work such as Black and Khanna (2007) Balasubramanian, Black and Khanna (2010) which provide only cross sectional evidence on the relationship between CG and FP whereas, in case of other studies such as Jackling and Johl (2009); Arora and Sharma (2016), only some conventional facet of CG codes such as board size, board independence, role duality, ownership structure have been repetitively addressed with conflicting results. As pointed out by Arora and Sharma (2016) some qualitative aspects of the board such as inclusion of women directors, formation of an audit committee with independent directors have been largely ignored so far in the existing literature. Another important issue that remained overlooked is whether CG responds to FP (Arora & Bodhanwala, 2018) as Hermalin and Weisbach (1988) find that poor performance leads to improved CG mechanisms (eg: board independence) or firms with better performance may choose to adopt improved CG practices as a control mechanism to limit insiders to refrain from inefficient practices

(Denis & Sarin, 1999). Further, there could be some unobserved factors which may simultaneously determine both CG and FP (Hermalin & Weisbach, 2001). Though panel data regression models such as the fixed or random effect model control for unobserved heterogeneity, they are unable to handle simultaneity or reverse causality issue due to their core assumption of strict exogeneity. Thus considering CG variables as exogenous may show a spurious relationship with FP if the issue of simultaneity is not taken into consideration.

Against this backdrop the present study primarily aims to examine the relationship between CG and FP (both market based and accounting based performance) in the Indian context after taking into account the potential endogeneity in their relationship. Further, this study apart from considering the conventional CG mechanisms such as board size, board independence, role duality, ownership structure, also intends to examine the influence of board gender diversity and audit committee independence on FP.

The remaining part of the study is organized as follows: Section 1 presents an overview of CG in India; Section 2 reviews the theoretical and empirical literature and formulates different hypotheses. The methodology followed in the study including the selection of the sample, data used, measurement of variables employed are presented in Section 3; empirical results are discussed in Section 4; while final section provides the conclusions.

1. Corporate governance in India

Since the study is focussed on examining the impact of CG reforms on FP it is necessary to present an overview of CG in India over the past two and half decades. The first step towards corporate regulatory reform in India was initiated in 1991 with the adoption of LPG policy when it was forced to do so due to huge deficit in foreign exchange reserve. Following this a series of corporate scandals occurred in the early nineties which fuelled the need for good governance (Goswami, 2002). The most noteworthy event in the field of CG in the post-liberalization period was the establishment of Securities Exchange Board of India (SEBI) in 1992 as the regulator of the stock market. Subsequently SEBI set up several committees headed by some prominent industrialists such as Bajaj Committee in 1996, Kumar Mangalam Birla Committee in 1999; and Narayana Murthy Committee in 2003, in order to transform the CG scenario of India. In line with the Sarbanes-Oxley measures in the US the recommendations put forth by these committees specially focussed on independent directors, the audit committee, related party transactions, risk management, financial disclosures, shareholders' rights, etc. which were formally implemented through enactment of Clause 49 in the Listing Agreement. In conjunction with the initiatives of SEBI, the Department of Company Affairs and Ministry of Finance formed the Naresh Chandra Committee in 2002 and J.J Irani Committee in 2004, with the objective of reviewing the existing Companies Act, 1956 and this led to the introduction of new company bill in 2009. Regardless of these steps, yet again investors' confidence was shaken by the enormous fraud of information technology giant Satyam Computer Services Ltd in 2009, which was instigated by its chairman by presenting flawed books of accounts to its board, regulators and investors. This fraud cast doubt about directors' and auditors' independence as it is not possible to hide such facts without their involvement. Resultantly the Ministry of Corporate Affairs included several changes in the company bill 2009 on the basis of the report submitted by the Parliamentary Standing Committee on finance and overhauled the existing Companies Act 1956 through the enactment of the company bill in 2009 in the form of a new Companies Act, 2013 which received presidential assent on 29 th August, 2013. The Act established responsibility and accountability of independent directors and auditors, mandated the presence of a minimum of one women director on a board and prescribed additional disclosure norms such as a formal performance evaluation of directors, disclosure related to any change in the shareholding positions of promoters to the registrar of companies, etc. Further, to maintain parity with the provisions of the new act SEBI also revised its listing agreement (Clause 49) in 2014. In addition, most recently SEBI has replaced Clause 49 with Listing Obligations and Disclosure Requirements(LODR), Regulations 2015 in line with the OECD principles, which specifies more stringent rules as compared to Clause 49.

From the preceding discussion it is apparent that scope of CG requirements in India has been gradually expanded over the years in line with international practices. However it is often alleged that some prevalent features of Indian companies such as ownership concentration, existence of principal promoters, expropriation of minority shareholders' interests, poor disclosure practices, etc. have made them simply comply with the recurring imposition by different regulatory authorities rather than adopting the codes in real sense. Thus it is a prime need currently to examine the effectiveness of CG reforms in recent years in influencing FP.

2. Theory and hypotheses

Researchers have employed a number of theoretical perspectives in explaining the relationship between CG and FP. Among them agency theory has been most extensively used in governance research, which is premised on the inherent agency conflict between managers and owners, whereby managers with better access to information about firms are in a position to pursue some actions for their own interest at the expense of owners. It suggests the need for an adequate CG mechanism to protect owners from individualistic behaviour of managers, which in turn also maximizes the wealth of shareholders (Jensen & Meckling, 1976). On the contrary, the stewardship theory considers managers as stewards of firms' resources and they essentially act in the best interest of owners (Donaldson & Davis, 1991). Further, the resource dependency perspective consider managers as a crucial link between the firm and the key external resources required by it so as to have better FP. Based on the diverse theories and relevant literature, this section discusses some prominent CG attributes and their expected relationship with FP.

2.1. Board size

Determining ideal board size has been widely debated in literature which encompasses two aspects such as firstly, the coordination and communication issue created by board size, secondly, the monitoring capacity of the board to control the agency problem. Lipton and Lorsch (1992) opined that when board size increases it becomes difficult for board members to exchange meaningful ideas within the limited time available to them. Thus the cost associated with a large board outweighs its benefit and they suggested that an ideal board should include eight to nine members. Some empirical findings also support the view that large boards deteriorate FP as it becomes difficult to arrive at a consensus in time (Yermack, 1996; Mak & Kusnadi, 2005; Kao, Hodgkinson, & Jaafar, 2019). On the contrary proponents of the resource dependency perspective advocates that directors with a greater exposure to external settings assist firms in getting better access to various key resources, which in turn improves FP (Mizruchi & Stearns, 1988). Accordingly evidence, mostly from developing markets, reports the positive influence of board size on FP (Jackling & Johl, 2009; Sheikh, Wang, & Khan, 2013; Mishra & Kapil, 2018). They have highlighted some unique characteristics of the developing market such as a large proportion of family owned firms coupled with the scarcity of qualified outside directors whereby firms tend to restrict executive positions to family members, which limits the qualified pool of human resources. Thus in the Indian context the Companies Act, 2013, raised the maximum limit of directors to fifteen as compared to a maximum of twelve directors under the Companies Act 1956 and also simplified the procedure for raising the maximum limit, if the need arises and hence the following hypothesis can be framed: H_1: There is a positive association between board size and FP.

2.2. Board independence

Theoretically the agency perspective asserts that directors who work independently without any affiliation to the firm except for their directorship, are in a better position to diffuse the agency conflict that potentially leads to improved FP (Shleifer & Vishny, 1997) whereas the stewardship perspective contends that inside directors with better access to firms' information assist in taking prudent decisions which in turn leads to better FP. Empirical findings on this issue are mixed with studies reporting positive (Jermias, 2007; Jackling & Johl, 2009; Kao et al., 2019), negative (Muth & Donaldson, 1998; Singh & Gaur, 2009) and an insignificant influence of board independence on FP (Chang & Leng, 2004; Zabri, Ahmad, & Wah, 2016). From a practical standpoint, independent directors (IDs) started gaining prominence after the Sarbanes-Oxley Act mandated their presence on a board. Following the Anglo-American CG codes many developing countries including India mandated listed companies to have a minimum proportion of IDs on the board in order to have a better monitoring of corporate affairs. In this regard Singh and Gaur, (2009) contend that the contribution of IDs towards FP depends on the functions they perform in fulfilling their *monitoring* as well as *advisory* roles in a given context. In the case of a developed market such as the US, characterized by separation of ownership and control, the monitoring role of IDs is considered important in mitigating the agency conflict whereas in the context of an emerging market such as India, characterized by a highly concentrated family ownership structure, their monitoring role becomes less important due to owner—manager unification. However their advisory role in an emerging market becomes more important as firms often lack the requisite expertise needed to function (Khanna & Palepu, 1999) and thus their presence on the board can be expected to bring better resource expertise and it can be hypothesized that: H_2: There is a positive association between board independence and FP.

2.3. Role duality

Another important feature of the corporate board widely discussed in literature is its leadership structure. Proponents of the agency perspective suggest the separation of the role of CEO and chairman as this combined authority can lead to opportunistic behaviour which can have an adverse impact on FP (Jensen & Meckling, 1976). Moreover there is less possibility of detecting such behaviour when the same person occupies both the positions. Conversely, the stewardship perspective supports role duality as it offers greater autonomy to managers who act as stewards' in maximizing shareholders wealth (Donaldson & Davis, 1991). Given the diverse theoretical view empirical findings on the issue are mixed with studies reporting positive (Sheikh et al., 2013; Azeez, 2015; Mishra & Kapil, 2018), negative (Jermias, 2007; Kao et al., 2019) and no association (Chang & Leng, 2004; Tachiwou, 2016) between role duality and FP. Nevertheless CG codes around the globe as well as in India have emphasized the separation of the role of CEO and chairman in order to limit the power of board leaders (Cadbury, 1992; SEBI, 2015). Hence it can be anticipated that: H_3: There is a negative association between role duality and FP.

2.4. Gender diversity

The discussion of gender diversity on corporate boards primarily encompasses two significant propositions firstly, 'resource based perception' which contends that a gender diverse board brings diversity of opinions, external networks, set of leadership styles, etc. in managing corporate affairs (Carter, D'Souza, Simkins, & Simpson, 2010); secondly, 'diligence in monitoring' which asserts that female directors exhibit lower tolerance to opportunism than their male counterparts in decision making (Adams & Ferreira, 2009). Empirically studies document positive (Singh, Vinnicombe, & Johnson, 2001; Ntim, 2015), as well as no association (Carter, Simkins, & Simpson, 2003; Sanan, 2016) between board gender diversity and FP. In the Indian context, though, the Companies Act, 2013 mandated the presence of a minimum of one women director on the board. The uniqueness of family owned businesses necessitates the study as to whether such a gender quota actually impacts FP or is simply considered as mere formality. Nevertheless, based on the theoretical view and prevailing regulation, it can be hypothesized that: H_4: There is positive association between a board's gender diversity and FP.

2.5. Ownership concentration

Literature on ownership concentration draws attention toward two types of agency problem: firstly, the vertical agency problem or principal-agent conflict which mainly occurs due to the separation of ownership and control and secondly, the horizontal agency problem or principal-principal conflict, which arises due to a concentration of shareholdings above a certain level by few individuals or groups (Fama & Jensen, 1983). While the former is mostly prevalent in developed countries, emerging countries like India, characterized by a closely held family ownership structure, experiences the later. Though horizontal agency conflict (ownership concentration) is associated with some benefits such as: i) an efficient monitoring of management action as blockholders can influence management's decision by virtue of their position (Shleifer & Vishny, 1997); ii) elimination of the vertical agency problem as blockholders often also work as managers (Carney, 2005), and iii) an active involvement of the blockholders assists in maintaining the market value of the firm as they have a substantial investment at stake, it also creates some problems such as blockholders may pursue certain activities for their individual gain which may exploit the wealth of minority shareholders (e.g. increasing perquisites such as wasteful travel expenses). In the Indian context several CG codes were implemented in the past decades which focus on protecting the rights of minority shareholders. Accordingly, empirical evidence from India as well other emerging countries mostly shows a positive impact of ownership concentration on FP (Chang & Leng, 2004; Mak & Kusnadi, 2005; Singh & Gaur, 2009; Ducassy & Guyot, 2017; Kao et al., 2019) indicating that the benefits of ownership concentration outweigh its cost. Thus in the Indian context, it can be hypothesized that: H_5: There is a positive association between ownership concentration and FP.

2.6. Audit committee independence

Following the Sarbanes-Oxley Act in the US, the presence of an audit committee is globally recognized to maintain investors' confidence in financial markets. An audit committee is basically formed for the purpose of carrying out the audit process independently as it is entrusted with the responsibility of presenting an authentic picture of firms as revealed by their financial statements to the external auditor. It is unlikely to obtain such information from internal management whose very activities are being audited and thus the independence of the audit committee from internal management is necessary in order to maintain the objectivity and independence of external auditors which in turn also reduces the probability of fraud and encourages better performance (Klein, 2002). Empirically some studies report a positive association between audit committee independence and FP (Klein, 2002; Amar, 2014) whereas some studies reveal an insignificant association between the two (Chang and Leng, 2004; Qaiser & Abdullah, 2016; Berkman & Zuta, 2017). CG regulations in India require listed entities to set up an audit committee with a minimum of two thirds of independent members for the purpose of controlling manipulative reporting practices and to assess performance of companies and thus it can be hypothesized that: H_6: There is a positive association between audit committee independence and FP.

3. Methodology

This section presents selection of sample firms[4], data sources, variables measurement and construction of estimation models for examining the relationship between CG and FP.

3.1. Sample and data

The sample for this study comprises the top 100 non-financial and non-utility companies listed on the BSE based on market capitalization as on 31st March 2014. Financial and utility companies were excluded as additional regulations are applicable to them such as the Banking Regulation Act, 1949, the Electricity Act, 2003. The study covers a period of five years from 2013-14 to 2017-18, as this period is marked by some major CG reforms in India (i.e.: Companies Act, 2013, SEBI's Revised Clause 49, 2014, SEBI, Regulation, 2015). The 100 sam-

[4] The sample of firms' names can be provided upon request by the author.

ple companies selected in the initial year, e.g. 2013-2014 are studied over the consecutive years of the study. The necessary information regarding CG variables has been collected from annual reports of the respective companies and information relating to control variables and FP variables have been collected from the corporate database 'Capitaline plus'.

3.2. Variable measurement

3.2.1. Dependent variable

The resultant impact of CG on dependent variable e.g., FP is observed on both market based as well as accounting based measures of FP. In empirical models three proxies of FP such as: i) market capitalization (MCAP)—measured as the natural logarithm of market capitalization, ii) return on assets (ROA)—measured as the ratio of profit before interest and tax by total asset and iii) return on equity (ROE)—measured as the ratio of profit before interest and tax by equity share capital. All these variables have been considered as significant indicators of FP in literature (Arora & Sharma, 2016).

3.2.2. Independent variables

The details about measurement of independent variables included in the study such as board size, board independence, role duality, gender diversity, ownership concentration and audit committee independence are presented in Table 1.

Table 1. Measurement of independent variables

Acronym	Variables	Measurement
BS	Board Size	Total number of directors on board
BI	Board Independence	Percentage of Independent Non-Executive Directors(INDs) to total number of directors on board
RD	Role Duality	'1', if CEO is also the chairman of board, otherwise '0'
GD	Gender Diversity	Percentage of female directors to total number of directors on board
OC	Ownership Concentration	Percentage of shareholding by majority shareholders divided by total share capital
ACI	Audit Committee Independence	Percentage of Independent Non-Executive Directors to total number of directors in audit committee

Source: Own work based on literature.

3.2.3. Control variables

It is evident from prior work that FP is influenced by many other firm specific factors and accordingly this study employs some control variables which are generally considered to influence FP such as: i) firm size (Singh & Gaur, 2009; Sheikh et al., 2013), ii) firm age (Jackling & Johl, 2009; Arora & Sharma, 2016), iii) financial leverage (Sheikh et al., 2013; Arora & Bodhanwala, 2018), iv) Big-4 audit firms (Kao et al., 2019) and v) growth opportunities proxied by the research & development (R&D) ratio and advertisement ratio (Jackling & Johl, 2009). The details about measurement of control variables are presented in Table 2.

Table 2. Measurement of control variables

Acronym	Variables	Measurement
FSIZE	Firm Size	Natural logarithm of total sales
AGE	Firm Age	Natural logarithm of firm age since incorporation
LEV	Financial Leverage	Ratio of total debt by equity share capital and reserves
BIG4	Big4 Audit Firms	'1' for companies audited by BIG4 audit firms otherwise '0'
R&D	R&D ratio	Natural logarithm of R&D expenses by total sales
ADV	Advertisement ratio	Natural logarithm of advertisement expenses by total sales

Source: Own work based on literature.

3.3. Empirical model

A common approach for analyzing the relationship between CG and FP is to estimate the pooled OLS model (Klein, 1998). However in recent times one of the issues widely discussed in literature is the presence of endogeneity in the governance-performance relationship. There are some potential sources of endogeneity such as: unobserved heterogeneity (Hermalin & Weisbach, 2001) and simultaneity (Wintoki, Linck, & Netter, 2010). In presence of endogeneity the pooled OLS model may give biased and inefficient estimates as endogeneity violates its basic assumptions (Jackling & Johl, 2009). Further, some studies employ other panel estimation techniques such as the fixed or random effect models which handle the endogeneity issue in a partial manner as they only account for unobserved heterogeneity. Thus, to overcome this limitation, this study uses the Two Stage Least Squares (2SLS) with Instrumental Variables (IVs) estimation, which is widely considered as robust methodology to address the endogeneity issue. Moreover in this study a formal test of endogeneity such as the Hausmen Specification Test for all the CG variables has been conducted in the case of both market as well as accounting based measures of FP. In first step of the test CG variables have been regressed on all other exogenous variables. Subsequently the residuals for each CG variable is obtained from the first step which is further regressed on the ultimate dependent variable, i.e. MCAP, ROA and ROE whereby the result indicates that in the case of MCAP, co-efficient of residuals of BS, BI, ACI and OC are highly significant whereas in case of ROA and ROE, co-efficient of residuals of BI and OC are highly significant indicating the presence of endogeneity in respective cases (Gujarati, 2010). Hence the Hausmen test of endogeneity also advocates the application of 2SLS. The following equations have been used for estimation by applying 2SLS with IVs technique in order to examine the influence of different CG attributes on FP after controlling the influence of firm specific characteristics.

$$MCAP_{it} = \beta_o + \beta_1 BS_{it} + \beta_2 BI_{it} + \beta_3 RD_{it} + \beta_4 GD_{it} + \beta_5 OC_{it} + \beta_6 ACI_{it} + \beta_7 FSIZE_{it} + \\ + \beta_8 AGE_{it} + \beta_9 LEV_{it} + \beta_{10} BIG4_{it} + \beta_{11} R\&D_{it} + \beta_{12} ADV_{it} + \varepsilon_{it} \quad (1)$$

$$ROA_{it} = \beta_o + \beta_1 BS_{it} + \beta_2 BI_{it} + \beta_3 RD_{it} + \beta_4 GD_{it} + \beta_5\ OC_{it} + \beta_6 ACI_{it} + \beta_7 FSIZE_{it} + \\ + \beta_8 AGE_{it} + \beta_9 LEV_{it} + \beta_{10} BIG_{4it} + \beta_{11}\ R\&D_{it} + \beta_{12} ADV_{it} + \varepsilon_{it} \quad (2)$$

$$ROE_{it} = \beta_o + \beta_1 BS_{it} + \beta_2 BI_{it} + \beta_3 RD_{it} + \beta_4 GD_{it} + \beta_5 OC_{it} + \beta_6 ACI_{it} + \beta_7 FSIZE_{it} + \\ + \beta_8 AGE_{it} + \beta_9 LEV_{it} + \beta_{10} BIG_{4it} + \beta_{11} R\&D_{it} + \beta_{12} ADV_{it} + \varepsilon_{it} \quad (3)$$

where $\beta_0 \dots \beta_{12}$ are coefficients to be estimated; ε_{it} is a disturbance term; 'i' = 1, …, 100 sample firms; 't' = 2014-2018.

4. Empirical results

This section presents the descriptive statistics, correlation matrix and the regression results on the relationship between CG attributes and different measures of FP using 2SLS. The descriptive statistics of all variables included in this study are summarized in Table 3. Regarding CG attributes BS shows a range of 5 to 20 with a mean of 10.90, which is in conformity with the prevailing regulation except for one company (Larsen and Turbo Ltd.) where the maximum number of directors is twenty during two years of the study period. BI depicts a wide variation as the range is from 0 to 85.71 percent with a mean value of 50.58 percent. Though its average value is consistent with SEBI's listing agreement which requires the board to consist of a minimum 50% INDs when the board's chairman is an executive director, two sample companies (NLC Ltd. and MRPL Ltd.) did not have any INDs during two years of the study period. The mean value of RD indicates that 32 percent of sample firms have one person occupying both positions implying that the majority of sample firms (68 percent) have voluntarily separated the role of CEO and chairman. GD shows a mean of 12.41 percent while it was 5.3 percent in 2009 (Balasubramanian, 2013) indicating an enhanced participation of women on a corporate board. On average 84.51 percent of audit committees are occupied by INDs which is also consistent with SEBI (LODR) Regulations, 2015. In terms of OC the average percentage of shares owned by a majority shareholders is 91.66 percent indicating that sample firms have a highly concentrated ownership structure. FSIZE indicates less variation with mean and median values of 3.94 and 3.86 respectively while the age of sample firms shows a mean of 1.57 with a range of 0.84 to 2.05. Leverage gives a means of .31 with a range of 0 to 2.74 while the mean value of the Big4 indicates that only 35 percent of the sample firms are audited by Big4 audit firms. Sample firms' growth proxied by the natural logarithm of R&D ratio and advertisement ratio shows mean values of 0.18 and 0.04 respectively. The market based measure of FP, e.g. MCAP indicates mean and median values of 4.50 and 4.47 respectively which are 'reasonably' close indicating lesser variations among sample firms in terms of their market value while the accounting based measure of FP, e.g. ROA and ROE indicates wide variations as evident from their standard deviation values of 21.24 and 18.26 respectively.

Before undertaking the regression analysis multicollinearity among the independent variables is checked by using Pearson's correlation analysis. It is evident from the correlation matrix (Table 4) that multicollinearity is not a cause

Table 3. Descriptive statistics

Variables	Mean	Median	Standard deviation	Minimum	Maximum
BS	10.90	11	2.61	5	20
BI	50.58	50	12.36	0	85.71
RD	0.32	–	0.46	0	1
GD	12.41	10	7.78	0	40
ACI	84.51	83.33	17.07	0	100
OC	91.66	93.13	7.26	66.28	99.78
Ln_FSIZE	3.94	3.86	0.61	2.31	5.68
Ln_AGE	1.57	1.56	0.24	0.84	2.05
LEV	0.31	0.11	0.44	0	2.74
BIG4	0.35	–	0.47	0	1
Ln_R& D	0.18	–	0.44	–0.045	2.11
Ln_ADV	0.04	–	0.56	–2.45	1.28
Ln_MCAP	4.50	4.47	0.49	2.83	5.75
ROA	22.80	17.97	21.24	–23.12	161.17
ROE	19.54	15.55	18.26	–27.68	130

Source: Own calculations using STATA 14.

Table 4. Pearson correlation analysis

Variables	BS	BI	RD	GD	ACI	OC	FSIZE	AGE	LEV	BIG4	R&D	ADV
BS	1											
BI	(498) 0.059	1										
RD	(498) 0.124**	(498) 0.002	1									
GD	(498) −0.188**	(498) 0.102**	(498) −0.099**	1								
ACI	(498) 0.126**	(498) 0.481**	(498) 0.032	(498) −0.099**	1							
OC	(498) 0.036	(498) −0.097**	(498) 0.098**	(498) 0.051	(498) −0.049	1						
FSIZE	(498) 0.219**	(498) −0.004	(498) 0.044	(498) −0.103**	(498) 0.047	(498) −0.030	1					
AGE	(498) 0.088*	(498) −0.009	(498) 0.022	(498) −0.039	(498) −0.082	(498) 0.280**	(498) 0.190**	1				
LEV	(498) 0.087*	(498) −0.039	(498) 0.054	(498) −0.103*	(498) 0.086*	(498) −0.076*	(498) 0.246**	(498) −0.121**	1			
BIG4	(498) −0.030	(498) 0.137**	(498) −0.220**	(498) 0.020	(498) 0.031	(498) −0.122**	(498) 0.213**	(498) 0.110**	(498) 0.02	1		
R&D	(498) −0.151**	(498) 0.135**	(498) 0.070	(498) −0.015	(498) 0.114*	(498) −0.093**	(498) −0.073	(498) 0.220**	(498) −0.109**	(498) −0.010	1	
ADV	(498) −0.003	(498) 0.075	(498) −0.262**	(498) 0.124**	(498) 0.092*	(498) −0.058	(498) −0.150**	(498) 0.074	(498) −0.149**	(498) 0.090*	(498) −0.068	1

Notes: ** significant at 1% level; * significant at 5% level. Figures given within parentheses indicate degrees of freedom.

Source: Own calculations using STATA 14.

of concern in this study as the highest correlation coefficient is 0.481. The highest positive correlation ($r = 0.481$, $p < 0.01$) exists between BI and ACI as the percentage of INDs on the audit committee depends on the percentage of INDs on the board. This is followed by a significant negative correlation between OC and AGE ($r = -0.280$, $p < 0.01$). In addition RD is negatively related with BIG4 and ADV implying that firms having a combined leadership structure are less likely to be audited by Big4 audit firms ($r = -0.220$, $p < 0.01$) and they also have less advertisement intensity ($r = -0.262$, $p < 0.01$). Moreover, FSIZE and LEV are positively related ($r = 0.246$, $p < 0.01$) suggesting that large firms tend to have more debt in their capital structure. A robustness test for multicollenearity was done by calculating the Variance Inflation Factor (VIFs) for all independent variables and the highest VIF value obtained is 1.42 which is much below the threshold limit of 10 (Neter, Wasserman, & Kutner, 1989).

The result of 2SLS estimation is reported in Table 5. The results given in Column 3 are based on the market measure of FP e.g., MCAP whereas results presented in Columns 4 and 5 are based on accounting measures of FP such as ROA and ROE respectively. This section discusses the results pertaining to the impact of each CG attribute and control variables separately on the alternative measures of FP. Consistent with the expectation in H_1 the result reveals that BS is positively associated with MCAP at a one percent significant level though it is not significant in the case of ROA and ROE. This finding is parallel with Jackling & Johl (2009) suggesting that a large board brings a greater pool of expertise which in turn assists in boosting the overall performance of the firm. Contrary to the expectation in H_2, the result shows a negative impact BI on FP in the case of accounting based measures while its impact on market based measures is statistically insignificant. The negative impact of BI on operating performance of a firm is consistent with the findings of Jackling & Johl (2009), Singh & Gaur (2009) and supports the relevance of the stewardship perspective in India implying that as IDs are generally less aware of the internal strengths and weaknesses of the firm and thus their inputs in the decision making process have a negative impact on the accounting based measure of FP. Moreover, the insignificant impact of BI on MCAP highlights the lack of autonomy given to IDs due to the active participation of substantial owners in management whereby IDs are basically appointed to fulfill a statutory requirement while in the real sense they work under the dominance of blockholders. Regarding H_3, though its direction is negative, it is statistically insignificant at a conventional level in all the measures of FP. This insignificant impact of role duality on FP might be due to a limited demarcation among sample firms for this attribute to have statistical significance as 68% of them have voluntarily separated the role of CEO and chairman subsequent to the recommendation given by SEBI as well as various international bodies. The finding also exhibits the insignificant impact of a board's gender diversity on all measures of FP, discarding H_4. Though literature from developed markets establishes a significant positive

Table 5. Results of 2SLS analysis

Variables	Expected sign	MCAP	ROA	ROE
Constant	?	2.93*** (0.003)	4.23*** (0.000)	3.94*** (0.000)
BS	+	2.08*** (0.037)	−0.99 (0.320)	−0.73 (0.465)
BI	+	0.73 (0.468)	−4.09*** (0.000)	−3.92*** (0.000)
RD	–	−1.45 (0.147)	−0.09 (0.998)	1.89 (0.598)
GD	+	1.51 (0.131)	0.78 (0.435)	0.90 (0.368)
ACI	+	1.87* (0.062)	1.54 (0.123)	1.51 (0.132)
OS	+	5.24*** (0.000)	−2.51*** (0.012)	−2.33*** (0.020)
FSIZE	+	19.41*** (0.000)	−0.51 (0.612)	−0.17 (0.861)
AGE	+	−1.87* (0.062)	0.20 (0.844)	−0.45 (0.650)
LEV	+	−9.29*** (0.000)	−8.61*** (0.000)	−7.08*** (0.000)
BIG4	+	4.18*** (0.000)	1.43 (0.154)	1.08 (0.282)
R&D	+	4.63*** (0.000)	2.07*** (0.038)	3.34*** (0.001)
ADV	+	2.09*** (0.037)	7.26*** (0.000)	7.81*** (0.000)
R-Square		0.6039	0.3073	0.2626
Wald-Chi Square		597.60*** (0.000)	188.43*** (0.000)	159.74*** (0.000)
Sargan Chi Square		.014395 (0.904)	1.02072 (0.3123)	2.89584 (0.888)
Basmann Chi Square		.013891 (0.9062)	0.987512 (0.3204)	2.81487 (0.934)
Observations (N)		500	500	500

Notes: *** significant at 1% level; ** significant at 5% level and * significant at 10% level.

Source: Own findings using STATA 14.

association between GD and FP (Singh et al., 2001; Ntim, 2015) this finding highlights the ramification of mandating women directors in the case of Indian companies as the dominance of family ownership leads to the appointment of female members of the promoters' family to executive management positions in order to comply with the existing regulation, even if they are unaware of the technicalities of business. Moreover in some cases where women directors are independent the prevailing scarcity of independent women directors with the right kind of expertise increases their engagement in terms of the number of board on which they serve and that in turn offsets their effectiveness. Further consistent with H_5 the finding indicates the significant positive influence of OC on market based measures of FP. This finding supports the result of Singh & Gaur, (2009) indicating that since blockholders have a substantial amount of investment at stake they undertake every possible action to maintain their investment value intact (Shleifer & Vishny, 1997). Nevertheless the result shows a negative relationship between OC and the accounting based measure of FP. Finally, H_6 can also be accepted as ACI is found to have a positive influence on market based measures of FP. This significance disappears when accounting based measures such as ROA or ROE are used as a dependent variable. Though the level of significance in the case of MCAP is weak such finding is important as it depicts the premium awarded by investors in terms of market value for having an independent audit committee. Regarding control variables FSIZE, BIG4, R&D and ADV are found to have a significant positive impact on FP whereas AGE and LEV have a significant negative impact on FP.

The observed *R*-square values and highly significant Wald-Chi Square values in all three models advocate of goodness of fit of the models. Moreover 2SLS may not bring better estimates than the panel data model if the selected instruments are incorrect. As discussed in earlier works the choice of appropriate instruments is challenging as it is difficult to obtain such instruments which are correlated with the endogenous regressors but not with the error terms (Kao et al., 2019). Following literature this paper uses one year lagged values of some CG variables like BS, BI, RD, ACI, OC as instruments in the case of model (1) and BS, BI and OC in case of model (2) and (3). Subsequently the appropriateness of the chosen instruments is examined based on two conditions. Firstly, relevance condition: the IVs should be correlated with the endogenous regressors which are examined through the test of weak instruments. Secondly, exclusion condition: the IVs should not be correlated with the error terms which are examined by the test of over-identifying restrictions. The result of the test of weak instruments specifies that the instruments are highly correlated with the endogenous regressors such as BS, BI, ACI and OC [Shea's Partial *R*-square = 0.56, 0.50, 0.38, 0.90] respectively in the case of model (1) and endogenous regressors such as BI and OC in the case of model (2) and (3) [Shea's Partial *R*-square = 0.53 and 0.90] respectively and therefore there is no weak instrument problem. Further, Sargan and Basmann statistics were calculated to test the exclusion condition whereby the insignificant value of Sargan chi-square and Basmann chi-square in all the models [shown in lower part of Table-5] suggests that IVs are not correlated with the error terms, thus implying that the chosen IVs are exogenous and valid.

Conclusions

This study examines the performance consequences of different firm level CG mechanisms in India. In particular the study focuses on the influence of prominent CG mechanisms such as- board size, board independence, role duality, gender diversity, ownership concentration and audit committee independence on different measures of FP for sample companies over a period of five years (2014-2018) using the 2SLS method of estimation. The result reports a significant positive impact of board size on FP whereas board independence is negatively associated with FP. Further the result also shows a significant positive impact of ownership concentration and audit committee independence on FP. Nevertheless role duality and gender diversity does not contribute significantly towards FP.

The results of this study have some important implications. Firstly, the positive association between board size and FP is congruent with the regulatory move of increasing the number of directors of the board and thus extending support for an implementation of the resource dependency theory in the Indian context. Secondly, the negative impact of board independence on FP suggests that the practitioners in the context of an emerging market the appointment of independent directors should not be viewed in terms of performance gains. However their existence can still be considered important in order to encourage ethical behaviour in the business. Thirdly, the positive influence of ownership concentration on FP indicates that blockholders are effective monitors and this is an encouraging sign for policy makers as the reforms initiated in India in the past two decades with a focus on protecting the interests of minority shareholders seem to be effective. Fourthly, the positive influence of audit committee independence on FP though weak, encourages the practitioners to comply with such a regulation as it significantly contributes to the maintenance of the confidence of investors. Finally, the result also suggests that merely having a gender diverse board does not suffice but that adopting them in a true spirit might worth trying.

This study has the potential to add some novelties to the existing literature. Firstly, it addresses the endogeneity issue of the CG-FP relationship in an emerging market by employing the 2SLS technique of estimation and also presents the additional tests for the justification of using the 2SLS technique. Secondly, departing from prior studies that are confined only to the conventional CG mechanisms, this study adds new findings with regard to the two noteworthy but least studied attributes of CG in the Indian context such as the board's gender diversity and audit committee independence. Finally, unlike prior studies where the impact of CG is mostly examined through the market based measure of FP this study shows the impact of different CG attributes on both the market as well as accounting based measures of FP.

This study has some limitations which also pave the way for future research such as: firstly, apart from the audit committee the Companies Act 2013 and SEBI (LODR), Regulation 2015, have also prescribed companies to form some other board committees in order to focus on specific areas and informed decision making which remains unexplored in this study. Future studies can emphasize this area by considering the other committees of a board such as a nomination and remuneration committee, stakeholder relationship committee, corporate social responsibility committee and risk management committee so as to find their possible impact on FP. Secondly, some unique characteristics of family owned business in India such as the number of promoters on the board, family members on the board, etc. could constitute a useful extension of analysis in future studies. Finally, some other qualitative aspects such as the expertise of female directors on the board, the expertise of independent directors included on the audit committee might have a significant contribution towards FP and thus could be usefully considered in future studies.

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Analysis on the Relationship between the Change of Accounting Policy and Market Share Price

Li Shanshan
Wuhan Technology and Business University, School of Management.
Wuhan 430065, Hubei, China
809630466@qq.com

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Abstract. In the increasingly complex and intense competition of modern society, enterprises in order to survive, in its business process will use a variety of ways to ensure that their own business results to meet the requirements of investors and related interest groups to achieve the purpose of continuing operations, but also That is, through various means to beautify the financial report. With the continuous strengthening of supervision, enterprises began to transfer related party transactions to the accounting policy, that is, changes in accounting policies. The effectiveness of the market that the effective capital market should be the center of all kinds of information integration, the market will absorb the information reflected in the stock of the enterprise. In this paper, by using the event study method, through the 2013 annual report disclosed in the accounting policy changes of listed companies as a sample, to discuss the impact of changes in accounting policy on the stock price.

1. Introduction

During Deng Xiaoping's period, China began its economic policy of reform and development. The implementation of the policy has brought our country from planned economy to market economy, and the market guided enterprises and the people to spontaneously start with the development and growth of capital economy. The two stock exchanges founded later have become the official symbol of the burgeoning of China's capital market. The increasingly improved supervision mechanism has made our capital market more standardized and orderly. The split share reform implemented in 2005 has made the stock market of our country move towards the international market. The rapid economic development has made the stock market play an increasingly important role in our financial system. With the development of economy in the past 20 years, China's influence in the securities market has become growingly profound and lasting. Nowadays, as an important part of China's economic development, the securities market is gradually stepping among our common people, and its influence is also going up.

Owing to the special nature of the securities market, the securities market has attracted great attention from the capital. The high attention paid to information in the securities market is the performance of its high sensitivity to the market. The complexity of the stock market determines that all the factors that exist in the stock market may impact the changes of the stock price. Complex relations and factors keep the stock market in a constant fluctuation. Meanwhile, the price of stocks is also influenced by these complex factors, which are changing all the time.

In comparison with the foreign markets, the development of China's capital market is still very immature, and the relevant policies and management are still incomplete. There is still a large amount of real or false information in China's securities market, which is always concerned by the investors of enterprises and influences their subsequent investment plans. The new accounting standard promulgated in 2006 has provided the greater room for enterprises to choose accounting policy to a certain extent. The accounting policy adopted by enterprises according to specific circumstances does not only have an impact on the profits of enterprises, but also has a certain impact on the operation decision and direction of strategy of the enterprises in the later period. As for the investors, the expected future returns and operating conditions of enterprises are factors that need to be carefully considered, thus they will also have an impact on investors' investment behaviors, and the corresponding investor's investment behaviors are reflected in the fluctuation of stock price. Therefore, it is a necessity to study the impact of the accounting policy changes on the fluctuations of stock prices of the listed companies.

2. Literature review

Hupphorn (1953) puts forward that the main purpose of the manager of the enterprise is to balance the yield returns of different periods, rather than maximizing the reported profits, which also has brought forward new idea for the later research. Then Watts and Zimmer came up with three famous hypotheses in the study of the reasons for accounting policy choice, i.e. bonus plan, political cost and debt contract. In 1985, Healy's study found that if profit volumes fluctuate around the targeted earnings, the managers may take actions to increase their earnings during the reporting period; on the contrary, the managers will reduce their earnings during the reporting period, i.e. the details of the bonus plan play an important role in judging the impact of the bonus plan of the enterprise on accounting behavior, whilst well verifies the hypothesis of the bonus plan.

There are lots of studies on the motivation of changes in accounting policies in China. Yang Peng (2011) discusses that the audit of internal control of enterprises will influence the change of accounting policies of the enterprises, in which the regression method is applied to test the influence of internal control of enterprises on the change of accounting policies, and the factors that influence accounting policies are considered from the perspective of enterprises. Hu Liya (2015) puts forward the enterprise financial statements under the background of the change of accounting policy of the enterprise. In her analysis of the enterprise financial statements, the special impact of the change of accounting policy is focused on and then the targeted analysis and research are made on the change of the accounting policy of the enterprise. Zhang Xialian (2015) interprets the primary cause of the changes of accounting policy in enterprises as their pursuit of the maximization of the benefits, and the way enterprises take advantage of is the information asymmetry between the enterprises and investors when discussing the causes and effects of the changes of accounting policy in enterprises, Without doubt, some scholars try to use different ways to establish new theories or to explore the behavioral motives of the change of accounting policy from the new perspectives.

3. Overview of basic theory

3.1 Efficient market hypothesis

Eugene Farea, an American financier, put forward the efficient market hypothesis in the 1960s. He believed that the stock price of the market could not be predicted, which has been verified by that the market value follows the random walk model. The stock price of an enterprise is influenced by the demand of investors, and the demand of investors is mainly reflected by the accounting information issued by the enterprise. The change of accounting policy may or may not have an impact on the accounting profit of the enterprise. But the investors in the market will not care about the "past" accounting information of the enterprise, and they are more concerned about the profits the enterprise can bring to them. Therefore, only when the change of accounting policy the enterprise that affects the future earnings of the enterprise, i.e. the future cash flow and cash dividends of the enterprise, the investors will decide whether to buy stocks or not according to the degree of influence, which will also have an impact on the stock price.

3.2 Asymmetric information theory

Due to the characteristics of information generation and dissemination, there often exist the distortions and misunderstandings in the process of information transmission. In the securities market, since the status of the interested parties of the information differs in receiving and using, the corresponding information they receive is asymmetric, and the information the buyers and sellers possessing differs. The more the authenticity and quantity of the information become, the more accurate the analytical judgment will be. In reality, this information asymmetry extensively exists. As for an enterprise, retaining more relevant information will make the investors not know the real situation of the enterprise, and the enterprise will have more commanding heights to gain more benefits. Therefore, there exist the behaviors that the enterprises use information asymmetry to make their statements accepted by the investors and relevant groups.

3.3 Enterprise contract theory

The goal of the enterprise comes from the relevant requirements of different contractors. For instance, the requirement of shareholders for the enterprise is the maintenance and appreciation of the value of the capital; the creditors of the enterprise are concerned about whether the enterprise can repay the principal and interest at maturity, etc. The requirements of the relevant contractors affect the operation of the enterprise, and the contractors are rational investors. They will choose whether to join or withdraw from the contract according to their own costs and benefits and their withdrawal will have an impact on the enterprise. The investors' consideration of the enterprise also comes from the accounting information issued by the enterprise. When the management chooses the change of the accounting policy, different accounting policies will lead to different accounting information, so as to influence the degree of investors' recognition of the enterprise.

4. Research method and hypothesis

4.1 Research method

Event study is based on the hypothesis of market efficiency, which is used to discuss the impact of a specific event on the stock price of the enterprise. This paper examines the impact of the change of accounting policy on the stock price by the virtue of event study. Firstly, a reasonable sample for the change of accounting policy should be selected, and the data of stock price before and after the event of the sample company should be possessed. Secondly, the normal and abnormal rate of return of stock price and the effective rate of return of stock price should be calculated by substituting the market model in. By comparing the abnormal rate of returns and zero, whether the change of accounting policy of the enterprise has exerted Influence on the stock price or not can be worked out.

When discussing the relationship between the change of accounting policy and stock price in event study, the abnormal rate of return should be firstly determined.

To calculate abnormal rate of return during the event period should firstly calculate the expected normal rate of return of the enterprise, which is estimated by applying the market model in the paper, namely:

$$R_{it} = \alpha_i + \beta_i * R_{mt} + \varepsilon_{it} \quad (1)$$

of which, $E[\varepsilon_{it}]=0$ and $Var[\varepsilon_{it}]=\sigma_{it}^2$

R_{it} is the rate of return of the stock i on the t day. In this paper, the daily rate of return of cash dividend of the sample company on the t day is taken as the daily rate of return of the day; R_{mt} is the market rate of return on the t day of the enterprises and the α_i and β_i are the parameters to be estimated. Taking the annual report date of the sample company as the midpoint, the stock data of [-30, 30] are used. Finally, the normal rate of return of each company's stock price during the window period is calculated based on the estimated α_i and β_i.

Secondly, the daily abnormal rate of return of each stock during the window period is calculated.

$$\mathrm{AR_{it}} = \mathrm{R_{it}} \cdot \quad (2)$$

AR_{it} denotes the abnormal rate of return of the stock i on the t day; $\bar{R}_{it}$ is the normal rate of return of the stock i on the t day estimated under the market model; R_{it} is the effective rate of return of the stock i on the t day.

Finally, there are daily average abnormal rates of return of some stocks during the window period.

$$\mathrm{AAR} = \frac{1}{N}\sum_{t=1}^{N} \mathrm{A\,R_{it}} \quad (3)$$

N is the number of samples.

4.2 The proposition of hypothesis

In the complex economic activities, there are many factors affecting the stock price of the enterprise. From the information perspective, the external accounting information of the enterprise will affect the investment action of the investors in the enterprises. For investors, when the company is in a profitable state, they will invest, and the stock price will rise. Contrarily, they may withdraw the investment and the stock price will decline. On the premise of the market efficiency hypothesis, the accounting behavior of the enterprise will affect the change of stock price. The change of accounting policy of an enterprise is related to its operating income, i.e. the change of accounting policy of an enterprise will have a certain impact on the stock price of an enterprise. Therefore, the hypothesis is put forward.

Hypothesis 1: The change of accounting policy has an effect on stock price, i.e. the abnormal rate of return is not zero.

Hypothesis 2: The impact of the change of accounting policy on the stock price of the listed company differs before and after the window period.

5. Empirical results and analysis

5.1 The analysis of abnormal return of rate

Figure 5-1 shows the connection diagram of abnormal rate of return from t_{-10} to t_{10} . It can be seen intuitively that the average abnormal rate of return of other days show a downward trend except for the -10 day on which the average abnormal rate of return is higher. Table 5-1 lists the abnormal rates of return during the window period. It can be seen that the abnormal rate of return of 21 days are not zero except for the 2nd and 6th days, which indicates that the event has an impact on the stock price. This result is cross-checked with hypothesis 1. The average abnormal rates of return of the - 8, - 3, 0, 5, 7 and 10 day is negative and those of the other days are positive. The average abnormal rate of return on the event day is - 0.35%. The reason may be that some investors leave the market after a good turn, which makes them turn to be negative. In the following three days, the abnormal rate of return is respectively 0.12%, 0.10% and 0.13% to compensate for the negative value before, i.e. some investors join in the investment, which leads to the sustained rise of the stock price. It is demonstrated that the impact of the change of accounting policy on the stock price is short-term, which will be digested by the market in a short time.

Table 5-1 Abnormal rate of return of the event window

Time t	abnormal rate of return	T statistic	P value	significance
-10	0.0033	19.5872	0.0000	***
-9	0.0012	8.3876	0.0000	***
-8	-0.0025	-6.1489	0.0000	***
-7	0.0003	2.3805	0.0100	
-6	0.0028	7.6371	0.0000	***
-5	0.0020	7.1489	0.0000	***
-4	0.0016	7.1452	0.0000	***
-3	-0.0029	-7.0102	0.0000	***
-2	0.0023	8.6332	0.0000	***
-1	0.0024	6.3233	0.0000	***
0	-0.0035	-12.5722	0.0000	***
1	0.0012	5.2314	0.2705	***
2	0.0002	3.1428	0.0000	
3	0.0013	4.3506	0.0000	***
4	0.0031	6.6232	0.0000	***
5	-0.0014	-4.6654	0.0000	**
6	0.0001	3.2435	0.0000	
7	-0.0048	1.3775	0.0873	***
8	0.0005	1.7653	0.0000	**
9	0.0022	9.4123	0.0000	***
10	-0.0023	-9.5621	0.0000	***

*significant at the level of 1%, **significant at the level of 5%, and ***significant at the level of 10%

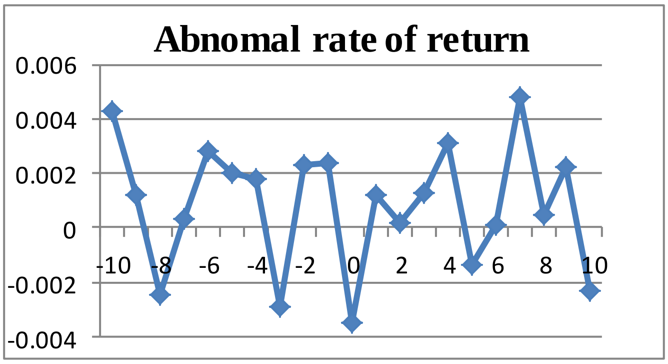

Fig. 5-1 Abnormal rate of return during the window period

5.2 The analysis of cumulative abnormal return

As can be seen from Figure 5-2, the cumulative abnormal rate of return during the window period shows a distinct upward trend; after the seventh day of the event, the cumulative abnormal rate of return shows a distinct upward trend.

Except for the 9th and 10th days, the cumulative abnormal rate of return slightly decreases. In Table 5-2, it can be seen that in 21 days during the window period, except the - 9, - 8, - 5, - 4 day, the other abnormal rates of return are obviously not zero, the abnormal rates of return of the - 10, - 9 day are negative, and those of other days are positive.

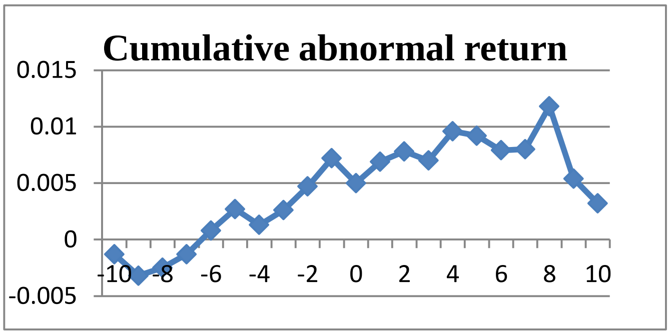

Fig. 5-2 Cumulative abnormal rate of return during the window period

Table 5-2 Cumulative abnormal rate of return of the event window

Time t	Cumulative Abnormal Return	T statistic	P value	significance
-10	-0.0013	-1.4361	0.0032	***
-9	-0.0032	-3.8881	0.1232	
-8	-0.0025	-2.1394	0.1523	
-7	-0.0013	-1.5713	0.0002	***
-6	0.0008	0.8885	0.0022	***
-5	0.0027	3.1695	0.3654	
-4	0.0013	1.0802	0.2319	
-3	0.0026	2.9189	0.0042	***
-2	0.0047	4.8856	0.0000	***
-1	0.0072	7.5961	0.0000	***
0	0.0050	2.8496	0.0046	***
1	0.0069	5.7750	0.0000	***
2	0.0078	7.9721	0.0000	***
3	0.0070	8.2832	0.0000	***
4	0.0096	10.1600	0.0000	***
5	0.0092	9.6468	0.0000	***
6	0.0075	8.6774	0.0000	***
7	0.0080	9.4142	0.0000	***
8	0.0118	13.5612	0.0000	***
9	0.0054	6.3724	0.0000	***
10	0.0032	3.8552	0.0002	***

*significant at the level of 1%, **significant at the level of 5%, and ***significant at the level of 10%

5.3 The analysis of the business performance of the enterprise

Through the impact of the change of accounting policy on the profit of the enterprise, the profit is divided into two groups: rising and falling. According to the chart of abnormal rate of return, it can be concluded from Figure 5-3, Figure 5-4 and Figure 5-5 that as for the cumulative abnormal rate of return on the event day [-10, 4], the increase of profit is higher than the decrease of profit; as for the cumulative abnormal rate of return on the event day [-20-20], and the increase of profit is lower than the decrease of profit. This shows that the impact of accounting policy on the profits of listed companies during the different periods is different. There are some differences before and after the event of the change of accounting policy, which is consistent with hypothesis 2.

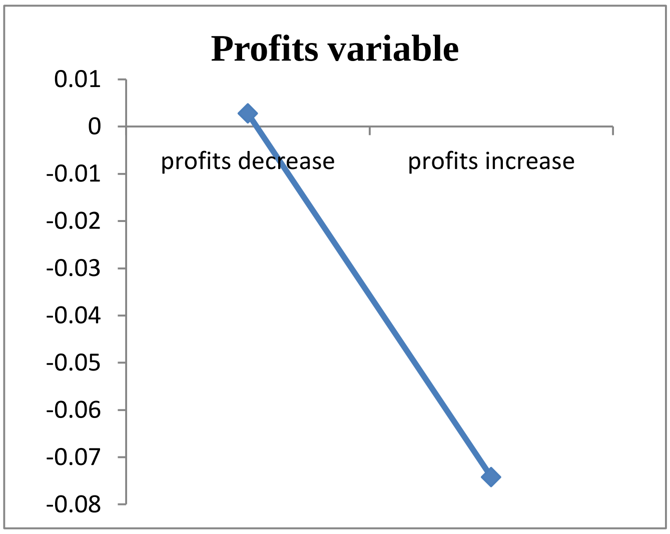

Fig. 5-3 Abnormal rate of return on the event day

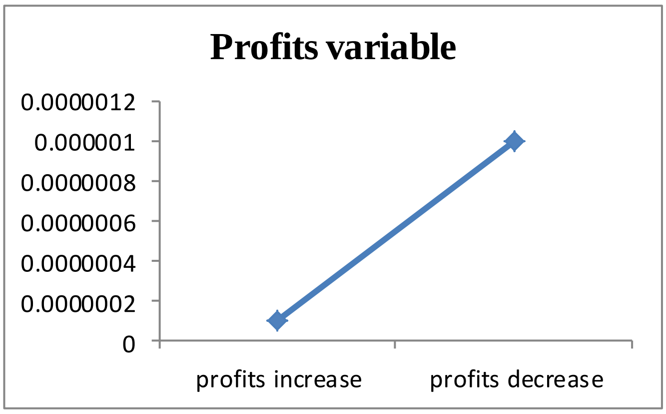

Fig. 5-4[-10, 4] Abnormal rate of return

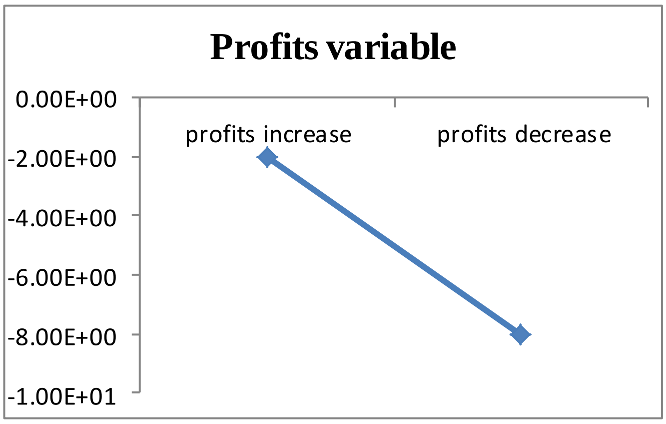

Fig. 5-5 [-20, 20] Abnormal rate of return

6. Research results

This paper uses the event study to study the change of the stock price of the listed company before and after the change of the accounting policy in 2016, and comes to a conclusion:

The market responds fairly to the change of accounting policy. The efficiency of the market considers that the securities market responds to the disclosure of accounting information by the enterprise, which is reflected in the stock price of the enterprise, i.e. the stock price will fluctuate with the disclosure of accounting policy information.

In the short run, the impact of the change of accounting policy on the stock price is limited, which will be absorbed by the market in a relatively short period of time. All abnormal returns obtained through the change of accounting policy will not last long.

As for the impact of the change of the accounting policy, it differs in the early and late stage of the event from the profit of the enterprise.

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Market Uncertainty and the Importance of Media Coverage at Earnings Announcements☆

Samuel B. Bonsall, IV

The Pennsylvania State University

Jeremiah Green[1,*]

Texas A&M University

Karl A. Muller, III[2,*]

The Pennsylvania State University

Abstract

We investigate whether increased investor demand for financial information arising from higher market uncertainty leads to greater media coverage of earnings announcements. We also investigate whether greater coverage during times of higher uncertainty further destabilizes financial markets because of greater attention-based trading or, alternatively, improves trading and pricing by lowering investor acquisition and interpretation costs. When uncertainty is higher, we find evidence of greater media coverage of earnings announcements and that the greater coverage leads to improvements in investor informedness, information asymmetry, and intraperiod price timeliness, and greater trade by both retail and institutional investors. In contrast to the media serving an expanded role in improving capital markets during more uncertain times, we fail to find that changes in firm-initiated disclosures lead to similar improvements and find that less frequent analyst forecast revisions exacerbate problems in capital markets during earnings announcements.

Keywords: *media coverage, market uncertainty, earnings announcements, price efficiency*

JEL: M41, G12, G14, G41, D82, D83

Data Availability: *All data are publicly available from the sources identified in the text.*

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*Corresponding author: James Benjamin Department of Accounting, Mays Business School, Texas A&M University, 460W Wehner Building, 4353 TAMU, College Station, TX 77843-4353

Email addresses: sbb151@psu.edu (Samuel B. Bonsall, IV), jgreen@mays.tamu.edu (Jeremiah Green), kam23@psu.edu (Karl A. Muller, III)

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1. Introduction

Investors face significant challenges in gathering information about firms' expected future payoffs. As evidence of these challenges, prior research demonstrates that investors are affected by the coverage of earnings information through the media, social networks, equity and credit analyst reports, and other intermediaries (e.g., Blankespoor et al., 2013; Bushee et al., 2010; De Franco et al., 2009; Drake et al., 2017; Huang et al., 2014).[3] These studies find evidence of important capital market benefits of greater coverage of earnings information—such as narrower spreads, increased liquidity, and reduced mispricing. Underlying these studies is the notion that investors are constrained in their ability to obtain news or that intermediaries' reports and stories provide additional information beyond firms' earnings releases. Such constraints can arise because investors do not pay the significant costs to be directly informed or have limited cognitive resources to pay attention (e.g., Hong and Stein, 1999; Merton, 1987). Information intermediaries can mitigate these constraints. Greater coverage by intermediaries, however, can also lead to greater problems in financial markets, such as attention-driven trading and momentum trading (e.g., Barber and Odean, 2008).

This study examines whether periods of increased market uncertainty lead the media to expand its role as an intermediary of earnings announcements. We investigate whether higher market-wide investor uncertainty leads to an outward shift in investor demand for financial information that manifests itself through greater media coverage of earnings announcements. Because investors are averse to uncertainty (e.g., Bansal and Yaron, 2004; Drechsler, 2013), their aggregate demand for financial information can grow when market uncertainty increases. We predict an expanded role for the media because it is an information intermediary with extensive readership and broad coverage and one that specializes in the production of relatively low-cost news reports. Because of extensive readership, the production costs of creating stories can be spread more easily across subscribers, leading to lower average costs for producing stories and potential greater profitability. Because of broad market coverage and relatively low production costs, the media can respond to increased demand with an expansion in coverage. We further predict that the media will shift their coverage increasingly to earnings announcements rather than non-earnings announcements because earnings

[3] Miller and Skinner (2015) provides a discussion of recent developments in this line of research.

releases have low acquisition costs, are predictable, and typically contain value-relevant information that can help market participants resolve uncertainty. Whether the media shifts coverage based on the level of market uncertainty is unclear, as such actions involve the costly reallocation of resources and higher uncertainty can make it more difficult for media stories to affect investor opinions.

This study also examines how greater media coverage of earnings announcements influences trading and pricing during periods of higher market uncertainty. During such times, increased media coverage of earnings announcements can lead to improved trading and pricing, as evidenced by lower mispricing and information asymmetry, and greater speed of price discovery (e.g., Bushee et al., 2010). However, whether this occurs is unclear, as in other settings, prior research finds that greater media coverage can reduce price efficiency because of resulting attention-driven trading (e.g., Barber and Odean, 2008) and momentum trading (e.g., Hillert et al., 2014), and because of slanted media coverage of news (e.g., Gurun and Butler, 2012).

Using media stories from the RavenPack database during 2004–2013 and the Chicago Board Options Exchange's Volatility Index (VIX) to measure overall market uncertainty,[4] we find that media coverage of earnings announcements increases during periods of higher market uncertainty and that the increased coverage leads to improved trading and price efficiency at earnings announcements.[5] In contrast, we find that media coverage during non-earnings announcement periods decreases with the level of market uncertainty. As higher market uncertainty can lead to important changes in the supply of information by other market participants, which can in turn affect the coverage decisions of the media, our analysis also examines how concurrent changes in firm-initiated disclosure and financial analyst forecasting behavior affect the change in media coverage. During earnings announcements, we find that higher uncertainty leads to less frequent analyst revisions but fail to find a change in firm-initiated disclosures. The decline in analyst revisions, in turn, leads to lower media coverage during periods of greater uncertainty. In contrast, outside of earnings announce-

[4]We focus on the VIX because it captures investors' expectations about future volatility, is widely followed by market participants, especially the media, and affects the broadest set of listed firms. For instance, the index is often colloquially referred to as "Wall Street's fear gauge" and as "a staple of the financial press" (Loder and Banerji, 2017). The focus on the market's expectation differs from alternative measures of expected future macroeconomic uncertainty (Jurado et al., 2015; Rossi and Sekhposyan, 2015). Other types of common uncertainty (e.g., industry uncertainty) can lead to similar problems for investors.

[5]Price efficiency is defined generally as the extent to which prices and trading capture all information available to market participants.

ments, we find that higher uncertainty leads to relatively fewer firm disclosures but relatively more frequent analyst revisions, which, in turn, result in lower and higher media coverage, respectively.

In further analyses, we provide evidence of when and how the media makes systematic coverage changes during periods of higher market uncertainty. We find greater media coverage when market uncertainty increases for each VIX quartile, suggesting that the media monitors and responds to user demand for financial information at different levels of the VIX. We also find that economic policy uncertainty (Baker et al., 2016), foreign currency volatility, and other sources of market uncertainty are important drivers of the VIX that lead to greater media coverage of earnings announcements. In addition, we show that the lower media coverage found during non-earnings announcement periods is largely explained by the greater coverage of other firms' earnings releases, consistent with non-earnings announcement coverage being crowded out during periods of higher uncertainty. Finally, we show that the media shifts coverage towards short news flash stories that can quickly rebroadcast disclosures, towards bellwether firms (i.e., firms whose earnings are most closely linked to the macroeconomy), away from full stories, and less towards non-bellwether firms.

Regarding how greater coverage at earnings announcements during periods of higher market uncertainty affects capital markets, we find that the greater coverage leads to improvements in trading and pricing. Overall, we find that higher market uncertainty leads to deteriorating capital market conditions at earnings announcements, as evidenced by abnormally higher price changes and trading volume, wider bid-ask spreads, lower depth, reduced intraperiod price timeliness, and increased trade by retail investors but decreased trade by institutional investors. When we focus on how the level of the VIX affects media coverage and then how media coverage affects these capital market outcomes, however, we find that the greater coverage during such times leads to improved investor informedness, as evidenced by higher abnormal price changes and trading volume. We also find improved price efficiency, as evidenced by narrower spreads and greater depth, increased intraperiod price timeliness, and increased trade by not only retail investors but also institutional investors. In addition, when we focus on how the level of the VIX influences firm disclosure and analyst forecast revisions and then how each affects the different capital market outcomes, we find that fewer analyst forecasting revisions during earnings announcements lead to even worse capital market outcomes but that disclosure changes have little impact on capital market outcomes.

These findings offer several important contributions to prior literature. We provide evidence that media coverage increases at earnings announcements during periods of elevated market uncertainty and that the increased coverage in turn leads to improved trading and pricing. This evidence builds on and extends the growing body of research findings of when and in what settings media coverage can make capital markets more or less efficient (e.g., Blankespoor et al., 2018).

In addition, we provide evidence of how the media makes trade-offs during times of higher uncertainty. Prior research shows that media attention clusters around earnings announcements (e.g., Tetlock et al., 2008), however, little evidence exists regarding why that coverage changes over time or across firms. Our results provide evidence that the media's move to expand coverage of earnings announcements crowds out the coverage of non-earnings announcement periods. Our results also provide evidence that journalists write fewer full stories during periods of higher uncertainty but move to more frequent small updates using short news flashes. Further, our results provide evidence of increased coverage of bellwether firms while not increasing coverage as much for non-bellwether firms.

Finally, our findings demonstrate that the importance of media coverage during earnings announcements grows during times of higher market uncertainty relative to other sources of information. In particular, during such times, we find that firm-initiated disclosure is relatively unchanged and that analyst forecast revisions are less frequent at earnings announcements. In addition, in contrast to the activities of the media improving capital market outcomes at earnings announcements, we fail to find similar evidence for firm-initiated disclosures and find that less frequent analyst forecast revisions result in worse capital market outcomes.

2. Background and research hypotheses

2.1. Prior research on the media and earnings announcements

The media plays an influential role as an information intermediary in financial markets.[6] Coverage by the media tends to concentrate on firms that are of greater interest to its readers, individuals, and institutional investors. This leads to greater coverage for larger firms, value stocks, firms with

[6] A large literature examines the role of the media in financial markets: Ahern and Sosyura (2014); Ahn et al. (2019); Blankespoor et al. (2018); Bushee et al. (2010, 2018); Bushman et al. (2017); Drake et al. (2014, 2017); Engelberg and Parsons (2011); Fang et al. (2014); Fang and Peress (2009); Griffin et al. (2011); Guest (2018); Hillert et al. (2014); Klibanoff et al. (1998); Miller (2006); Peress (2014); Solomon (2012); Solomon et al. (2014); Soltes (2011); Tetlock (2007); Tetlock et al. (2008); Tetlock (2010); Thompson et al. (1987); Twedt (2015).

more analyst coverage, firms more widely held by individuals and institutions, greater idiosyncratic volatility stocks, indexed firms, firms with more employees, more heavily traded stocks, and momentum stocks (e.g., Bushee et al., 2010; Drake et al., 2014, 2017; Fang and Peress, 2009; Hillert et al., 2014). Coverage by the media also tends to concentrate during the days around earnings announcements (e.g., Drake et al., 2014; Tetlock et al., 2008; Thompson et al., 1987). Accordingly, the media appears to respond to the demands of individual and institutional investors to follow certain types of firms and to cover earnings releases to meet investor demands.

Media coverage of earnings announcements also has important capital market consequences. For instance, Bushee et al. (2010) finds that media coverage of earnings announcements assists in narrowing bid-ask spreads and increasing depth. Soltes (2011) also finds that greater coverage of earnings information increases trading volume and lowers idiosyncratic volatility. Engelberg and Parsons (2011) shows that local coverage of earnings announcements leads to greater trading by local investors. Drake et al. (2014) demonstrates that cash flow mis-pricing is lower for firms receiving greater coverage of their earnings announcements. Blankespoor et al. (2018) provides evidence that algorithmic articles of firms' earnings announcements produced by the Associated Press and disseminated by large media outlets lead to higher trading volume and liquidity.

2.2. Research hypotheses

2.2.1. Increased media coverage of earnings releases

Coverage of firms' earnings releases by media outlets is a function of the demand for such information, which can vary over time. As shown in Veldkamp (2006), because complementarity in information acquisition can arise, the media can maximize their profitability by obtaining information with a price that will exceed the cost of obtaining and disseminating the information.[7] The investment represents, for instance, the cost of a journalist preparing a story or obtaining non-public information. As the number of purchasers of the information increases, the cost is spread out, making the investment in information more profitable. The relative value of the information

[7] Whether the cost is fixed or variable only matters over the very short-run. Within Veldkamp (2006), the cost of a story is primarily fixed as news organizations are constrained in the short-run by their personnel, information, and time for collecting and synthesizing information and then disseminating news stories. Over longer periods virtually all costs are variable, as news organizations can shift almost all production costs. For instance, investments in individual journalists are variable costs. Consistent with this, 100,000 journalists have been fired over the last decade Thompson (2016), while over 10,000 new journalist majors graduate each year (see: https://datausa.io/profile/cip/090401/).

obtained will dictate the price that the individual supplier can charge and, accordingly, the expected cost it is willing to incur. The media generally incurs relatively low production costs to acquire information. This is in contrast to other more specialized suppliers of information that incur high production costs (e.g., investment advisors with private newsletters).

Higher demand for media coverage is expected to arise when uncertainty about asset payoffs grows. Veldkamp (2006) demonstrates that important shifts in the aggregate demand for information can occur when common shocks occur to the variance of firms' expected future payoffs, as the shocks to expected payoffs are multiplicative and time-varying. Because news stories become more valuable during such times due to the higher variance of expected payoffs, there should be an outward shift in demand for news stories.[8] Although less formal than Veldkamp (2006), Jensen (1979) also predicts that consumer preferences—especially aversion to ambiguity—shape the demand for news. In addition, this prediction is consistent with prior findings that investors dislike uncertainty, requiring a premium for holding assets with high uncertainty risk (e.g., Bansal and Yaron, 2004; Drechsler, 2013; Kumar, 2009; Ozoguz, 2009; Segal et al., 2015).

Because of the greater demand, periods of higher market uncertainty can lead to significant increases in media coverage. This prediction is premised on the media paying attention to changes in market uncertainty. Consistent with this assumption, as Baker et al. (2016) shows, the top 10 leading U.S. newspapers increase their coverage of major events that create economic policy uncertainty, as measured by their text-based economic policy uncertainty (EPU) index. Also, using an alternative text-based uncertainty measure from front-page articles of the *Wall Street Journal*, Manela and Moreira (2017) shows that the media closely tracks their coverage with information also contained in the VIX.

To gain further insight, we interviewed senior journalists that have written for major business press outlets including *Bloomberg News*, *Dow Jones Newswires*, *Forbes*, *The Financial Times*, *The New York Times*, and *The Wall Street Journal*. Consistent with our assumption, journalists indicated that the business press actively monitors investor demand for information. For instance, one

[8] The increased demand can come from readers that follow the firm about which the story is written and readers who are trying to learn about macroeconomic uncertainty through multiple noisy signals from a wide number of firms; the latter can occur as individual firm's earnings reveal important information about the macroeconomy (Anilowski et al., 2007; Bonsall et al., 2013; Aobdia et al., 2014).

journalist indicated that "stories get pushed based on what investors are searching for. Our analytics allows us to see what people are looking for and we respond to what the readers are requesting, [based on such inputs as] Google searches, other newspapers, and social media." Our interviews of journalists also included questions about how and why the media shift coverage during periods of market uncertainty (e.g., what types of news stories are more common during periods of greater uncertainty). We discuss the relevant institutional insights gained through our interviews in later sections of the study.

While the media could increase all types of coverage in response to heightened demand for information, we predict that the media will increase their coverage of earnings releases rather than all possible types of news stories. The media face short-term supply constraints that force them to make trade-offs in their coverage decisions. Increasing the supply of stories, particularly original stories, requires costly investments in hiring and training journalists, and in acquiring private information.[9] In addition, the information that firms and other information intermediaries provide may be affected by higher uncertainty; accordingly, the cost of acquiring some types of information may also increase with market uncertainty. Because of these constraints and the media's role as a low-cost information supplier, we predict that the media will shift toward news stories that are relatively low cost, predictable, and relevant. Firms' earnings announcements possess all three attributes. Specifically, the gathering and dissemination of earnings information is relatively inexpensive and firms' announcement dates can be readily anticipated. In addition, as shown in prior research, the media's dissemination of earnings information has important capital market consequences.

Whether the media respond to greater demand for coverage by increasing their capacity to supply coverage or by altering the mix of coverage they provide, however, depends on the net benefit to the media. Despite the increased demand for coverage during periods of higher uncertainty, the needed outlay of expenditures to increase the resources to acquire, process, interpret, and disseminate earnings information could preclude significant coverage changes by the media. Additionally,

[9] The notion that the press is constrained in its provision of news stories is pervasive in practice. Randall (2000) describes the constraints in this way: "There are limits to the process of journalism. Shortage of time and information are two which are endemic." Our interviews with senior journalists indicated that short-term constraints continue today, even in the digital news environment. For instance, one journalist indicated, "all newsrooms are stressed based on the number of people available for coverage."

unlike the demand for greater coverage of specific types of firms (e.g., larger firms), temporary demand shifts brought about by higher market uncertainty can be relatively unpredictable.

2.2.2. Capital market consequences of increased coverage of earnings releases

When the level of market uncertainty increases, greater demand for coverage of earnings information can lead to the media having a more important role as an information intermediary. If the media shift resources to increase the dissemination and interpretation of earnings information, a greater number of traders will receive the information and update their beliefs. This can lead to important changes in prices, trading volume, and price efficiency. First, following Holthausen and Verrecchia (1990), larger abnormal price changes will occur if the increased dissemination and interpretation of earnings announcements leads to greater informedness (i.e., the degree to which investors become more informed) and consensus (i.e., the degree of agreement among investors). In addition, larger abnormal trading volume will occur if the increased coverage leads to greater informedness; however, lower (higher) abnormal volume will be observed if the increased coverage leads to greater (lower) consensus. Thus, unlike abnormal price changes, whether higher or lower abnormal trading volume will occur depends on whether lower consensus complements greater informedness or whether greater consensus dominates. Accordingly, the two types of market reactions to earnings announcements can provide different insights into investors' reactions when media coverage grows during periods of higher market uncertainty.

Second, greater media coverage of earnings announcements during such times can lead to trading and pricing being more or less efficient. On one hand, the increased coverage could overcome investor limited attention issues when uncertainty is higher, resulting in improved price efficiency. Prior research suggests that investors face limited attention with regard to firm-specific information (e.g., Bloomfield, 2002; Hirshleifer et al., 2009; Hirshleifer and Teoh, 2003; Merton, 1987; Peng and Xiong, 2006). The media, in their role as an information intermediary, can both disseminate and synthesize the information released in earnings announcements, lowering information acquisition and interpretation costs and improving price efficiency (e.g., Bushee et al., 2010; Fang and Peress, 2009; Tetlock, 2010). Empirical evidence indicates that the media can serve such a role, finding that media coverage reduces mispricing (Drake et al., 2014), information asymmetry (e.g., Blankespoor et al., 2018; Soltes, 2011) and the cost of capital (e.g., Fang and Peress, 2009; Kothari et al., 2009).

These findings are consistent with the gradual diffusion of news model of Hong and Stein (1999).

On the other hand, greater coverage could lead to more attention-driven trading at the worst possible time (i.e., higher market uncertainty), resulting in diminished price efficiency. Chan (2003) and Vega (2006) find that price drift is greater for news receiving coverage by the media. Barber and Odean (2008) provides evidence that coverage leads individual investors to purchase stocks receiving attention. Engelberg et al. (2012) offers evidence that stock recommendations from the popular television show *Mad Money* generate attention-based trading and overnight returns that subsequently reverse in later months. Bushee et al. (2018) finds that such attention-driven trading is more pronounced during IPO quiet periods. In addition, Tetlock (2011) shows that individual investors trade on stale news stories and that such trading leads to subsequent price reversals. Further, some case studies provide evidence of large price and volume changes to media coverage that simply rebroadcast news made public months earlier (e.g., Huberman and Regev, 2001). Finally, during heightened market uncertainty, media coverage can have a more pronounced effect on short-term price distortions due to greater investor sensitivity to news (e.g., Garcia, 2013; Williams, 2014). Because of these differing possibilities, we do not make a directional predication regarding how greater media coverage of earnings announcements during periods of higher market uncertainty affects trading and price efficiency.

3. Research design

3.1. Increased media coverage of earnings releases

Our first set of empirical tests examines how market uncertainty leads to systematic increases in media coverage of earnings announcements. We begin by investigating whether media coverage of earnings announcements grows with market uncertainty using the following OLS regression model:

$$LCoverage_X = \alpha_0 + \alpha_1 VIX + \sum \alpha_i Control_i + \epsilon \qquad (1)$$

where $LCoverage_{EA}$ is the natural logarithm of one plus the number of news articles with relevance scores greater than or equal to 90 captured by RavenPack on days $[0, +1]$ relative to the quarterly earnings announcement ($X = EA$); and VIX is the average level of the Chicago Board Options

Exchange Volatility Index during the period from five days following the announcement of quarter $t-1$ earnings to five days prior to the announcement of quarter t earnings.

We test whether significant increases in media coverage during times of higher market uncertainty are concentrated at earnings announcements or are, alternatively, attributable to increased demand for all types of information. Our approach, similar to that adopted by Bushee et al. (2010), uses non-earnings announcement periods as a benchmark to evaluate the effect of market uncertainty on the coverage of earnings announcements relative to the coverage of other news. Our approach differs from that of Bushee et al. (2010) as we estimate separate models for the earnings announcement and non-earnings announcement periods, rather than one model for abnormal earnings announcement coverage. The dependent variable for the non-earnings announcement periods, $LCoverage_{NonEA}$, is the natural logarithm of one plus the number of stories written about firm i on non-earnings announcement trading days ($X = NonEA$) that fall between the current and most recent prior earnings announcement divided by the number of non-overlapping two-day non-earnings announcement trading days (for comparability with $LCoverage_{EA}$).[10] We expect that α_1 when $LCoverage_{EA}$ is the dependent variable will be greater than when $LCoverage_{NonEA}$ is the dependent variable.

We also examine how other market participants alter their actions in response to higher market uncertainty and how the media coverage is influenced by their actions. First, we investigate how firms change their disclosure practices in response to higher market uncertainty. Such change can occur if investors demand greater disclosure during more uncertain times. Managers may respond to the heightened demand by increasing their disclosures. Alternatively, managers may decrease their disclosure due to the increased uncertainty. Consistent with managers facing greater costs or limitations of disclosing forward-looking information, Kim et al. (2015) find that managers are less likely to issue management earnings forecasts during periods of elevated macroeconomic uncertainty.[11] Second, we investigate how analysts change their forecasting behavior in response to

[10] Our approach is equivalent to Bushee et al. (2010) except that it allows for the estimation of separate coefficients in the earnings and non-earnings announcement periods. Specifically, Bushee et al. (2010) measure abnormal press coverage as: $ABN\_PRESS = Ln\left((1 + PRESS_{EVENT}) / (1 + PRESS_{PRE})\right)$. Accordingly, by the quotient rule, coefficient estimates when using ABN_PRESS equal those from the separate estimation of $Ln\left(1 + PRESS_{EVENT}\right)$ minus those from the separate estimation of $Ln\left(1 + PRESS_{PRE}\right)$.

[11] Nagar et al. (2019) find, however, that managers are more likely issue forecasts when economic policy uncertainty is higher.

higher uncertainty. Loh and Stultz (2017) find that during periods of macroeconomic uncertainty analysts work harder by providing more accurate forecasts conditioned on the level of macroeconomic uncertainty and more frequent earnings forecasts. Loh and Stultz (2017) also find, however, that during such times there are significant reductions in analyst ranks, consistent with shrinking compensation and greater attrition. These changes in manager and analyst behavior during periods of higher market uncertainty could lead to changes in media coverage, as their disclosures and forecasts are common sources of information for journalists' stories (Call et al., 2018).

To examine how changing firm disclosure and analyst forecasting practices affect media coverage during periods of higher market uncertainty, we use a mediation model (i.e., path analysis) approach following the suggestions of MacKinnon and Dwyer (1993) and Hayes and Rockwood (2017). Prior accounting research has used path analysis to formally test whether a relationship between X and Y arises through path Z (e.g., Bonsall et al., 2018; Bonsall and Miller, 2017; Landsman et al., 2012; Lang et al., 2012). In our analysis, we decompose the total effect of the relationship between VIX and $LCoverage_X$ in equation (1) into the mediated paths resulting from changes in firm disclosure and analyst forecast revisions and the direct path of $VIX \rightarrow LCoverage_X$. Our mediator variable for firm disclosure is $LForm8K$, the natural logarithm of one plus the number (two-day averaged number) of Form 8-K filings by a firm during the earnings (non-earnings announcement) window. Form 8-Ks are collected from the SEC EDGAR database using an approach similar to Guest (2018). We use the release of Form 8-Ks as they typically relate to material events that arise in day-to-day changes in operations, performance, financial information, governance, and trading (e.g., Lerman and Livnat, 2010). Also, other forms of voluntary disclosure, such as management earnings forecasts and press releases, generally overlap with the release of a Form 8-K. For instance, Chuk et al. (2013) finds that the overlap of management forecasts in Form 8-Ks and press releases is 94 percent but that their inclusion is more common in Form 8-Ks. Our mediator variable for analyst forecasting activity is $LRevisions$, the natural logarithm of one plus the number (two-day averaged number) of analyst earnings forecast revisions made during the earnings (non-earnings announcement) window.

Certain types of firms are more likely to receive media attention than others do, such as large and growing firms. Our control variables are intended to capture the determinants of firms' normal level of media coverage. Specifically, similar to those used in prior related research (e.g., Blankespoor et al., 2018; Bonsall et al., 2018; Bushee et al., 2010; Drake et al., 2014, 2017; Fang and Peress, 2009;

Hillert et al., 2014) our control variables (defined in Appendix A) include $AbsEarnSurp$, $NegSurp$, $LMktCap$, $LFollow$, $InstHold$, $IVol$, Ret,[12] $SP500Member$, $LEmployee$, $LOwn$, $NasdaqTraded$, $Turnover$, and $MomStrength$. Despite our many controls, our causal interpretation of the findings could be threatened if other (unobservable) factors are correlated with our variable of interest, VIX, and $LCoverage_{EA}$. To mitigate this possibility, we conduct our tests using a firm fixed-effects model. This approach provides evidence of how the level of market uncertainty affects within-firm variation in media coverage.

3.2. Capital market consequences of increased coverage of earnings releases

3.2.1. Changing investor informativeness and consensus

Our next set of empirical tests examines the extent to which capital market outcomes during earnings announcements are negatively affected by higher market uncertainty and whether higher media coverage during such periods worsens or improves trading and pricing. We investigate these issues using the below model:

$$CapMktOutcome = \delta_0 + \delta_1 VIX + \sum \delta_i Control_i + \upsilon \qquad (2)$$

We first examine how investor informativeness and consensus change around earnings announcements. We investigate whether abnormal price changes at earnings announcements increase when market uncertainty is higher using $|AbnReturn|$, defined as the absolute value of the raw return minus the CRSP value-weighted index return during the earnings announcement period $[0, +1]$. Our measure of abnormal price changes follows Tetlock et al. (2008) and Tetlock (2011). As Tetlock et al. (2008) show, controlling for traditional risk factors has little effect on abnormal return calculations focused on short-window announcements of firm-specific news. Because the pre-disclosure precision of information should be lower when market uncertainty is higher and the release of earnings information should lead to greater belief revisions (Veldkamp, 2006), abnormal price changes should be higher when market uncertainty is higher.

[12] We control for firm-specific returns to alleviate concerns that good or bad news determines the level of media coverage. We do not directly control for market-level returns, however, as prior work by Romer (1990), Fernández-Villaverde et al. (2011), Fernández-Villaverde et al. (2015), and Barrero et al. (2017) demonstrates, changes in the business cycle are caused by shocks to macroeconomic uncertainty.

We also examine whether there is abnormal trading volume when market uncertainty is higher using $AbnVol$, defined as share turnover during the earnings announcement period $[0, +1]$ less the median two-day share turnover of consecutive two-day periods during the non-announcement period. The non-announcement period is comprised of all dates between five trading days subsequent to the release date of quarter $t-1$ earnings and five trading days prior to the release date of quarter t earnings. Our measure of abnormal volume is similar to that used in Barron et al. (2018). We expect that abnormal trading volume surrounding earnings announcements will be higher when market uncertainty is higher. This prediction assumes again that pre-disclosure precision of information is lower when market uncertainty is higher and that the release of earnings information leads to greater belief revisions. In models of trading volume (Kim and Verrecchia, 1991a,b), greater differential precision of information before earnings announcements can lead to greater revisions to investors' beliefs when earnings are released. Empirical studies examining earnings announcements support this prediction (e.g., Bamber et al., 2011). However, if the release of earnings during such times leads to greater investor consensus dominating greater informativeness, lower abnormal trading volume will be observed.

We directly investigate whether increased media coverage during periods of higher market uncertainty is responsible for the predicted changes in prices and trading volume in equations (2) and (3) using path analysis. Specifically, we decompose the total effect of the relationship between VIX and $|AbnReturn|$ and $AbnVol$ into mediated paths resulting from changes in media coverage, as well as changes in firm disclosure and analyst forecast revisions. Our mediator variables are $LCoverage_{EA}$, $LForm8K$, and $LRevisions$. For $|AbnReturn|$ and $AbnVol$, the combined indirect paths of $VIX \rightarrow LCoverage_{EA} \rightarrow |AbnReturn|$ and $VIX \rightarrow LCoverage_{EA} \rightarrow AbnVol$ are of primary interest. Control variables included in the analyses are the same as equation (1) and are consistent with those used in prior related research.

3.2.2. Changing price efficiency

Abnormal price changes and trading volume around earnings announcements could yield results that are caused by more information being available to investors through greater media coverage or by uninformed investors trading more in response to greater coverage. Accordingly, our last set of tests explores whether price efficiency improves or declines around earnings announcements.

Information asymmetry

Greater coverage by the media at earnings announcements can reduce information asymmetry (i.e., narrower bid-ask spreads and greater depth). Examining different samples of firms, Bushee et al. (2010), Soltes (2011), and Blankespoor et al. (2018) find supporting evidence of a reduction in information asymmetry. During periods of increased market uncertainty, greater coverage could also lead to improvements in information asymmetry (e.g., lower spreads and greater depth), have no effect given the increased market uncertainty, or even lead to greater information asymmetry as the increased market uncertainty could provide sophisticated investors with an information advantage at earnings announcements. We investigate how increased market uncertainty affects information asymmetry at earnings announcements using two variables for information asymmetry: *AbnSpread* is the weighted average effective bid-ask spread during the earnings announcement period $[0, +1]$ less the median two-day weighted average effective bid-ask spread of consecutive two-day periods during the non-announcement period and *AbnDepth* is the weighted average bid and offer depth during the earnings announcement period $[0, +1]$ less the median two-day weighted average bid and offer depth of consecutive two-day periods during the non-announcement period. Following Holden and Jacobsen (2014) and Blankespoor et al. (2018), weighted average amounts are based on the amount of time during each trading day that the spreads and depth are in force. Similar to our investor informativeness and consensus tests, we examine the mediated paths arising from changes in media coverage, as well as disclosure and analyst forecast revisions, for *AbnSpread*, *AbnDepth*, in this and later tests. We also use the same control variables.

Intraperiod price timeliness

Greater media coverage of earnings announcements can also increase the speed by which earnings information is impounded into prices. Along these lines, Twedt (2015) finds that greater media dissemination of the release of management earnings forecast leads to greater efficiency in the incorporation of the information into price. Blankespoor et al. (2018), however, do not find that greater dissemination of automated articles by the Associated Press of earnings releases leads to greater speed of price discovery. During periods of higher market uncertainty, how greater media coverage affects price discovery is again unclear as the greater interpretation and dissemination of earnings information could speed price discovery, or alternatively, it could lead to biased or uninformed trading, particularly by retail investors. Our investigation of this possibility begins with examining how higher market uncertainty affects intraperiod price timeliness using IPT, defined as the adjusted intraperiod timeliness measure measured over the six-day earnings announcement window suggested by Blankespoor et al. (2018).[13] Larger IPT values are consistent with faster price discovery.

Trade by retail and non-retail investors

The greater attention and dissemination brought about by greater media coverage at earnings announcements can lead to more trade by retail investors. Consistent with such a possibility, Blankespoor et al. (2018) finds more retail trading volume following greater dissemination of automated articles by the Associated Press. When market uncertainty is higher, greater coverage could lead to more or less trade by retail investors. Such time periods could make retail investors more reluctant to trade due to the greater uncertainty, despite greater dissemination. Alternatively, it could make retail investors more likely to trade given heightened investor sensitivity and greater media dissemination of earnings information. In addition, the greater media coverage can lead to more trade by institutional investors, as the greater coverage increases the informedness of institutional investors. Accordingly, the actions of institutional investors provide greater insight into whether abnormal trading volume increases are attributable to increased investor informedness. The possibility exists that greater coverage at earnings announcement can lead to greater investor consensus, however, resulting in abnormally lower trading.

We examine these possibilities using two variables for abnormal trading: $AbnRetailVol$ is share turnover by retail investors during the earnings announcement period $[0, +1]$ less the median two-day share turnover by retail investors of consecutive two-day periods during the non-announcement period, which is comprised of all dates between five trading days subsequent to the release date of quarter $t-1$ earnings and five trading days prior to the release date of quarter t earnings and $AbnNonRetailVol$ is share turnover by non-retail investors during the earnings announcement

[13] As the internet appendix of Blankespoor et al. (2018) details, the original IPT measure of Butler et al. (2007) assumes that no return overreaction and reversal occurs during the five-day measurement window; the adjusted measure corrects for this possibility. Potential alternative measures of the efficiency of price responses to earnings information include cross-sectional differences in earnings response coefficients and longer-term post earnings announcement drift. Consistent with prior research examining the price effects of the media (e.g., Blankespoor et al., 2018), we focus on intraperiod price timeliness as these alternative measures further require conditioning on the market's expectation of earnings surprises.

period $[0, +1]$ less the median two-day share turnover by non-retail investors of consecutive two-day periods during the non-announcement period. The non-announcement period is comprised of all dates between five trading days subsequent to the release date of quarter $t-1$ earnings and five trading days prior to the release date of quarter t earnings. Retail trades are identified and separated from non-retail trades using the approach created by Boehmer et al. (2017) and adopted in recent related research (e.g., Bushee et al., 2018; Guest, 2018; Israeli et al., 2017). Unlike prior studies' use of trade size to identify retail trades, the Boehmer et al. (2017) approach relies on retail trades being filled off-exchange in broker's inventory or through wholesalers (identified as FINRA Trade Reporting Facility Trades with exchange code "D" trades on TAQ with small price improvements).

4. Sample and empirical results

4.1. Data and sample description

We begin our sample construction by selecting the intersection of the CRSP database and all quarterly earnings announcements in Compustat during the 2004–2013 period, yielding 291,449 observations. The availability of control variables for our regression analyses reduces the sample further to 112,725 firm-quarter (earnings announcement) observations. Following von Beschwitz et al. (2017), we collect news stories from the Dow Jones edition of the RavenPack 3.0 news database with news stories beginning in January 2004 and ending in December 2013.[14] During our sample period, the RavenPack database covers approximately 8,000 companies and tracks nearly 10 million unique news stories. For each story, RavenPack records a score, called Relevance, to indicate the prominence of a firm within the story with higher values corresponding to the greater prominence of a firm within the story. We count news stories each day as the number of news flashes or full (i.e., original) articles with a relevance score of at least 90 from the Dow Jones news service. As discussed by Drake et al. (2014), RavenPack's relevance score leads to the isolation of articles that focus on the companies in our sample. In addition, RavenPack's identification of articles as news

[14] Our sample period ending in 2013 avoids the dramatic increase in robo-journalism started by the Associated Press in 2014 (Blankespoor et al., 2018). However, other automated news flashes occur during our sample period to some extent at earnings releases (e.g., Dow Jones Newswire on February 12, 2013, "Clearwire Corp 4Q Loss/Shr 29c"). This would affect our tests if earnings announcement and non-earnings announcement news flashes are automated in systematic ways that occur in tandem with changes in market uncertainty.

flashes or full articles allows us to examine the possible asymmetric supply of news flashes relative to full articles. News stories that relate to stock prices or trade imbalances are dropped because a large number of these stories are automatically generated, and stories that relate to insider trading are dropped because of changes in their coverage during the sample period (Rogers et al., 2016). We winsorize all continuous variables in our sample at the 1st and 99th percentile sample values.

Table 1 presents descriptive statistics for variables used in our earnings announcement analyses and for the coverage variables used in our non-earnings announcement period analyses. During the two-day window starting on the earnings announcement date, there are, on average, 11 news articles. Of these articles, approximately 5.6 are news flashes and 2.3 are original news stories. The average news flashes and original news stories do not sum to the average total articles because RavenPack also includes press releases and tabular material (e.g., a firm's income statement) in its news coverage. Media coverage is dramatically lower, on average, during non-earnings announcement periods. This pattern exists for total coverage (average of 0.7 stories), news flashes (average of 0.3 stories), and original articles (average of 0.2 stories). This indicates that the nature of the demand for and supply of information at earnings announcements differs from other days during the fiscal quarter. The panel presents descriptive statistics for the other variables used in our analyses.

4.2. Increased media coverage of earnings releases

4.2.1. Primary results

Our first set of empirical results relates to whether media coverage of earnings announcements increases during periods of higher uncertainty. Panel A of Table 2 presents the formal path analysis for our mediation tests using equation (1) for earnings announcement and non-earnings announcement periods. We find that the direct path $VIX \rightarrow LCoverage_{EA}$ is significantly positive in column (1). This indicates that media coverage of earnings announcements grows with market uncertainty. In contrast, the direct path $VIX \rightarrow LCoverage_{NonEA}$ is significantly negative in column (2). The reduction in coverage during non-earnings announcement periods could be the result of constraints faced by the media. For instance, the increase in coverage of earnings announcements could limit the media's ability to cover non-earnings announcement events; a possibility we explore later. Also, the coefficient estimate for VIX during earnings announcements is significantly greater than the estimate during non-earnings announcement periods, as shown in column (3). The coefficient for abnormal media coverage at earnings announcements in column (3) of 0.0038 indicates that during an average earnings announcement a moderate increase in VIX from the first to third quartile leads to a 6.12 percent increase in the average number of stories).[15] For a more extreme change in market uncertainty, the effect is considerably higher. A large change in VIX from the bottom decile (12.225) to the top decile (30.929) leads to the average number of abnormal stories during earnings announcements increasing by 11.83 percent.

Regarding how market uncertainty affects firm-initiated disclosure and analyst revisions, during earnings announcements the indirect path for $LForm8K$ (i.e., the path $VIX \rightarrow LForm8K$ multiplied by $LForm8K \rightarrow LCoverage_X$) and $LRevisions$ is insignificant.[16] During non-earnings announcement periods, however, the indirect paths for $LForm8K$ and $LRevisions$ are significantly negative and positive, respectively. The coefficient differences for $LForm8K$ and $LRevisions$ presented in column (3) indicate that the abnormal indirect paths are significantly positive and negative, respectively. The differences in behavior during and outside earnings announcement periods likely reflect variation in the demand for information and the constraints faced by managers and analysts in providing information and updating their forecasts. Overall, however, the differences in these indirect paths largely offset, leading to the direct path of $VIX \rightarrow LCoverage_X$ being similar in magnitude as the total effect (e.g., 0.0067 relative to 0.0079 in column (3)). As shown in the last two rows of Panel A, the direct path for $VIX \rightarrow LCoverage_{EA}$ leads to a significantly larger increase in media coverage than the indirect paths for $LForm8K$ and $LRevisions$ during earnings announcements, and the direct path $VIX \rightarrow LCoverage_{NonEA}$ leads to a significantly larger decrease in media coverage than the indirect path for $LRevisions$ outside of earnings announcement periods.

Panel B reports the underlying mediated regression results. As expected, the coefficient estimates for the variables of interest are the same as the direct effects reported in Panel A. For the control variables, we find that media coverage of earnings announcements is significantly higher for firms with greater analyst following ($LFollow$), greater institutional holdings ($InstHold$), higher

[15]That is, $\{e^{[0.0030\times(24.784-15.009)]}-1\}\times\left[\frac{1+10.989}{10.989}\right]-\{e^{[-0.0008\times(24.784-15.009)]}-1\}\times\left[\frac{1+0.651}{0.651}\right]$. The calculation adjusts for $LCoverage_{EA}$ being constructed as the natural logarithm of one plus the number of news stories.

[16]In later analyses, with some exceptions, we only report the indirect paths for brevity rather than each coefficient estimate along each path. The full results are provided in the internet appendix.

returns (Ret), membership in the S&P 500 ($SP500Member$), more employees ($LEmployee$), more dispersed ownership ($LOwn$), and more turnover ($Turnover$). In addition, we find that coverage is significantly lower for firms with higher market capitalization ($LMktCap$), lower growth (BM), greater idiosyncratic volatility ($IVol$), and listed on NASDAQ ($NasdaqTraded$).[17] This evidence is consistent with demand by shareholders, employees, and others determining media coverage of earnings announcements. Similar results are found for non-earnings announcement coverage; however, we find that greater coverage for firms with higher market capitalization ($LMktCap$), greater idiosyncratic volatility ($IVol$), and lower returns (Ret). These differences across the earnings and non-earnings periods likely reflect differential demands and supply for coverage of earnings and non-earnings information—e.g., institutional investors could have greater demand for the dissemination of earnings information versus non-earnings information.

Next, we turn to more detailed analyses to provide greater insight into how and why the media make earnings announcement coverage decisions. We first examine the role of the level of market uncertainty and specific sources of uncertainty on such decisions. We next explore if greater coverage of earnings announcements during periods of higher market uncertainty "crowds out" the coverage of non-earnings news of other firms. We then investigate whether the media focus on certain types of news stories and firms when market uncertainty grows.

4.2.2. What levels of the VIX and types of uncertainty underlying the VIX are most important?

An interesting issue is at what levels of market uncertainty the media shift coverage of earnings announcements. For instance, the highest levels of the VIX, particularly during the 2007–2009 financial crisis, could be responsible for our findings given the extreme levels of market uncertainty. To explore this issue in greater detail, we estimate a piecewise regression for quartiles of the VIX. We drop VIX from equation (1) and include four VIX variables, VIX^{Q1}, VIX^{Q2}, VIX^{Q3}, and VIX^{Q4}, for each quartile of the VIX.[18] In Panel A of Table 3, we find that higher uncertainty within each quartile of the VIX leads to greater abnormal media coverage of earnings announcements, as shown in column (3). For instance, in the lowest quartile, we find direct paths

[17]The finding of lower coverage for firms with greater idiosyncratic volatility is consistent with the evidence in Soltes (2011) of market benefits for firms with greater media coverage.

[18]For brevity, we only report the direct paths for this analysis and those that follow. The full set of results for each analysis are reported in the online appendix.

(e.g., $VIX^{Q1} \rightarrow LCoverage_X$) for VIX^{Q1} during earnings announcements of 0.101 and during non-earnings announcement periods of -0.0016. The abnormal media coverage direct paths for the second, third, and fourth quartiles are similar: 0.0088, 0.0078, and 0.0086, respectively. These abnormal coverage sensitivities are over twice as high as those in our primary analysis in reported in Table 2, demonstrating the importance of allowing for differing levels of the VIX. Together, this evidence indicates that the media shift earnings announcement coverage across different levels of the VIX, not just for the highest levels.

Another interesting issue is what specific types of uncertainty underlying the VIX lead to greater media coverage. For instance, greater political-related events could lead to reductions in business press coverage, due to resources being diverted away to such issues, or an expansion in business press coverage, as market participants' demand for financial information increases. As prior research (e.g., Alfaro et al., 2018; Barrero et al., 2017; Stein and Wang, 2016) finds, shocks to aggregate market uncertainty are caused by economic policy uncertainty (e.g., debates over the U.S. debt ceiling, participation in wars overseas, and fiscal policy), variation in the price of oil, and exchange rates.

Figure 1 shows how the three sources of uncertainty vary with the VIX over time. The first index, EPU, captures economic policy uncertainty.[19] The second index, oil price uncertainty or the oil price volatility index, is the closing price of the CBOE crude oil ETF volatility index. The third index, exchange rate uncertainty or the currency volatility index, is the mean volatility index of the following volatility indices: CBOE FX Euro Volatility index, FX Yen Volatility Index, FX British Pound Volatility Index, and the EuroCurrency Volatility Index. To facilitate comparisons, each index uses month-end values and each series is transformed to a standard normal distribution. As the figure shows, the different sources of uncertainty are related but have some differences. For instance, similar to Baker et al. (2016), the EPU index is dramatically higher during tight presidential elections, Gulf Wars I and II, the 9/11 attacks, the failure of Lehman Brothers, the 2011 debt ceiling dispute, and other major battles over fiscal policy.[20] In contrast, the oil price

[19] Baker et al. (2016) measures this as the relative frequency of the trio of terms "uncertainty" or "uncertain"; "economic" or "economy"; and one of the following policy terms: "Congress," "deficit," "Federal Reserve," "legislation," "regulation," or "White House" (including variants like "uncertainties," "regulatory," or "the Fed" in the top 10 leading newspapers in the United States. We appreciate the public posting of the EPU index by Scott Baker, Nick Bloom, and Steven Davis and the data from Barrero et al. (2017).

[20] Nagar et al. (2019) provide evidence that changes in economic policy uncertainty are important for individual

volatility index rises dramatically in 2007 during a rapid oil price increase while other indices are unaffected. In addition, economic policy uncertainty decreases after Obama's reelection without a similar decrease in other indices. The spikes in uncertainty common to most of the indices are during the global banking crisis, the European debt crisis, and the U.S. debate on the debt ceiling.

We investigate how these underlying sources of aggregate market uncertainty, as well as unexplained variation in the VIX, individually contribute to abnormal media coverage. Variables for each of the three indexes are denoted as EPU, $OilVol$, and $CurrVol$. To directly examine how each influences the VIX, we first regress each variable on VIX using monthly observations. As shown in Appendix B, all three variables are significantly positive and jointly explain 89.7 percent of the variation in VIX. We then investigate the role of each by using the predicted value of each, denoted as VIX^{EPU}, VIX^{OilVol}, and $VIX^{CurrVol}$, respectively, rather than VIX in equation (1). The residual from the first-stage regression is also included as a measure of other sources of uncertainty, denoted as VIX^{Other}, that affect the VIX. To ease comparability, all variables are standardized. In Panel B of Table 3, we find that VIX^{EPU}, $VIX^{CurrVol}$, and VIX^{Other} lead to greater abnormal media coverage of earnings announcements. As indicated by the significant z-tests in the last rows of Panel B, VIX^{EPU} is relatively more important for changes in earnings announcement coverage than VIX^{OilVol}, $VIX^{CurrVol}$, and VIX^{Other}. This suggests that the media make the greatest changes when economic policy uncertainty shocks occur.

4.2.3. Does increased earnings announcement coverage crowd out non-earnings announcement coverage?

Our primary findings suggest that media coverage of non-earnings announcement stories falls with market uncertainty. Consistent with the views of the senior journalists whom we interviewed, one possibility for this decline is that the increased earnings announcement coverage for other firms crowds out the coverage of firms' non-earnings announcement news. We test this possibility by further mediating equation (1) for non-earnings announcement coverage by including $LCoverage_{EA,Other}$, the amount of other firms' earnings announcement coverage during the same two-day window, as a mediator variable. The results of this analysis are presented in Table 4. As shown, the indirect path of VIX $\rightarrow$ $\mathrm{LCoverage}_{\mathrm{EA,Other}}$ is significantly positive, consistent with

firms, leading to higher bid-ask spreads and lower responses to earnings releases.

our earlier findings that higher market uncertainty leads to greater coverage of earnings announcements. In addition, the indirect path of $\text{LCoverage}_{\text{EA,Other}} \rightarrow \text{LCoverage}_{\text{NonEA}}$ is significantly negative, consistent with the coverage of other firms' earnings announcements leading to reduced coverage of firms' non-earnings announcement news. Combined, the indirect effect attributable to $LCoverage_{EA,Other}$ is significantly negative, providing evidence that non-earnings announcement coverage is crowded out by the increased coverage of other firms' earnings announcements during periods of higher market uncertainty. In the last row of Table 4, we also provide evidence that the reduction in coverage from the indirect effect attributable to $LCoverage_{EA,Other}$ is statistically different from the increase in coverage brought about by the increased frequency in analyst revisions outside of earnings announcement periods.

4.2.4. Does the media shift to specific types of news stories and firms?

Active monitoring of user demand for information can lead the media to shift their coverage toward certain types of news stories and firms and away from others during periods of increased market uncertainty. Consistent with such shifts taking place, our interviews of journalists indicated that greater inferred demand during such times can lead to greater dissemination of earnings information through quick and simple stories that re-iterate key metrics in earnings releases. In addition, during periods of greater uncertainty, journalists pointed out that there is more news and more opportunities to provide more information. Because of these changes, journalists suggested that a story can get split across multiple reporters rather than just one reporter and can lead to reporters sticking with a particular firm for a longer period of time. The shift in coverage can lead to a reduction in the number of by-lined stories, especially enterprise stories (e.g., investigations about wrongdoing), as newsrooms are stressed by the number of journalists available for coverage. Together, this anecdotal evidence suggests that during times of higher uncertainty the media could move to increase the number of news flashes relative to the number of original stories, which could decrease.[21]

We formally investigate whether the media make such shifts in news stories by examining coverage decisions separately for news flashes, $LCoverage_{X,Flash}$, and original articles, $LCoverage_{X,Orig}$.

[21] As Drake et al. (2014) shows, news flash stories typically only rebroadcast a disclosure and are relatively short articles, containing on average 42 words. In contrast, full article stories can rebroadcast a disclosure but also include reporter-generated information and are much more extensive stories, containing on average 248 words.

$LCoverage_{X,Flash}$, is the natural logarithm of one plus the number of news flashes for a firm on the day of or the day after a quarterly earnings announcement ($X = EA$) or during the two-day averaged non-earnings announcement period ($X = NonEA$). $LCoverage_{X,Orig}$, is the natural logarithm of one plus the number of original news stories for a firm on the day of or the day after a quarterly earnings announcement ($X = EA$) or during the two-day averaged non-earnings announcement period ($X = NonEA$).The test of our prediction is that the coefficient for $LCoverage_{EA,Flash}$ is greater than that for $LCoverage_{EA,Orig}$. The formal test for the difference in coefficients is conducted by stacking the separate equations.

Panels A and B of Table 5 provide the results for $LCoverage_{EA,Flash}$ and $LCoverage_{EA,Orig}$ as dependent variables, respectively. The results indicate that news flash coverage is more sensitive to increases in market uncertainty than original articles. For news flash stories during earnings announcements, the direct path estimate for VIX of 0.0067 is significantly positive. For original articles during earnings announcements, the direct path estimate of -0.0075 is significantly negative. In untabulated tests, the difference in the VIX coefficients of 0.0142 for the two types of stories is significantly positive. For news flashes, during non-earnings announcement trading days, we find that the direct path estimate for VIX is insignificant. In addition, we find that the positive coefficient for VIX during earnings announcement periods is significantly greater than that during non-earnings announcement periods; the difference of 0.0063 is much larger than the difference of 0.0038 observed for our primary analysis, which combines news flashes with original articles. This evidence indicates that news-flash coverage during earnings announcements grows with market uncertainty but is relatively unaffected outside of earnings announcements. For original articles, during non-earnings announcement periods, the direct path estimate for VIX is significantly negative and, in untabulated tests, is statistically more negative than the estimate during earnings announcement periods. The last two rows in Panels A and B indicate that the changes in coverage from the direct paths of $VIX \rightarrow LCoverage_{EA}$ and $VIX \rightarrow LCoverage_{NonEA}$, as well as the differences in estimates, are significantly greater (in absolute value) than the indirect paths for $LForm8K$ and $LRevisions$, with the exception of $VIX \rightarrow LCoverage_{NonEA}$ not being significantly greater than the indirect path for $LRevisions$.

User demand for earnings information can also increase or decrease for certain types of firms during periods of higher market uncertainty. First, we expect greater demand for earnings information of bellwether firms relative to non-bellwether firms. As Anilowski et al. (2007), Aobdia et al. (2014), and Bonsall et al. (2013) observe, bellwether firms' disclosures can be a source of important information about macroeconomic activity, as evidenced by significant aggregate stock market responses to the release bellwether firms' management earnings forecasts. By focusing on the news regarding bellwether firms, the media can provide answers to investors regarding a bellwether firm's uncertainty but, more importantly, provide information to investors about macroeconomic uncertainty in general. Second, we expect greater demand for earnings information of early announcing firms in a quarter relative to late announcing firms. As Savor and Wilson (2016) finds, the earnings announcements of early announcing firms provide greater information about aggregate earnings in a given period; this result is intuitive as less information is known earlier in the quarter. Our interviews of journalists suggest that changes in demand for those types of firms can occur during periods of higher market uncertainty.

We separately examine whether the expansion of coverage during earnings announcements is more pronounced for bellwether and early announcing firms by including interactions of VIX with $Bellwether$ and $EarlyAnnouncer$. $Bellwether$ is an indicator variable with a value of one if the explanatory power of various macroeconomic indices for a firm's earnings is in the upper quartile of the sample distribution (Bonsall et al., 2013), and zero otherwise. $EarlyAnnouncer$ is an indicator variable with a value one if a firm's expected earnings announcement date is in the earliest quartile in a given fiscal quarter (Savor and Wilson, 2016), and zero otherwise. In addition, we explore whether firms whose earnings are less informative about aggregate uncertainty lose coverage or have less of an increase in coverage during times of higher uncertainty. We investigate this possibility by including interactions of VIX with $Non-Bellwether$ and $LateAnnouncer$. $Non-Bellwether$ is an indicator variable with a value of one if the explanatory power of various macroeconomic indices for a firm's earnings is in the lower quartile of the sample distribution (Bonsall et al., 2013), and zero otherwise. $LateAnnouncer$ is an indicator variable with a value one if a firm's expected earnings announcement date is in the latest quartile in a given fiscal quarter Savor and Wilson (2016), and zero otherwise. We expect a positive coefficient on the interaction of VIX with $Bellwether$ and VIX with $EarlyAnnouncer$, and a negative coefficient on the interaction of VIX with $Non-Bellwether$ and VIX with $LateAnnouncer$.

Panels C and D of Table 5 present the moderated path analysis findings for bellwether versus non-bellwether firms and early versus late announcing firms, respectively. Only the direct paths are reported for parsimony; the detailed mediated paths are reported in the online appendix. In Panel C, for bellwether firms, the interaction $VIX \times Bellwether$ is significantly positive for abnormal earnings announcement coverage. The estimate of the of 0.0041 indicates that the coverage of bellwether firms at earnings announcements is much more sensitive to market uncertainty. An interquartile-range increase in the VIX leads to a 22.09 percent increase in the average number of stories for bellwether firms. For non-bellwether firms, the interaction $VIX \times Non - Bellwether$ is significantly negative. The estimate of -0.0064, when considered together with the estimate for other firms of 0.0041, indicates that the coverage of non-bellwether firms is relatively insensitive to market uncertainty. An interquartile-range increase in the VIX leads to a 0.04 percent increase in the average number of stories for non-bellwether firms. In Panel D, we fail to find that the interaction $VIX \times EarlyAnnouncer$ for abnormal earnings announcement coverage is significant. For late announcing firms, however, we find that the interaction $VIX \times LateAnnouncer$ is significantly negative. The estimate of -0.0004 suggests only a modest lower sensitivity to market uncertainty. Together, this evidence is consistent with the media responding to changing demand for earnings information during periods of increased market uncertainty by increasing their coverage of bellwether firms and increasing their coverage less for non-bellwether and late announcing firms.

4.3. Capital market consequences of increased coverage of earnings releases

Having established that the supply of media stories during earnings announcements increases when there is higher market uncertainty, we next turn to how the change in coverage affects capital markets. We use path analyses to directly test whether the increased supply leads to changes in investor consensus and informedness and price efficiency.

4.3.1. Changing investor consensus and informativeness

Table 6 presents the results from estimating the mediated analyses for abnormal price changes, $|AbnReturn|$, and abnormal stock return volatility, $AbnVol$, using bootstrapped standard errors clustered by firm and year-quarter (MacKinnon et al., 2004). In column (1), the significantly positive indirect path $VIX \rightarrow LCoverage_{EA} \rightarrow |AbnReturn|$ indicates that greater media coverage associated with higher uncertainty leads to greater abnormal return volatility. The coefficient estimate of 0.000279 implies that an increase in VIX from its first to third quartile value leads to a 5.8 percent ($0.000279 \times (24.784 - 15.009) \div 0.047$) increase in abnormal volatility at earnings announcements through increased media coverage relative to the mean level in our sample. We also find that the indirect path of $VIX \rightarrow LForm8K \rightarrow |AbnReturn|$ is insignificant but find evidence that the indirect path of $VIX \rightarrow LRevisions \rightarrow |AbnReturn|$ is statistically negative, suggesting that higher market uncertainty leads to fewer analyst revisions and, in turn, lower abnormal return volatility. As shown in the last two rows of the table, we find that the indirect path for $LCoverage_{EA}$ is significantly greater than the indirect paths for $LForm8K$ and $LRevisions$. This evidence suggests that coverage by the media has relatively greater influence on abnormal return volatility during periods of higher market uncertainty than firm-initiated disclosures and analyst forecast revisions. The significantly positive direct path from VIX to $|AbnReturn|$ indicates that abnormal stock return volatility is higher during periods of higher market uncertainty after taking into account the media, firm-initiated disclosure, and analyst forecast revisions.

In column (2), we find similar evidence for abnormal trading volume. The indirect path of $VIX \rightarrow LCoverage_{EA} \rightarrow AbnVol$ is significantly positive. The coefficient estimate of 0.000170 indicates that an increase in VIX from its first to third quartile value leads to a 4.3 percent ($0.000170 \times (24.784 - 15.009) \div 0.039$) increase in abnormal volatility at earnings announcements through increased media coverage relative to the mean level in our sample. We also find that the indirect path of $VIX \rightarrow LForm8K \rightarrow AbnVol$ is insignificant, the indirect path of $VIX \rightarrow LRevisions \rightarrow AbnVol$ is significantly negative, and the direct path of $VIX \rightarrow AbnVol$ is significantly positive.

4.3.2. Changing price efficiency

The increased abnormal stock price volatility and trading volume suggest that the greater media coverage during periods of higher market uncertainty lead to greater investor informedness. In this sub-section, we go further and explore whether greater coverage leads to greater price efficiency.

Information asymmetry

Panel A of Table 7 provides the results of our formal path analysis for abnormal spreads and depth. We find that the indirect path estimates $VIX \rightarrow LCoverage_{EA} \rightarrow AbnSpread$ and $VIX \rightarrow LCoverage_{EA} \rightarrow AbnDepth$ are significantly negative and positive, respectively. This evidence suggests that greater coverage during periods of higher uncertainty leads to important improvements in information asymmetry. When compared to the positive and negative direct path estimates of $VIX \rightarrow AbnSpread$ and $VIX \rightarrow AbnDepth$, the findings suggest that media coverage helps mitigate increased information asymmetry brought about by increased market uncertainty. The coefficient estimates for the indirect paths for media coverage of -0.000762 and 0.00116 indicate that that an increase in VIX from its first to third quartile value leads to a 14.9 percent ($-0.000762 \times (24.784 - 15.009) \div 0.050$) decrease in abnormal spreads and a 75.6 percent ($0.00116 \times (24.784 - 15.009) \div 0.015$) increase in abnormal depth at earnings announcements through increased media coverage relative to the mean. We do not find that the indirect path estimates for firm disclosures and analyst forecast revisions lead to change in information asymmetry, with the exception of the significantly positive indirect path $VIX \rightarrow LRevisions \rightarrow AbnSpread$. This finding indicates that fewer analyst revisions at earnings announcements during periods of market uncertainty lead to higher abnormal spreads. The last two rows of Panel A show that the indirect path estimates for $LCoverage_{EA}$ have a statistically greater effect on abnormal spreads and depth than the indirect paths for $LForm8K$ and $LRevisions$.

Intraperiod price timeliness

Panel B presents the results of the path analysis for intraperiod price timeliness. The indirect path estimate for $VIX \rightarrow Coverage_{EA} \rightarrow IPT_{Adj}$ is significantly positive. This evidence indicates that greater media coverage due to higher market uncertainty increases intraperiod price timeliness. The coefficient estimate of 0.00339 implies an increase of 1.00 percent for an interquartile increase in the VIX. In contrast, the direct effect estimate of $VIX \rightarrow IPT_{Adj}$ is statistically negative. Accordingly, while periods of market uncertainty lead to slower intraperiod price timeliness at earnings announcements, firms with greater media coverage during such times face relatively faster price timeliness. In addition, the indirect path $VIX \rightarrow LRevisions \rightarrow IPT_{Adj}$ is significantly negative, indicating that fewer analyst revisions when market uncertainty is higher leads to slower intraperiod price timeliness at earnings announcements. The last two rows of Panel B indicate that the positive indirect path estimate for intraperiod price timeliness related to media coverage is significantly greater than the indirect path estimates related to firm-initiated disclosures and analyst forecast revisions.

Trade by retail and non-retail investors

Panel C gives the results of the path analyses for retail and non-retail trading volume. The indirect paths estimates for $VIX \rightarrow LCoverage_{EA} \rightarrow AbnRetailVol$ and $VIX \rightarrow LCoverage_{EA} \rightarrow AbnNonRetailVol$ are significantly positive. We also find that the direct path estimates $VIX \rightarrow AbnRetailVol$ and $VIX \rightarrow AbnNonRetailVol$ are significantly positive and negative, respectively. These findings suggest that—while greater market uncertainty leads to greater and lower abnormal volume by retail investors and non-retail investors—the greater media coverage of earnings releases during such times leads to greater abnormal volume by both types of traders. In contrast to this evidence for coverage by the media, we find that fewer analyst forecast revisions during such times leads to decreased volume by both retail and non-retail traders, as indicated by the significantly negative indirect path estimates. As shown in the last two rows, the positive indirect path estimates for $LCoverage_{EA}$ are significantly greater than the indirect paths for $LForm8K$ and $LRevisions$.

Together, the evidence suggests that greater media coverage when market uncertainty is higher mitigates greater information asymmetry and delayed intra-period price timeliness at earnings announcements, and leads to greater trade by both retail and institutional traders, which presumably are not subject to limited attention trading biases. With regard to other important providers of information during such times, we are unable to find evidence that firm-initiated disclosures improve the efficiency of capital markets and find evidence that less frequent analyst forecast revisions at earnings announcements leads to reduced price efficiency.

5. Conclusion

This study provides evidence of how the media serves an enhanced role as an information intermediary of earnings information during periods of increased market uncertainty. We find when the VIX is higher the media increase their coverage of earnings announcements relative to coverage outside of earnings announcements. This evidence is consistent with the media responding to increased demand for financial information during uncertain times. We find that such increases occur across different levels of the VIX, not just during the most extreme levels, and occur when increases in the VIX are attributable to changes in economic policy uncertainty, foreign currency volatility, and other sources of market uncertainty. We also find that the media trade off how they cover firms in response to market uncertainty. The increase in media coverage is most pronounced for short news flashes that can quickly but briefly disseminate new information. Full length articles, in contrast, decline. The increase in media coverage is also greater for bellwether firms and less for non-bellwether firms. In contrast to the media expanding its role as an information intermediary during uncertain times, we find little evidence that other providers of information increase their supply of information at earnings announcements. Firms do not change the frequency of their disclosures and financial analysts reduce the number of their forecast revisions.

We also find that the increased media coverage of earnings announcements during periods of higher market uncertainty leads to greater trading volume for both retail and institutional investors, larger price reactions, narrower spreads and greater depth, and greater intraperiod timeliness. These changes are in sharp contrast to the overall worsening of capital market outcomes that occur during periods of higher market uncertainty. In addition, these changes are in contrast to the effect of firm-initiated disclosure, which we fail to find alter capital market outcomes, and analyst forecast revisions, which decline in frequency and result in even worse capital market outcomes at earnings announcements.

These findings provide important new insights into how changes in aggregate market uncertainty alter the media's timing, content, and dissemination of information to market participants and how these changes improve capital market outcomes at earnings announcements. In addition, these findings provide insight into how the media makes trade-offs in coverage during periods of elevated market uncertainty. These findings also provide insight into how different providers of information—firms, analysts, and the media—alter their behavior and influence capital market outcomes when there is higher market uncertainty.

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Appendix A

The variables for each empirical analysis are described in detail below.

Variable	Description
$LCoverage_{EA}$	The natural logarithm of one plus the number of news articles with relevance scores greater than or equal to 90 captured by RavenPack on days $[0, +1]$ relative to the quarterly earnings announcement
$LCoverage_{EA,Flash}$	The natural logarithm of one plus the number of news flashes with relevance scores greater than or equal to 90 captured by RavenPack on days $[0, +1]$ relative to the quarterly earnings announcement
$LCoverage_{EA,Orig}$	The natural logarithm of one plus the number of original news stories with relevance scores greater than or equal to 90 captured by RavenPack on days $[0, +1]$ relative to the quarterly earnings announcement
$LCoverage_{NonEA}$	The natural logarithm of one plus the average number of news articles with relevance scores greater than or equal to 90 captured by RavenPack during all two-day windows during the matched non-earnings announcement period
$LCoverage_{NonEA,Flash}$	The natural logarithm of one plus the average number of news flashes with relevance scores greater than or equal to 90 captured by RavenPack during all two-day windows during the matched non-earnings announcement period
$LCoverage_{NonEA,Orig}$	The natural logarithm of one plus the average number of original news stories with relevance scores greater than or equal to 90 captured by RavenPack during all two-day windows during the matched non-earnings announcement period
$\|AbnReturn\|$	The absolute value of raw return minus the CRSP value-weighted index return during the earnings announcement period $[0, +1]$
$AbnVol$	The share turnover during the earnings announcement period $[0, +1]$ less the median two-day share turnover of consecutive two-day periods during the non-announcement period, which is comprised of all dates between five trading days subsequent to the release date of quarter $t-1$ earnings and five trading days prior to the release of quarter t earnings
$AbnSpread$	The weighted average effective spread over trading days [0, +2] of the earnings announcement, where the weights are number of trades, minus the weighted average effective spread over trading days [−41,−11], multiplied by 100 (from Blankespoor et al., 2018)

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Appendix A continued

Variable	Description
$AbnDepth$	The natural logarithm of the weighted average bid and offer dollar depth over trading days [0, +2] of the earnings announcement, where the weights are time in force, over the weighted average bid and offer dollar depth over trading days [−41,−11] (from Blankespoor et al., 2018)
IPT_{Adj}	The speed with which earnings information is impounded into price, measured over the six-day earnings announcement window and adjusted for overreaction and subsequent reversal to the final cumulative abnormal return (from Blankespoor et al., 2018)
$AbnRetailVol$	The firm's daily average retail percentage of shares traded during days [0, +2] relative to the earnings announcement, minus the equivalent amount over days [−41, −11], multiplied by 100 (from Blankespoor et al., 2018)
$AbnNonRetailVol$	The firm's daily average non-retail percentage of shares traded during days [0, +2] relative to the earnings announcement, minus the equivalent amount over days [−41, −11], multiplied by 100 (from Blankespoor et al., 2018)
VIX	The average level of the Chicago Board Options Exchange Volatility Index during the period from five days following the announcement of quarter $t-1$ earnings to five days prior to the announcement of quarter t earnings
EPU	The average level of economic policy uncertainty index from Baker et al. (2016) during the period from five days following the announcement of quarter $t-1$ earnings to five days prior to the announcement of quarter t earnings
$OilVol$	The average level of oil price volatility during the period from five days following the announcement of quarter $t-1$ earnings to five days prior to the announcement of quarter t earnings
$CurrVol$	The average level of volatility of the seven currencies designated by the Federal Reserve Board as "major" currencies during the period from five days following the announcement of quarter $t-1$ earnings to five days prior to the announcement of quarter t earnings
VIX^{EPU}	The predicted value of VIX using EPU from a regression of VIX on EPU, $OilVol$, and $CurrVol$ (see Appendix B)
VIX^{OilVol}	The predicted value of VIX using $OilVol$ from a regression of VIX on EPU, $OilVol$, and $CurrVol$ (see Appendix B)
$VIX^{CurrVol}$	The predicted value of VIX using $CurrVol$ from a regression of VIX on EPU, $OilVol$, and $CurrVol$ (see Appendix B)
$VIX^{OtherUncert}$	Residual uncertainty from a regression of VIX on EPU, $OilVol$, and $CurrVol$ (see Appendix B)

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Appendix A continued

Variable	Description
$LForm8K$	The natural logarithm of one plus the number (two-day averaged number) of Form 8-K filings by a firm during the earnings (non-earnings announcement) window
$LRevisions$	The natural logarithm of one plus the number (two-day averaged number) of analyst earnings forecast revisions made during the earnings (non-earnings announcement) window
$AbsEarnSurp$	The absolute value of the seasonally adjusted change in earnings before extraordinary items scaled by market capitalization at the beginning of the fiscal quarter
$NegSurp$	An indicator variable equal to one if the seasonally adjusted change in earnings before extraordinary items is negative and zero otherwise
$LMktCap$	The natural logarithm of market value of equity
BM	Book value of stockholders' equity divided by market capitalization
$LFollow$	The natural logarithm of one plus the number of equity analysts following the firm during the most recent fiscal quarter
$InstHold$	Percentage of shares held by institutional investors
$IVol$	Annualized standard deviation of weekly residual returns based on the following model from Bandarchuk and Hilscher (2013): $r_{it} = a_i + b_i r_{mt} + \gamma_i r_{It} + e_{it}$
Ret	Buy-and-hold equity return during the previous twelve months
$SP500Member$	Indicator variable set equal to one if a firm is a member of the S&P 500 market index and zero otherwise
$LEmployee$	The natural logarithm of the number of employees
$LOwn$	The natural logarithm of the number of shareholders
$NasdaqTraded$	Indicator variable set equal to one if a firm's common shares trade on the NASDAQ and zero otherwise
$Turnover$	Average share volume divided by shares outstanding using daily stock market data over the last six months
$MomStrength$	Absolute value of the difference between the firm's stock return over the previous six months and the median stock return over the same period (Bandarchuk and Hilscher, 2013)
$Bellwether$	An indicator variable with a value of one if the explanatory power of various macroeconomic indices for a firm's earnings is in the upper quartile of the sample distribution (Bonsall et al., 2013), and zero otherwise
$Non-Bellwether$	An indicator variable with a value of one if the explanatory power of various macroeconomic indices for a firm's earnings is in the lower quartile of the sample distribution (Bonsall et al., 2013), and zero otherwise.

Continued on next page

Appendix A continued

Variable	Description
EarlyAnnouncer	An indicator variable with a value one if a firm's expected earnings announcement date is in the earliest quartile in a given fiscal quarter Savor and Wilson (2016), and zero otherwise
LateAnnouncer	An indicator variable with a value one if a firm's expected earnings announcement date is in the latest quartile in a given fiscal quarter Savor and Wilson (2016), and zero otherwise

Appendix B
Underlying sources of uncertainty driving the level of the VIX

The table below provides the results from the estimation of a time-series regression of VIX on economic policy uncertainty from Baker et al. (2016) (EPU), oil price volatility ($OilVol$), and the average volatility of the seven currencies designated by the Federal Reserve Board as "major" currencies ($CurrVol$) using monthly-level observations during our sample period of November 2005 through December 2013. Each variable is a significant determinant of the VIX and combined the variables explain 89.7 percent of the variation in VIX. The predicted values, denoted VIX^{EPU}, VIX^{OilVol}, and $VIX^{CurrVol}$, respectively, along with the residual, denoted $VIX^{OtherUncert}$, are used in place of VIX in Panel B of Table 3.

	(1) VIX
EPU	0.0197**
	(2.20)
$OilVol$	0.1637**
	(2.56)
$CurrVol$	1.9470***
	(7.31)
Constant	-8.2803***
	(-5.09)
Observations	98
Adjusted R^2	0.897

T-statistics are shown in parentheses below estimated coefficients and use Newey and West (1987) standard errors with four lags. *, **, and *** indicate two-sided statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Figure 1: The VIX and underlying sources of market uncertainty

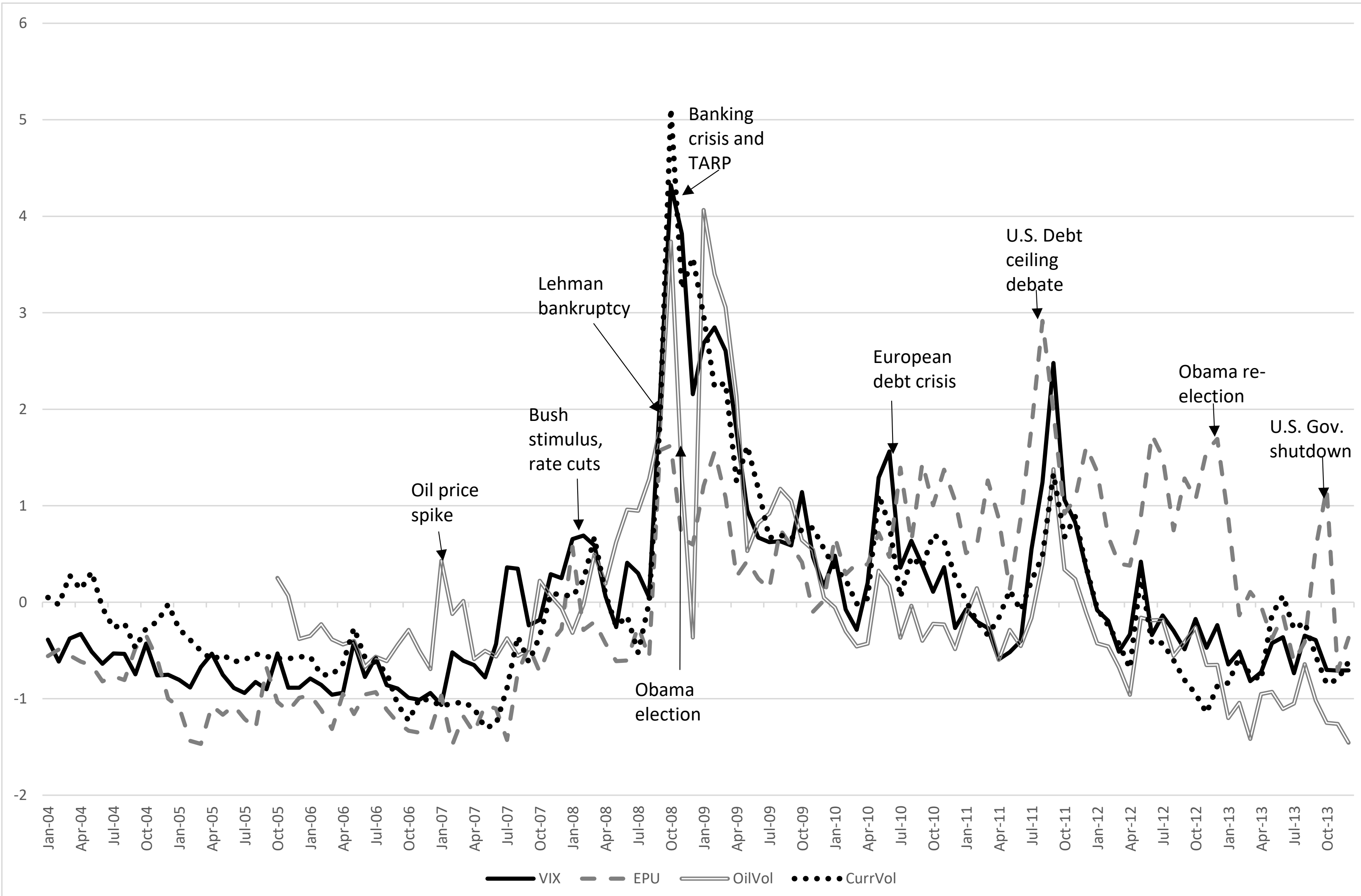

Figure 1 plots the month-end options volatility index (VIX), economic policy uncertainty index (EPU), crude oil price volatility index (OilVol), and average currency volatility index (CurrVol). All indices are standardized.

Table 1: Descriptive statistics

	Mean	Std. Dev.	Q1	Median	Q3
Dependent variables:					
$Coverage_{EA}$	10.989	9.806	5.000	9.000	14.000
$Coverage_{EA,Flash}$	5.580	5.039	3.000	4.000	7.000
$Coverage_{EA,Orig}$	2.321	3.988	0.000	1.000	2.000
$Coverage_{NonEA}$	0.651	1.065	0.111	0.340	0.727
$Coverage_{NonEA,Flash}$	0.253	0.389	0.000	0.122	0.321
$Coverage_{NonEA,Orig}$	0.190	0.488	0.000	0.045	0.160
$\|AbnReturn\|$	0.047	0.039	0.019	0.036	0.062
$AbnVol$	0.025	0.039	0.002	0.011	0.031
$AbnSpread$	0.050	0.827	-0.012	0.007	0.049
$AbnDepth$	0.015	0.388	-0.188	0.024	0.222
IPT_{Adj}	3.320	1.861	2.690	3.827	4.530
$AbnRetailVol$	0.049	0.108	0.000	0.014	0.052
$AbnNonRetailVol$	0.759	1.264	0.038	0.340	1.007
Variables of interest:					
VIX	21.919	9.523	15.009	19.347	24.784
EPU	128.974	39.076	99.543	135.782	159.120
$OilVol$	35.348	12.861	28.970	31.467	35.984
$CurrVol$	11.207	3.604	8.675	10.311	12.481
$OtherUncertainty$	0.075	2.728	-1.401	-0.452	1.833
$Form8K$	0.920	0.495	1.000	1.000	1.000
$Revisions$	4.158	5.381	0.000	2.000	6.000
$AbsEarnSurp$	0.005	0.088	-0.009	0.001	0.010
$NegSurp$	0.455	0.498	0.000	0.000	1.000
Control variables:					
$MktCap$	3662.290	10510.699	130.704	551.850	2222.413
BM	0.633	0.599	0.279	0.503	0.828
$Follow$	9.668	8.265	3.000	7.000	14.000
$InstHold$	0.619	0.304	0.376	0.693	0.878
$IVol$	0.425	0.256	0.243	0.360	0.532
Ret	-0.038	0.542	-0.294	0.030	0.279
$S\&P500Member$	0.131	0.338	0.000	0.000	0.000
$Employee$	8.003	19.902	0.270	1.300	5.500
Own	11.949	40.695	0.240	1.045	5.499
$NasdaqTraded$	0.523	0.499	0.000	1.000	1.000
$Turnover$	0.009	0.008	0.004	0.007	0.012
$MomStrength$	0.315	0.399	0.077	0.181	0.384

Table 1 presents descriptive statistics for the samples and variables used in the analysis. The descriptive statistics are for quarterly earnings announcements from 2004 to 2013 from Compustat, equity market information from CRSP, news stories from RavenPack, and intraday trading and price information from the NYSE's Daily TAQ database. All variables are defined in Appendix A.

Table 2: Abnormal media coverage of earnings announcements and market uncertainty: Primary results

Panel A: Path analysis

	(1) $X = EA$		(2) $X = Non-EA$		(3) Diff.	
	Coef.	Bootstrap z	Coef.	Bootstrap z	Coef.	Bootstrap z
Direct path:						
VIX → $\mathbf{LCoverage_X}$	**0.0030****	**2.54**	**-0.0008****	**-2.08**	**0.0038*****	**3.40**
Mediated paths:						
I. $VIX \rightarrow LForm8K$	0.0003	1.25	-0.0004**	-2.20	0.0006**	2.38
II. $LForm8K \rightarrow LCoverage_X$	0.3863***	14.89	1.8610***	38.83	-1.4747***	-29.83
Indirect effect via $LForm8K$ (I×II)	0.0001	1.26	-0.0007**	-2.19	0.0008**	2.45
III. $VIX \rightarrow LRevisions$	-0.0011**	-2.43	0.0006***	3.45	-0.0017***	-3.09
IV. $LRevisions \rightarrow LCoverage_X$	0.0226***	4.15	0.3683***	20.56	-0.3458***	-20.41
Indirect effect via $LRevisions$ (III×IV)	-0.0000**	-1.96	0.0002***	3.41	-0.0002***	-3.39
Total indirect effect (I×I+II×IV)	0.0001	0.90	-0.0005	-1.35	0.0005	1.53
Total effect	0.0031**	2.54	-0.0013***	-4.13	0.0044***	3.42
Controls	Yes		Yes			
Firm Fixed Effects	Yes		Yes			
z-test: Direct = I × II	2.45**		-0.20		2.58**	
z-test: Direct = III × IV	2.55**		-2.57**		3.57**	

Panel B: Mediated regression

	(1) $LCoverage_{EA}$	(2) $LCoverage_{NonEA}$	(3) Diff.
VIX	**0.0030*****	**-0.0008****	**0.0038*****
	(3.08)	**(-2.40)**	**(3.69)**
$LForm8K$	0.3863***	1.8610***	-1.4747***
	(14.68)	(37.30)	(-26.14)
$LRevisions$	0.0226***	0.3683***	-0.3458***
	(3.95)	(20.18)	(-18.08)
$AbsEarnSurp$	0.0621*		
	(1.72)		
$NegSurp$	0.0153***		
	(3.33)		
$LMktCap$	0.0058	0.0146***	-0.0088
	(0.39)	(2.98)	(-0.57)
BM	0.0402***	0.0022	0.0380**
	(2.75)	(0.48)	(2.49)
$LFollow$	0.0901***	-0.0015	0.0916***
	(6.15)	(-0.34)	(5.99)
$InstHold$	0.1479***	-0.0184	0.1663***
	(2.76)	(-1.04)	(2.94)
$IVol$	-0.0628	0.0382***	-0.1011**
	(-1.60)	(3.91)	(-2.49)
Ret	0.0049	0.0026	0.0023
	(0.24)	(0.65)	(0.11)
$S\&P500Member$	-0.0822	-0.0196	-0.0626
	(-1.33)	(-0.78)	(-0.94)
$LEmployee$	0.0725***	0.0255***	0.0470***
	(5.05)	(5.14)	(3.10)
$LOwn$	-0.0102	0.0027	-0.0129*
	(-1.52)	(1.13)	(-1.81)
$NasdaqTraded$	0.0895	0.0274	0.0620
	(1.25)	(1.27)	(0.83)
$Turnover$	2.3816**	1.4690***	0.9126
	(2.32)	(3.87)	(0.83)

Table 2 continued on next page

Table 2, Panel B – continued

	(1) $LCoverage_{EA}$	(2) $LCoverage_{NonEA}$	(3) Diff.
$MomStrength$	0.0035	0.0065***	-0.0030
	(0.54)	(2.93)	(-0.45)
Firm Fixed Effects	Yes	Yes	
Observations	112,725	112,725	
Adjusted R^2	0.758	0.771	

Table 2 examines the relationship between market uncertainty (VIX) and media coverage. Panel A presents path analysis of the association with firm-initiated disclosures ($LForm8K$) and analyst forecast revisions ($LRevisions$) as mediator variables. Panel B presents regression results from the estimation of 1 using ordinary least squares. The analyses in both panels include results for an earnings-announcement period sample (as well as for a non-earnings-announcement period sample for comparison). The dependent variable, $LCoverage_X$, is the natural logarithm of one plus the number of news stories for a firm on the day of or the day after a quarterly earnings announcement ($X = EA$) or the average during all two-day windows during the matched non-earnings announcement period ($X = NonEA$). The sample period covers quarterly earnings announcements from 2004 to 2013 and corresponding non-earnings announcement periods. All other variables are defined in Appendix A. Column (3) reports the statistical test of the difference between the estimated coefficients on VIX in columns (1) and (2) using a stacked regression model. T-statistics are shown in parentheses below estimated coefficients and use standard errors that are clustered two-way by firm and year-quarter. *, **, and *** indicate two-sided statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 3: Abnormal media coverage of earnings announcements and market uncertainty: What levels of the VIX and sources of uncertainty underlying the VIX are most important?

Panel A: Path analysis for quartiles of the VIX

	(1) $X = EA$		(2) $X = Non-EA$		(3) Diff.	
	Coef.	Bootstrap z	Coef.	Bootstrap z	Coef.	Bootstrap z
Direct paths:						
$\mathbf{VIX^{Q1} \rightarrow LCoverage_X}$	**0.0101*** **	**4.03**	**-0.0016**	**-0.98**	**0.0117*** **	**5.05**
$\mathbf{VIX^{Q2} \rightarrow LCoverage_X}$	**0.0075*** **	**3.33**	**-0.0013**	**-0.88**	**0.0088*** **	**4.02**
$\mathbf{VIX^{Q3} \rightarrow LCoverage_X}$	**0.0068*** **	**3.78**	**-0.0010**	**-1.04**	**0.0078*** **	**2.84**
$\mathbf{VIX^{Q4} \rightarrow LCoverage_X}$	**0.0076*** **	**4.24**	**-0.0010**	**-1.47**	**0.0086*** **	**4.30**
Controls	Yes		Yes			
Firm Fixed Effects	Yes		Yes			

Panel B: Path analysis for sources of uncertainty underlying the VIX

	(1) $X = EA$		(2) $X = Non-EA$		(3) Diff.	
	Coef.	Bootstrap z	Coef.	Bootstrap z	Coef.	Bootstrap z
Direct paths:						
$\mathbf{VIX^{EPU} \rightarrow LCoverage_X}$	**0.0618*** **	**7.14**	**-0.0030**	**-0.72**	**0.0647*** **	**6.52**
$\mathbf{VIX^{OilVol} \rightarrow LCoverage_X}$	**0.0036**	**0.99**	**0.0004**	**0.07**	**0.0033**	**0.59**
$\mathbf{VIX^{CurrVol} \rightarrow LCoverage_X}$	**0.0196*** **	**2.70**	**-0.0059**	**-0.96**	**0.0255** **	**2.54**
$\mathbf{VIX^{OtherUncert} \rightarrow LCoverage_X}$	**0.0138*** **	**3.20**	**0.0028**	**1.46**	**0.0110** **	**2.37**
Controls	Yes		Yes			
Firm Fixed Effects	Yes		Yes			
z-tests:						
VIX^{EPU}=VIX^{OilVol}	6.20***		-0.48		4.66***	
VIX^{EPU}=$VIX^{CurrVol}$	3.74***		0.39		2.63***	
VIX^{EPU}=$VIX^{OtherUncert}$	4.96***		-1.26		5.13***	

Table 3 presents more detailed analyses of the relationship between market uncertainty (VIX) and media coverage. Panel A presents results from a piecewise model across sample quartiles of market uncertainty. Panel B presents results from the estimation of a modified version of 1 with predicted components of VIX (all variables are standardized) using economic policy uncertainty from (Baker et al., 2016) (VIX^{EPU}), oil price volatility (VIX^{OilVol}), and the average volatility of the seven currencies designated by the Federal Reserve Board as "major" currencies ($VIX^{CurrVol}$) included as regressors of interest in place of VIX. The residual value of VIX ($VIX^{OtherUncert}$) is also included as a regressor. See Appendix B for the estimation of VIX onto EPU, $OilVol$, and $CurrVol$. The dependent variable, $LCoverage_X$, is the natural logarithm of one plus the number of news stories for a firm on the day of or the day after a quarterly earnings announcement ($X = EA$) or the average during all two-day windows during the matched non-earnings announcement period ($X = NonEA$). All other variables are defined in Appendix A. In Panel A, the sample period covers quarterly earnings announcements from 2004 to 2013 and corresponding non-earnings announcement periods. In Panel B, the sample period covers quarterly earnings announcements from November 2005 to December 2013 and corresponding non-earnings announcement periods. Columns (3) report the statistical tests of differences between the estimated coefficients in columns (1) and (2) using a stacked regression model. T-statistics are shown in parentheses below estimated coefficients and use standard errors that are clustered two-way by firm and year-quarter. *, **, and *** indicate two-sided statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 4: Abnormal media coverage of non-earnings announcement periods and market uncertainty: Does increased earnings announcement coverage of other firms crowd out non-earnings announcement coverage?

	(1) $LCoverage_{NonEA}$ Coef.	Bootstrap z
Direct path:		
VIX → $\mathbf{LCoverage_{NonEA}}$	**-0.0001**	**-0.09**
Mediated paths:		
I. $VIX \rightarrow LForm8K$	-0.0004**	-2.30
II. $LForm8K \rightarrow LCoverage_{NonEA}$	1.8629***	39.84
Indirect effect via $LForm8K$ (I×II)	-0.0007**	-2.28
III. $VIX \rightarrow LRevisions$	0.0006***	3.57
IV. $LRevisions \rightarrow LCoverage_{NonEA}$	0.3676***	20.72
Indirect effect via $LRevisions$ (III×IV)	0.0002***	3.53
V. VIX → $\mathbf{LCoverage_{EA,Other}}$	**0.0025*** **	**2.73**
VI. $\mathbf{LCoverage_{EA,Other}}$ → $\mathbf{LCoverage_{NonEA}}$	**-0.2846*** **	**-5.54**
Indirect effect via $\mathbf{LCoverage_{EA,Other}}$ (V×VI)	**-0.0007*** **	**-4.46**
Total indirect effect (I×II+III×IV+V×VI)	-0.0012**	-2.46
Total effect	-0.0013***	-4.47
Controls	Yes	
Firm Fixed Effects	Yes	
z-test: (V × VI) = (I × II)	-0.24	
z-test: (V × VI) = (III × IV)	-5.39***	

Table 4 presents path analysis results from estimating the role of media coverage of other earnings announcements in crowing out the media coverage of firms' non-earnings announcement periods. The path analysis uses the amount of other firms' earnings announcement coverage ($LCoverage_{EA,Other}$), firm-initiated disclosures ($LForm8K$), and analyst forecast revisions ($LRevisions$) as mediator variables. The dependent variable, $LCoverage_{NonEA}$, is the natural logarithm of one plus the average number of news stories for a firm during all two-day windows during the non-earnings announcement period. The sample period covers firm-quarter observations from 2004 to 2013. All other variables are defined in Appendix A. T-statistics are shown in parentheses below estimated coefficients and use standard errors that are clustered two-way by firm and year-quarter. *, **, and *** indicate two-sided statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 5: Abnormal media coverage of earnings announcements and market uncertainty: Does the media shift to specific types of news stories and firms?

Panel A: Path analysis for news flashes

	(1) $X = EA$		(2) $X = Non-EA$		(3) Diff.	
	Coef.	Bootstrap z	Coef.	Bootstrap z	Coef.	Bootstrap z
Direct path:						
VIX → $\mathbf{LCoverage_{X,Flash}}$	**0.0067*****	**6.07**	**0.0003**	**1.25**	**0.0063*****	**5.79**
Mediated paths:						
(I) $VIX \rightarrow LForm8K \rightarrow LCoverage_{X,Flash}$	0.0001	1.23	-0.0004**	-2.16	0.0005**	2.52
(II) $VIX \rightarrow LRevisions \rightarrow LCoverage_{X,Flash}$	-0.0000**	-2.07	0.0002***	3.43	-0.0002***	-3.53
Total effect	0.0067***	6.00	0.0001	0.39	0.0066***	5.53
Controls	Yes		Yes			
Firm Fixed Effects	Yes		Yes			
z-test: Direct = (I)	5.96***		2.31**		5.24***	
z-test: Direct = (II)	6.08***		0.40		5.97***	

Panel B: Path analysis for original articles

	(1) $X = EA$		(2) $X = Non-EA$		(3) Diff.	
	Coef.	Bootstrap z	Coef.	Bootstrap z	Coef.	Bootstrap z
Direct path:						
VIX → $\mathbf{LCoverage_{X,Orig}}$	**-0.0075****	**-2.37**	**-0.0017*****	**-5.14**	**-0.0058****	**-2.03**
Mediated paths:						
(I) $VIX \rightarrow LForm8K \rightarrow LCoverage_{X,Orig}$	0.0001	1.17	-0.0003**	-2.22	0.0004**	2.52
(II) $VIX \rightarrow LRevisions \rightarrow LCoverage_{X,Orig}$	-0.0000**	-2.16	0.0001***	3.19	-0.0001***	-3.67
Total effect	-0.0075**	-2.33	-0.0020***	-5.91	-0.0055*	-1.88
Controls	Yes		Yes			
Firm Fixed Effects	Yes		Yes			
z-test: Direct = (I)	-2.40**		-3.92***		-2.17**	
z-test: Direct = (II)	-2.34**		-5.42***		-1.99**	

Panel C: Moderated path analysis for bellwether and non-bellwether firms

	(1) $X = EA$		(2) $X = Non-EA$		(3) Diff.	
	Coef.	Bootstrap z	Coef.	Bootstrap z	Coef.	Bootstrap z
Direct paths:						
VIX → $\mathbf{LCoverage_{X}}$	**0.0031*****	**2.45**	**-0.0009****	**-2.11**	**0.0041*****	**3.35**
VIX × $\mathbf{Bellwether_{High}}$ → $\mathbf{LCoverage_{X}}$	**0.0032*****	**2.92**	**-0.0009**	**-0.96**	**0.0040*****	**2.61**
VIX × $\mathbf{Bellwether_{Low}}$ → $\mathbf{LCoverage_{X}}$	**-0.0072*****	**-2.99**	**-0.0008***	**-1.22**	**-0.0064****	**-2.50**
Controls	Yes		Yes			
Firm Fixed Effects	Yes		Yes			

Panel D: Moderated path analysis for early and late announcing firms

	(1) $X = EA$		(2) $X = Non-EA$		(3) Diff.	
	Coef.	Bootstrap z	Coef.	Bootstrap z	Coef.	Bootstrap z
Direct paths:						
VIX → $\mathbf{LCoverage_{X}}$	**0.0031****	**2.56**	**-0.0007***	**-1.95**	**0.0038*****	**3.41**
VIX × EarlyEA → $\mathbf{LCoverage_{X}}$	**0.0001****	**2.07**	**-0.0002**	**-0.41**	**0.0003**	**1.14**
VIX × LateEA → $\mathbf{LCoverage_{X}}$	**-0.0008*****	**-3.48**	**-0.0004**	**-0.98**	**-0.0004****	**-2.23**
Controls	Yes		Yes			
Firm Fixed Effects	Yes		Yes			

Table 5 presents results from estimating the association between market uncertainty (VIX) and different types of media coverage. Panels A and B presents path analyses of the association for news flashes and original articles with firm-initiated disclosures ($LForm8K$) and analyst forecast revisions ($LRevisions$) as mediator variables, respectively. Panel C presents path analysis of the association with firm-initiated disclosures ($LForm8K$) and analyst forecast revisions ($LRevisions$) as mediator variables and bellwether status as a moderator based on the R^2 from a regression of firm earnings on several macroeconomic series (Bonsall et al., 2013) with $Bellwether_{High}$ and $Bellwether_{Low}$ defined as indicators for firms in the upper and lower quartiles of the sample R^2 distribution. Panel D presents path analysis of the association with firm-initiated disclosures ($LForm8K$) and analyst forecast revisions ($LRevisions$) as mediator variables and with earnings announcement timing as a moderator based on firms' predicted earnings announcement timing with $EarlyEA$ and $LateEA$ defined as indicators for firms in the upper and lower quartiles of earnings announcement timing for a fiscal quarter. The analyses in all panels include results for an earnings-announcement period sample (as well as for a non-earnings-announcement period sample for comparison). The dependent variable $LCoverage_{X,Flash}$ ($LCoverage_{X,Orig}$) is the natural logarithm of one plus the number of news flashes (original articles) for a firm on the day of or the day after a quarterly earnings announcement ($X = EA$) or the average during all two-day windows during the matched non-earnings announcement period ($X = NonEA$). The sample period covers quarterly earnings announcements from 2004 to 2013 and corresponding non-earnings announcement periods. All other variables are defined in Appendix A. Column (3) reports the statistical tests of differences between the estimated coefficients in columns (1) and (2) using a stacked regression model. T-statistics are shown in parentheses below estimated coefficients and use standard errors that are clustered two-way by firm and year-quarter. *, **, and *** indicate two-sided statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 6: Market uncertainty and abnormal earnings-announcement return volatility and trading volume: The mediating influence of media coverage

	$DV = \|AbnReturn\|$		$DV = AbnVol$	
	(1)		(2)	
	Coef.	Bootstrap z	Coef.	Bootstrap z
Direct path:				
$VIX \rightarrow DV$	0.000285***	3.90	0.0000932***	3.23
Mediated paths:				
(I) $\mathbf{VIX \rightarrow LCoverage_{EA} \rightarrow DV}$	**0.000279***	**2.60**	**0.000170**	**2.35**
(II) $VIX \rightarrow LForm8K \rightarrow DV$	0.00000956	1.23	0.00000596	1.16
(III) $VIX \rightarrow LRevisions \rightarrow DV$	-0.00000360**	-2.15	-0.00000269**	-2.16
Total effect	0.000569***	5.88	0.000267***	2.96
Controls	Yes		Yes	
Firm Fixed Effects	Yes		Yes	
z-test: (I) = (II)	2.50**		2.26**	
z-test: (I) = (III)	2.63***		2.39**	

Table 6 presents path analysis results from estimating the mediating role of media coverage ($LCoverage_{EA}$) on the association between market uncertainty (VIX) and earnings announcement abnormal stock return volatility and trading volume. The dependent variables are: $|AbnReturn|$, the absolute value of raw return minus the CRSP value-weighted index return during the earnings announcement period $[0, +1]$ and $AbnVol$, the share turnover during the earnings announcement period $[0, +1]$ less the median two-day share turnover of consecutive two-day periods during the non-announcement period (all dates between five trading days subsequent to the release date of quarter $t-1$ earnings and five trading days prior to the release of quarter t earnings). The sample period covers quarterly earnings announcements from 2004 to 2013. All other variables are defined in Appendix A. T-statistics are shown in parentheses below estimated coefficients and use standard errors that are clustered two-way by firm and year-quarter. *, **, and *** indicate two-sided statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 7: Market uncertainty and earnings-announcement price efficiency: The mediating influence of media coverage

Panel A: Path analysis for information asymmetry

	$DV = AbnSpread$		$DV = AbnDepth$	
	(1)		(2)	
	Coef.	Bootstrap z	Coef.	Bootstrap z
Direct path:				
$VIX \rightarrow DV$	0.00412***	2.86	-0.0131***	-4.18
Mediated paths:				
(I) $\mathbf{VIX \rightarrow LCoverage_{EA} \rightarrow DV}$	**-0.000762******	**-3.18**	**0.00116******	**3.83**
(II) $VIX \rightarrow LForm8K \rightarrow DV$	-0.0000281	-0.98	0.0000412	1.21
(III) $VIX \rightarrow LRevisions \rightarrow DV$	0.0000149*	1.78	-0.0000108	-1.59
Total effect	0.00334**	2.32	-0.0119***	-5.71
Controls	Yes		Yes	
Firm Fixed Effects	Yes		Yes	
z-test: (I) = (II)	-3.04***		3.67***	
z-test: (I) = (III)	-3.24***		3.86***	

Panel B: Path analysis for intraperiod price timeliness

	$DV = IPT_{Adj}$	
	(1)	
	Coef.	Bootstrap z
Direct path:		
$VIX \rightarrow DV$	-0.0136***	-4.00
Mediated paths:		
(I) $\mathbf{VIX \rightarrow LCoverage_{EA} \rightarrow DV}$	**0.00339******	**5.37**
(II) $VIX \rightarrow LForm8K \rightarrow DV$	0.000140	1.18
(III) $VIX \rightarrow LRevisions \rightarrow DV$	-0.000106**	-2.10
Total effect	-0.0102**	-2.32
Controls	Yes	
Firm Fixed Effects	Yes	
z-test: (I) = (II)	5.06***	
z-test: (I) = (III)	5.52***	

Panel C: Path analysis for trade by retail and non-retail investors

	$DV = AbnRetailVol$		$DV = AbnNonRetailVol$	
	(1)		(2)	
	Coef.	Bootstrap z	Coef.	Bootstrap z
Direct path:				
$VIX \rightarrow DV$	0.00233**	2.22	-0.00688**	-2.03
Mediated paths:				
(I) $\mathbf{VIX \rightarrow LCoverage_{EA} \rightarrow DV}$	**0.000678*****	**2.46**	**0.000648*****	**2.33**
(II) $VIX \rightarrow LForm8K \rightarrow DV$	0.0000241	1.20	0.0000453	1.17
(III) $VIX \rightarrow LRevisions \rightarrow DV$	-0.00000706**	-2.04	-0.0000505**	-2.02
Total effect	0.00303***	2.74	-0.00624*	-1.88
Controls	Yes		Yes	
Firm Fixed Effects	Yes		Yes	
z-test: (I) = (II)	2.36**		2.15**	
z-test: (I) = (III)	2.49**		2.50***	

Table 7 presents path analysis results from estimating the mediating role of media coverage ($LCoverage_{EA}$) on the association between market uncertainty (VIX) and earnings announcement liquidity and price efficiency. The sample period covers quarterly earnings announcements from 2004 to 2013. The Panel A analyses investigate information asymmetry; the dependent variables are *AbnSpread*, the weighted average effective spread over trading days [0, +2] of the earnings announcement, where the weights are number of trades, minus the weighted average effective spread over trading days [−41,−11], multiplied by 100, and *AbnDepth*, the natural logarithm of the weighted average bid and offer dollar depth over trading days [0, +2] of the earnings announcement, where the weights are time in force, over the weighted average bid and offer dollar depth over trading days [−41,−11] (Blankespoor et al., 2018). The Panel B analysis investigates price efficiency; the dependent variable is IPT_{Adj}, the speed with which earnings information is impounded into price, measured over the six-day earnings announcement window and adjusted for overreaction and subsequent reversal to the final cumulative abnormal return (Blankespoor et al., 2018). The Panel C analyses investigate abnormal trade by retail and non-retail traders; the dependent variables are *AbnRetailVol*, the firm's daily average retail percentage of shares traded during days [0, +2] relative to the earnings announcement, minus the equivalent amount over days [−41, −11], multiplied by 100, and *AbnNonRetailVol*, the firm's daily average non-retail percentage of shares traded during days [0, +2] relative to the earnings announcement, minus the equivalent amount over days [−41, −11], multiplied by 100 (Blankespoor et al., 2018). The sample period covers quarterly earnings announcements from 2004 to 2013. All other variables are defined in Appendix A. T-statistics are shown in parentheses below estimated coefficients and use standard errors that are clustered two-way by firm and year-quarter. *, **, and *** indicate two-sided statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

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Fifty years of capital markets research in accounting: Achievements so far and opportunities ahead

Ilia D. Dichev *

Goizueta Business School, Emory University, USA

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ABSTRACT

This paper reviews the literature on capital markets research in accounting over the last 50 years. Rather than trying to be comprehensive, the review focuses on selected areas, and strives to be forward-looking. The first major takeaway is that the literature has made great progress, especially on the technical side. The second takeaway is that great opportunities remain, especially in using Big Data, looking more closely into the accrual process, and in issues related to standard setting.

1. Some caveats

I would like to start with some caveats. The first caveat is that this review is not meant to be comprehensive. The existing capital markets literature is simply too large, and so it is nearly impossible to cover everything. To use an analogy from music, what I am going to do here is to present the Selected Hits, rather than the Complete Collection. And since it is the Selected Hits, the choice of what to include is largely driven by personal choice and personal expertise. The idea is to provide a breezy and punchy overview rather than an exhaustive analysis of everything that has been done. Second, I will be attempting to "give an opinion" rather than just "listing what has been done". In other words, the review will take more of a position on certain things. Note that my opinion could be biased or wrong but I feel that this is the right occasion to say something more pointed rather than keep to the safety of just listing accomplishments. Third, the review aims to be big-picture and forward-looking. The important thing is not only what we have done so far but where we go from here. Accordingly, I will try to provide some ideas for future research.

For those who want a more complete coverage, there are some existing reviews of the capital market literature that are helpful. Kothari (2001) is a comprehensive review of capital markets research; it is widely read and cited but it does not reflect more recent findings. Richardson et al. (2010) is more recent but covers mostly

* Address: Goizueta Business School, 1300 Clifton Rd., Atlanta, GA 30322, USA.
E-mail address: idichev@emory.edu

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accounting anomalies and fundamental analysis. Dechow et al. (2014) is also recent and more compact, concentrating mostly on the relation between stock prices and earnings. The most recent review I have seen is Kothari and Wasley (2019), a fairly comprehensive review with a particular emphasis on how the literature evolves from Ball and Brown (1968).

2. Is the earnings number useful?

2.1. An updated replication of Ball and Brown (1968)

Ball and Brown (1968) is widely considered foundational for the capital market literature, tracking the stock returns for separate portfolios of positive and negative earnings surprises. The idea is that the stock market is an efficient aggregator of information, and therefore we can use stock prices and returns as a benchmark for the information content in earnings. Fig. 1 shows an updated replication of Ball and Brown (1968), reproduced from Dechow et al. (2014). An examination of Fig. 1 reveals pretty much the same message as the original Ball and Brown (1968) paper, showing that stock returns correctly anticipate the sign of future earnings surprises up to 12 months in advance. If anything, the spread between the positive and negative portfolio is wider here, exceeding 30% over the full 18-month window. Thus, the original message of Ball and Brown (1968) is emphatically confirmed in more recent samples, showing the continued relevance of their groundbreaking research. The other big takeaway is that there appears to be a market underreaction to earnings information, as the two portfolios continue to drift in the direction of the earnings surprises even after earnings are announced in month 0. This phenomenon was heavily studied in later research, and became known as the Post-Earnings-Announcements-Drift (PEAD).

2.2. Are earnings announcements useful?

The other major study from the early years is Beaver (1968), which shows pronounced spikes in trading volume and stock returns in narrow windows around earnings announcements. This evidence indicates that earnings announcements contain new information, and that the stock market reacts to this new information. Fig. 2 presents the Dechow et al. (2014) replication of Beaver (1968) for several sample periods over time. What is interesting here is that both the trading volume and the stock return reaction have become more pronounced over time. So, it seems that earnings announcements have become a source of increasing information content, although more recent studies find that this information content is due to items beyond earnings (Beaver et al., 2020).

Summing up, early studies like Ball and Brown (1968) and Beaver (1968) marked an exciting start to capital market research in accounting. Earnings especially, and the outputs of the accounting system more generally,

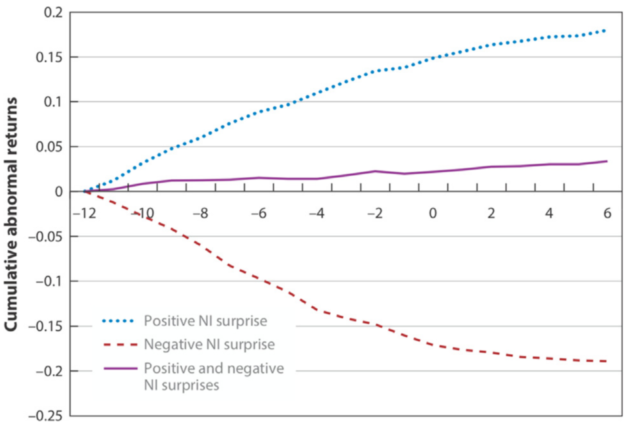

Fig. 1. Month relative to annual earnings announcement.

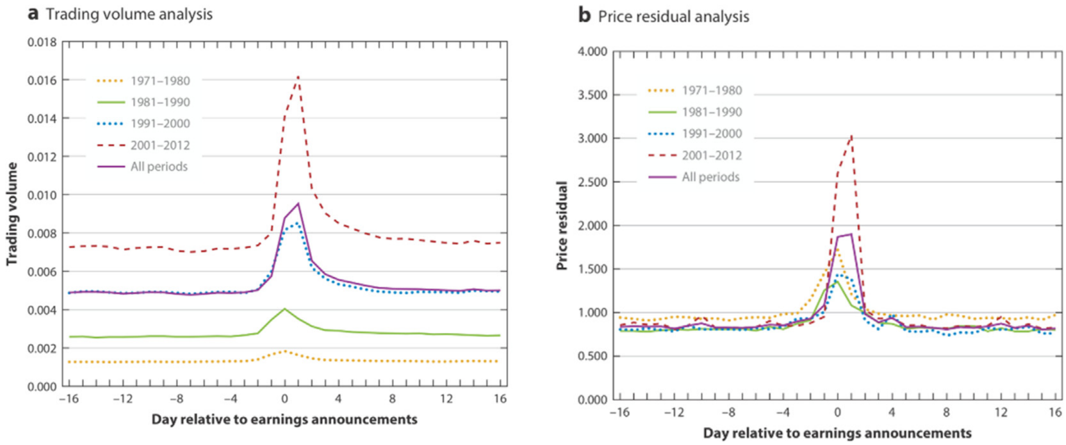

Fig. 2. Day relative to earnings announcements.

seemed to be a powerful source of information for capital markets. Accordingly, this early excitement and promise attracted many researchers, and capital markets quickly became perhaps the dominant area in all accounting research.

2.3. *After Ball and Brown (1968) and Beaver (1968)*

I use the framework and the language of *The Structure of Scientific Revolutions* by Thomas Kuhn to describe what followed the initial successes in capital markets research, as the comparison is apt. Basically, the early studies marked the rise of a new paradigm which captured the minds of accounting academics, and the whole idea and practice of accounting research shifted in a decisive manner. While previous research relied mostly on "armchair" arguments and speculations, the new paradigm brought empirical tests and evidence to the fore, with corresponding attention to data, statistical tests, and borrowing theories and methods from economics and finance. There were some interesting sociological angles as well, with many from the older generations displaced or sidelined by the new way of doing research.

Using the language of the Kuhn book, a great volume of "normal" research on the price/earnings relation appeared after the initial foundational studies. "Normal" research means "mopping up operations", basically studies that explore and advance the new paradigm but do not aim for radical novelty. The basic point of Ball and Brown (1968) and Beaver (1968) is that prices react to earnings, and earnings have information content. But there was a lot that could be done with these initial findings, they could be expanded to new samples, improve the test methodology, and so on. For example, the normal research on the price/earnings relation includes multiple studies on the specification of earnings surprises, such as using time-series models vs. analysts forecasts. Researchers explored event return windows that varied from a few days to several years, and used various definitions of earnings, such as net income, income before non-recurring items, and cash flows.

One useful way to summarize the first two decades of capital market research is provided by Lev's (1989) influential review. Looking at the big picture, Lev (1989) finds that the whole exercise has been somewhat disappointing, especially compared to the enormous effort invested in this literature. His main point is that if we look at the magnitudes of the R^2 of the associations between earnings numbers and returns, they are fairly small, with typical magnitudes of 2–7%. There are, of course, good reasons for this, a major one being that stock returns are very noisy. Thus, the question is how much R^2 can we expect, especially on a firm-level basis where the noise is much higher as compared to portfolio specifications. Lev (1989) also suggests that GAAP rules are probably at fault as well, and perhaps we need to think of ways to improve the accounting to better capture the value of firm operations.

Perhaps even more importantly, around the end of the 1980s and the beginning of the 1990s, the profession came to the critical realization that the basic premise of using formulations like $R_t = a + b^*\Delta E_t + e$ is quite limiting (Lee, 2001). Notice that we are using market prices or returns as the benchmark, and we judge information content in earnings by the degree to which the right-hand side maps into this benchmark. The problem is that if we always put contemporaneous returns on the left-hand side in these models, we are assuming that the market has already perfectly impounded all available information. But if the market perfectly knows everything already, what is the use of accounting? Where is our value-added then? Does it matter at all how we do the accounting?

3. The rise of fundamentals-based research

There was another new wave of research that soon arose in response to these disquieting questions, and I do think it was very good for accounting. This is the rise of what we can call fundamentals-based research. The critical difference from before is that instead of immediately going to the market for validation of accounting information, we now first study the accounting system itself, and try to understand how it captures the value created in real company operation, including the production of key value metrics like earnings and book value. And it is only after we internalize this knowledge that we turn to the market to see if the fundamentals-based metrics map into observable market prices. It was a very definite and large shift in the way that we think about these things. Perhaps most prominently, James Ohlson and Stephen Penman led the way here in a series of theoretical papers, developing these ideas more formally, see Ohlson (1995) for example. Basically, the idea is to derive equity value as a function of firm fundamentals, especially earnings and book value of equity. And soon after, there was a stream of empirical papers implementing these ideas, prominent examples include Frankel and Lee (1998) and Dechow et al. (1999).

This shift in thinking opened the doors to asking entirely new questions, and addressing new audiences. For example, if we find that fundamental values and observable stock prices differ, now we are not going to necessarily assume that prices are better, and accounting inputs are deficient. Now we may allow for the possibility that prices are deficient, and we may investigate whether prices catch up with fundamental value at some point, consistent with how value investors like Warren Buffett approach the analysis of financial information and make investments. Correspondingly, such research has natural synergies with our teaching, where a lot of our undergraduate and MBA students have an interest not so much in accounting itself but more in how accounting can be used to find hidden value, and lead to better investing decisions. In other words, this new thinking marked a radical shift where market efficiency is now an examined hypothesis rather than just a maintained hypothesis.

Perhaps the biggest single positive from the rise of fundamentals-based research is that this new approach sparked renewed interest in how accounting actually works. I view this as a strong positive because it naturally plays to our expertise in accounting, and allows us to offer insights which would otherwise not be possible for our colleagues in finance and economics who study similar questions. It basically brought us back to such classic questions as "What makes good accounting?" and "What makes earnings useful?".

4. What makes earnings useful?

4.1. Accrual accounting

Dechow (1994) is the paper that both signaled and catalyzed the rebirth of interest in how accrual accounting actually works. It is remarkable that Dechow (1994) appeared a full 26 years after Ball and Brown (1968), while it asks the most basic questions about accrual accounting. Most prominently, is earnings or cash flows better at measuring firm performance? The story in Dechow (1994) is that cash flow accounting is simple and objective: income is just cash flows coming in, while expenses are cash flows going out. But the weakness of cash flow accounting is that there are timing and mismatching problems, which question the use of net cash flow as a measure of firm performance. For example, consider a firm that sells Christmas trinkets. Before the Christmas season, the firm spends a lot of money on inventory, and then the money from the Christmas sales comes much later. So, if we look at the performance of this firm in terms of net cash flow, it looks like it has a lot of losses first and then it makes big profits later on. This does not make much sense because the "early losses" are clearly related to the "late profits" by the logic of the business.

Accrual accounting alleviates such timing and mismatching problems through the use of accruals. Using accruals, the Christmas trinkets firm above will capitalize the cost of inventory, and expense it in Cost of Goods Sold when the inventory is sold. Thus, accrual accounting aligns the cost of Inventory with Sales, consistent with the logic of the business, and so we get a much better measure of firm performance. But the cost of using accrual accounting is that accruals are essentially estimates made by management, which opens the door to estimation errors and subjectivity, and even willful manipulation. For example, capitalizing the cost of inventory at the time of purchase in anticipation of realizing it as Cost of Goods Sold at the time of sale may turn out to be problematic because we may need to write off the inventory before selling it. Thus, recording accruals involves a trade-off of benefits and costs, and it is an empirical question whether the sophistication of accrual accounting is better than the simplicity and objectivity of cash flow accounting.

Using stock prices as the benchmark for value-relevance, Dechow (1994) finds that accrual earnings are more strongly associated with stock returns than cash flows. In other words, the findings of Dechow (1994) indicate that accrual accounting is indeed resolving timing and mismatching problems, and that the stock market understands and endorses the use of accrual accounting. Thus, Dechow (1994) is foundational in terms of establishing the utility of accrual accounting.

A continuation of this line of inquiry is Dechow and Dichev (2002), delving further into the structure of the accrual process. The first message of Dechow and Dichev (2002) is captured in Eq. (1) below, where accounting earnings is expressed as a sum of past, present, and future cash flows, and the origination and reversals of accrual estimation errors. In Eq. (1), the first three terms are the cash flows, where the subscripts indicate when the cash flow occurs, and the superscripts indicate when the cash flow is recognized in earnings. The intuition is that accruals resolve the timing and mismatching problems in the underlying cash flows by moving their recognition in earnings across time, e.g., the revenue from a sale is recognized in earnings at the time of the sale by recording an accounts receivable rather than waiting for sales proceeds to be collected later on. Thus, the benefit of accrual accounting is captured in the first and third cash flow terms, whose recognition in earnings has been shifted across time. However, the benefit of recording accruals comes at the cost of incurring accrual estimation errors, e.g., the recorded Accounts Receivable estimate may be less than the actual cash collections later on. The consequence is that recording an overstated receivable first and writing it off later introduces noise in earnings, creating a false boost in earnings first, and a false decline in earnings later on. In sum, the cash flow terms capture the benefit of accrual accounting, while the error terms capture the cost. For accounting to be "good", we hope that the cash flow terms are large, and the error terms are relatively small.

$$Earnings_t = CF^t_{t-1} + CF^t_t + CF^t_{t+1} + \varepsilon^t_{t+1} - \varepsilon^{t-1}_t \tag{1}$$

Since moving the recognition of cash flows into earnings across time is accomplished by recording accruals, Dechow and Dichev (2002) also show how accruals can be expressed in terms of the underlying cash flows. Unfortunately, the current accounting system does not provide the theoretically required cash flow variables, and instead the empirical version of Dechow and Dichev's model is based on observable variables. Since the model is based on working capital accruals, not surprisingly the empirical version employs cash flow from operations (see Dechow and Dichev, 2002 for further detail):

$$Accrual_t = b_0 + b_1 CFO_{\mathrm{t}-1} + b_2 CFO_{\mathrm{t}} + b_3 CFO_{\mathrm{t}+1} + \boldsymbol{e} \tag{2}$$

Intuitively, Eq. (2) says that accruals that do not map into their corresponding cash flows represent the accrual estimation errors, e.g., the portion of receivables not eventually collected represents the initial overstatement of the receivable. The empirical tests in Dechow and Dichev (2002) show that the estimates of the accrual estimation errors derived from Eq. (2) are indeed helpful in capturing the quality of accruals and earnings, e.g., high levels of estimation errors are related to low earnings persistence.

While the Dechow and Dichev (2002) model has been widely used, it also has some limitations. So, how can we improve on it? Useful extensions and re-formulations include McNichols (2002), Francis et al. (2004, 2005), Ball and Shivakumar (2006), and others. For example, McNichols (2002) combines the Dechow and Dichev (DD) model with the Jones (1991) model, and that combination has been popular empirically, although it is more questionable on theoretical grounds. I would argue that further work is possible here. Most importantly, notice that the DD model only captures the discretion/estimation of anticipatory accruals mapping into future cash flows (like Accounts Receivable). But there is a lot of other discretion/estimation in accounting, including depreciable and useful lives, salvage values, interest rates, sales returns, percentage of completion, etc.

The good news is that the basic DD intuition applies to these other estimates as well. The spirit of the DD model is that accounting makes estimates, and the resulting estimation errors represent the cost of using accruals, manifesting as noise in earnings. The very same intuition applies to all other estimates as well, and so it can be used to measure the accrual estimation error noise as well. If you have the estimates, and if you have the realizations, the difference between them will give you the estimation errors. For example, if initial estimates of severance costs are too high and are low at realization, earnings will be initially understated and then overstated at realization. The bad news is that in most cases the accrual estimates and their realizations are not available to outside users of financial information.

But perhaps there could be some workarounds in implementing this intuition. For an idea what is possible, notice that the error term in Eq. (1) has a very specific form. If you re-write Eq. (1) as of time t − 1, and also as of time t + 1, and compare that to the expression as of time t, you would see that the error term is very strongly negatively correlated across time. This negative relation is, of course, not accidental. The error terms in (1) are negatively autocorrelated because the accrual process is self-correcting - if you make an accrual error in some period, it has to be corrected in some future period with an accrual with the opposite sign. The DD model is on working capital, so the errors and their corrections happen within one period, e.g., if at time t the initial estimate of the Accounts Receivable is too optimistic, the uncollected receivable is written off at time t + 1. The initial overestimation has a positive effect on earnings, and the write-off has a negative effect on earnings, so the accrual estimation errors are negatively autocorrelated over time. The same intuition applies to all other estimates. If we make an accrual estimation error, we have to correct it at some point after that with an accrual with the opposite sign. Thus, the signature of accrual estimation errors is that they reverse over time, and thus they induce a negative autocorrelation in earnings. The challenge will be to formalize this intuition, and to distinguish the reversals of all accruals (since all accruals have to reverse at some point) from the reversals of accrual estimation errors. To my knowledge, Dechow et al. (2012) is the only existing study that uses this intuition but I believe that we can get a lot more mileage out of it.

There are many other worthy studies on the properties of accruals but for the purposes of this review, I will limit the discussion to just two more widely influential examples. Sloan (1996) examines Eq. (3) below, and finds that the coefficient b_1 is greater than b_2, indicating that the cash flow component of earnings is more persistent than its accrual component. In other words, the results in Sloan (1996) indicate that firms with high accruals have low earnings persistence, and low earnings quality.

$$E_t + 1 = b_0 + b_1 * CFO_t + b_2 * Accruals_t + e \tag{3}$$

In addition, investors do not seem to understand this property, so portfolios long on stocks with low accruals and short on stocks with high accruals earn abnormal returns on the magnitude of 10% a year. This phenomenon has become known as the "accrual anomaly," and is one of the most widely known and researched stock market anomalies during the last 25 years.

Richardson et al. (2005) extends Sloan (1996), and investigates for differential persistence *within* accruals. The idea is that looking closer at the properties of the accrual process allows one to identify accruals that are more problematic than other accruals. Indeed, Richardson et al. (2005) identify a taxonomy of accruals that is helpful in predicting earnings quality, and also find that the stock market does not seem to fully appreciate these more subtle properties of accruals. But the most important contribution of Richardson et al. (2005) really is that they provide a comprehensive definition of accruals, namely, for a given period accruals can be defined as the changes in all non-cash assets and liabilities during that period. To me at least, the fairly-recent arrival of Richardson et al. (2005) is totally fascinating. Accruals represent the value-added of accrual accounting in the world, the bread and butter of what we do. Yet it took almost 40 years of research after Ball and Brown (1968) to finally have a comprehensive definition of accruals! While there could be a pessimistic read on this fact, I prefer the more positive interpretation. If the Richardson et al. (2005) experience is any guide – and I think it is – it implies that there are a lot of fundamental discoveries still to be made, and it is only our own limitations that prevent us from seeing what they are. What are we going to do in the next 50 years? The good news is there seems to be a lot that can be done, and I try to provide some pointers further below.

4.2. Conservatism

Another major strand of the literature on what makes earnings useful is conservatism, starting with Basu (1997). The story there is that accounting reacts asymmetrically to good and bad news. Specifically, accounting immediately impounds the full effect of bad news, capitalizing the present value of all future implications. For example, on finding that the depreciable life of some asset turns out to be shorter than originally expected, accounting will immediately write down the asset for the full effect of this shortening. In contrast, the book values of assets are not written up under favorable circumstances, and the gain on value is delayed until the asset is sold.

The literature on conservatism has seen rapid growth, finding a number of beneficial effects of more conservative accounting, especially for contracting outcomes. Indeed, the sheer volume of the conservatism literature warrants a separate review in itself, and such reviews actually already exist (Basu, 2009). So, instead of attempting to survey this literature, I would like to make one limited but crucial point. The Basu (1997) measure of conservatism uses stock returns as the benchmark for information content, and stock returns reflect many things, including possibly other explanations for the hypothesized asymmetric relations with earnings. Correspondingly, the Basu measure has been subject to a number of criticisms, and then rebuttals, see for example, Ball, Kothari, and Nikolaev (2013) and references thereof. Personally, I think a possible way forward in this literature is to derive a measure of conservatism which is independent of market prices, essentially a fundamentals-based measure of conservatism.

4.3. The dark side of discretion – earnings management

Earnings management can be defined as intentional adjustments to reported earnings to achieve desirable outcomes such as beating earnings benchmarks. By its very nature, earnings management is harmful to the role of earnings as a measure of firm performance and, correspondingly, research in this area has been a major focus for accounting academics for many years. By now, earnings management represents a very large, and rather mature literature, comprising dozens and perhaps even hundreds of studies.[1] Without getting into detail, I think the weight of the evidence leaves little doubt that earnings management exists. The extent of it, though, is more debatable, and partly depends on definition. It seems that more innocuous forms of earnings management within GAAP rules are widespread, affecting about 20% of U.S. firms in recent years (Dichev et al., 2013). More serious and extreme forms of earning management crossing into fraud seem to be much less prevalent, perhaps on the magnitude of 1–2% of firms, as reflected in studies of formal SEC actions and investor lawsuits (Dechow et al., 2011).

Is there room for more work in this literature? Given the sheer number of existing studies, it has become more difficult to make a meaningful contribution. On a personal level, I think two areas offer room for improvement. First, we need more earnings management studies where the null hypothesis is defined in a much sharper way as compared to that for most existing research. The null hypothesis is a statement of what earnings would be without earnings management. And this is really the key weakness of the majority of studies here: it is not quite clear whether the null is sharply defined enough to offer a powerful test. For example, suppose that there is a study which finds that in bad times managers cut R&D, apparently to hit earnings benchmarks. The question, though, is whether such a finding is truly indicative of earnings management - because in bad times prudent managers would cut R&D down anyway, as they should. So, what is the key to a sharp null hypothesis? There could be different approaches here but basically the key is identifying a setting where the null of no earnings management is very clear and convincing.

Second, it would be good to have more big-picture evidence on the economic prevalence of earnings management. By now there are scores of studies that offer evidence of earnings management in certain settings like equity offerings or for certain earnings components like special items or accruals. But there is less evidence on the broad prevalence of earnings management in the economy. Some authors opine that earnings management

[1] In fact, this literature has been such a major preoccupation of accounting research that one can argue that we have been more successful at identifying the problems of accounting (of which earnings management is a major one) rather than building up the case for what is good in accounting.

is likely confined to isolated pockets of rogue managers and firms, while others suggest that it is a rather pervasive phenomenon affecting perhaps the majority of firms in one way or another. More research could help to narrow down these rather divergent views.

4.4. Fair value

The research on fair values is another significant stream of the literature that investigates what makes accounting numbers useful. The reason is that the U.S. and international standard setting has adopted a balance sheet view of accounting, which emphasizes the valuation of assets and liabilities as the primary role of accounting. An integral part of this view is a broad push for various forms of fair value accounting, especially for financial assets and liabilities. Accordingly, there have been a number of studies that investigate the information content of fair values, usually benchmarking them against stock prices. Barth (1994) finds that the fair values of investment securities of banks provide significant information content beyond that of historical costs. For bank loans, Barth et al. (1996) also documents significant information content for fair values but Eccher et al. (1996) and Nelson (1996) arrive at the opposite result.

Some studies investigate the value relevance of fair values stratified by their reliability. Specifically, existing GAAP establishes the fair value hierarchy of using the so-called Levels 1, 2, and 3 inputs, where Level 1 includes the most cleanly measured assets like regularly traded shares on organized exchanges, and Level 3 includes the most problematic assets such as mortgage-backed securities and private equity shares. The prediction is that assets which are measured more cleanly will likely have more value relevance. This prediction seems intuitive, and is confirmed in the research findings (Choi et al.; Kallapur and Kwan, 2004; Song et al., 2010). The European setting provides some decisive advantages for research in fair values, specifically IFRS allows some PPE-type assets to be revalued up, which is not allowed under U.S. GAAP. The main finding in the European setting is that such upward asset revaluations do map into stock prices, which suggests that they have value relevance (Aboody et al., 1999).

Overall, it seems that fair values are reliably informative for financial assets and liabilities but the picture is more complicated and contentious for operating assets and liabilities. Of course, a key explanation for this difference is that financial assets typically have exchange value independent of the value of the firm and its operations, while operating assets are by definition mostly for synergistic use within the firm.

4.5. The big picture on the usefulness of accounting

In trying to make sense of the accumulated evidence, it is useful to step back and think about the big picture on the usefulness of accounting. The key question here is: what do investors think about the key outputs of accounting? Overall, there is some very good news here. Crucially, investors still consider earnings the single most important number in making their decisions (Graham et al., 2005). So, we can take some comfort in the fact that, despite all problems like earnings management and complicated accounting rules, we still produce the number that is the most used by investors.

But there's also some not-so-good news. There is solid evidence that earnings volatility has doubled or tripled over the last 30–40 years, and earnings persistence is way down, from a near-random-walk of 0.90 down to 0.60 (Givoly and Hayn, 2000; Dichev and Tang, 2008), and perhaps even lower today. These findings are troubling because they question the traditional role of current earnings as a guide to future earnings. Given these results, it is probably not surprising that studies have also shown a sharp deterioration of the relation between stock returns and earnings over time (Collins et al., 1997). In addition, we see a proliferation in non-GAAP definitions of earnings, which suggests that investors are dissatisfied with GAAP earnings, and are looking for alternative and better measures of performance.

Is this deterioration of the information content of GAAP earnings due to changes in the GAAP rules or changes in the real economy? And what can be done about it? Dichev and Tang (2008) point to the increasing balance sheet orientation of GAAP rules as a possible explanation. The story is that this orientation produces frequent asset/liability revaluations, which appear as one-time items on the income statement, and reduce the otherwise high persistence of regular ongoing income. Donelson et al. (2011) confirm the importance of one-time items but find that it is mostly due to economic factors, while Srivastava (2014) points to the confounding effect of newly listed firms with lots of intangibles. Overall, this is an ongoing debate, and the difficulty is that the accounting and the economics are entangled with each other, so it is hard to cleanly separate their effects. Finally, more research in this area seems highly desirable because of its potential to inform GAAP standard setting.

5. A note on research methodology

In addition to discussing topics and areas of research, I would like to make a brief note on research methodology, using the earlier discussion of the post-earnings announcement drift as an illustration. The big positive is that when you look over the last 30 to 40 to 50 years, the general level of research proficiency is way up, there is just no doubt about it. The younger generations are much more tooled up in terms of statistics and research methodologies, the PhD programs do a better job, the computer equipment is way better, the databases are also better. So, there is no doubt that the technical level is not just a little but significantly better over time. This is all a tremendous achievement, and a great portent for the future.

What, then, are the challenges? In short, a lot of research designs tend to be quite bland. The typical research paper today has some story and hypotheses, and basically what the test boils down to is a prediction that the coefficient on some variable is different from zero, say positive. And in the typical case, the coefficient does turn out to be significantly positive. Such results, however, are rather bland and unconvincing, or "do not change the priors much" if you want to use the scientific jargon. Why? For one thing, samples tend to be quite large nowadays, and that means that most variables show up as statistically significant at conventional levels. In addition, there are growing concerns about various forms of p-hacking and cherry-picking of the results. So, what can be done about this? At the very minimum, we have to be more proactive about establishing economic significance, in addition to statistical significance. That implies, for example, looking at incremental R^2 from including the relevant variable or not, and looking at the change in the dependent variable for a typical change in the independent variable. Formulating hypotheses on the magnitudes of the coefficient rather than just the sign is also a great way to go, while it is close to non-existent today.

I also think that the effort to avoid "accidental significance" should be broader than the minimums identified above. I would use one of my very favorite studies, Bernard and Thomas (1990), to illustrate what I am trying to say. Bernard and Thomas (1990) is a study on PEAD, so the basic story is that stock returns continue to drift in the direction of the earnings surprise for many months after the earnings announcement. So, a bland study in this space will be some kind of regression of the abnormal stock returns on the magnitude of the earnings surprises. But the Bernard and Thomas (1990) study is a lot more interesting, and consequently a lot stronger, than that. By advancing some sharper assumptions, Bernard and Thomas are able to make detailed and intricate predictions about the pattern of abnormal stock returns, including their ordered signs (three positives in a row, one negative), their relative magnitudes, and with the effects manifesting in narrow windows around subsequent earnings announcements. The bottom line is that at the end of that paper one is left with the strong impression that the documented pattern of results is highly unlikely to happen by chance. So, ideally, it would be great to see a lot more of that, sharper and more specific predictions about not just the sign of a coefficient but also about its magnitude, predictions on the pattern of results as opposed to just one result, the timing of the hypothesized effect, and so on. These are the kinds of characteristics that make for a convincing paper, and memorable results.

6. Some possible areas of future research

As Yogi Berra famously said "It's tough to make predictions, especially about the future." So, consider the following as partly a prediction of what is likely to happen, and partly as a personal wish list for what I would like to see happen.

6.1. Prediction of long-term earnings

The literature on valuation leaves little doubt that forecasting of long-term earnings is the key to deriving better estimates of value (Ohlson, 1995). And those who derive better estimates of value can then make better investing decisions, and earn positive abnormal returns. Given such indications of importance, surprisingly little has been actually done in this space. Most studies that use long-term earnings projections source them from analyst forecasts despite reliable evidence that such forecasts suffer from extreme optimism (McInnis, 2010). Perhaps the best explanation for this state of affairs is also the simplest - long-term prediction of earnings is just difficult. But the case for the value of long-term forecasting of earnings remains unchanged. Perhaps new data and new techniques can re-energize this line of inquiry (e.g., using machine learning).

6.2. Using big data, especially in fundamental analysis and valuation

Using Big Data in fundamental analysis and valuation is already happening, and will not only continue for a while but is almost surely here to stay. There are already a number of papers using various kinds of new and big data, including Glassdoor data on opinions from employees, online customer reviews, cellphone location data, crowdfunding data, photo, speech, and video data on managers, satellite images of parking lots and so on (Huang, 2018; Huang et al., 2020; Katona et al., 2018; Mayew and Venkatachalam, 2012). Further developments along these lines are basically unavoidable, and my guess is that they will happen sooner rather than later.

For those who are looking to get involved in this area, the basic template for research is fairly clear. You look for some new data like employee satisfaction or satellite data on whether parking lots are full. Based on this data, you try to establish some links to future fundamentals (especially earnings), and then you try to see whether this fundamental relation is priced correctly in the capital markets. In other words, at least conceptually, the basic template is fairly straightforward. The challenge is more on the technical side, in learning to program and to manipulate very large datasets or unusual and ill-behaved data. The upshot is that those who are willing and able to make the sizable investment to operate in this area are likely to be well-positioned for the future.

6.3. Paying more attention to the accrual process

The accrual process is our value-added to the world. We need to thoroughly understand and own this space to make a meaningful contribution to knowledge and practice. Some progress has been made, as discussed above. But we still do not quite understand (or at least we have not fully internalized) fairly basic things about the accrual process. For example, consider the following situation: a mature firm has no growth, and so its assets and liabilities stay roughly the same. For such a firm, can the quality of accruals deteriorate over time? Intuitively, the answer must be yes. But in the current literature (Richardson et al. 2005), the definition of accruals is the change in non-cash assets and liabilities. So, for a firm like this which has no change in non-cash assets and liabilities, the accruals are zero, which means there are no accruals. But that sounds strange then, how can you talk about the properties of something when that something doesn't even exist?! So, what is the answer to this puzzle?

To clarify the logic, let's make the question more specific. For a mature firm with zero growth, how can the quality of accounts receivable change? The answer is that for such a firm the *net* receivable accrual is zero (the change in the Accounts Receivable account is zero for the year) but you still have *gross* receivable accruals during the year. Specifically, the firm collects the old receivables, and originates new receivables. And the point is that the new receivables can have entirely different properties from the old receivables, for example they can be from more marginal customers. So yes, the quality of receivables can go down during the year, even though the net receivable accrual is zero for the year. When you think about this question the right way, the answer is obvious.

What I am trying to say here is that the great paper on the difference between net and gross accruals has not been written yet, while I think there will be a paper on that at some point. It does seem to be a key and consequential difference. To illustrate, let's develop this idea further, and say that we are going to regress accruals on cash flows. This is the most basic regression in this kind of research, with variations of it appearing in countless studies. What kind of accruals should we put on the left-hand side of this regression? And to be clear what we are doing, let's make this more specific, let's say that this is about revenue accruals, and we have only accounts receivable and no deferred revenues. So, that implies that we will be putting the accounts receivable accrual on the left-hand side, while the corresponding cash flows go on the right-hand side, and for revenues that will be cash collections from customers. So, what kind of accruals should we put on the left-hand side? Using the Richardson et al. (2005) definition, it should be the change in accounts receivable because that is the definition of the receivables accrual. However, this answer does not seem quite right. What would make more sense is that we need the accounts receivable to be matched with the cash flows which were collected from these same receivables, which implies that we need some kind of gross accruals on the left-hand side, not net accruals. So, who is putting the gross accruals on the left-hand side for such regressions? Pretty much nobody at this point. The implication is that there needs to be some re-assessment of the very basics of what we do in accrual research. Needless to say, there will be a significant premium attached to the work that can solve such fundamental problems.

Another example of the danger of misunderstandings of the basic properties of accruals is the interpretation of the empirical relation between contemporaneous cash flows and accruals. For example, some studies interpret the high negative correlation between concurrent cash flows and accruals (or equivalently, a high ratio of cash flow to earnings volatility) as indicative of opportunistic earnings smoothing. In addition, Bushman, Lerman, and Zhang (2016) show that the negative correlation between contemporaneous operating cash flows and working capital accruals has declined to just about zero in recent years. These are both fine points, and are well-taken. However, what I'm really concerned about is not so much these studies per se but about a possible misinterpretation and confusion about their results. Even before looking at the empirical results, it would help to be clear that the negative correlation between cash flows and accruals is an *unavoidable* property of accrual accounting, it happens any time the recognition of a cash flow is shifted over time. In fact, this correlation is −100% between properly specified accruals and their associated contemporaneous cash flows (Dichev and Owens, 2020). If you bought Inventory for $200 cash, that is a debit to Inventory of $200 (a positive accrual) and a credit to Cash of $200 (a negative cash flow), a perfect negative correlation of −100%. Of course, things look much messier on the empirical side because in any given period you also have the other side of the Inventory accrual – expensing to COGS which is not related to the Inventory cash flows - and various one-time items and revaluation accruals that weaken the negative association to something less than −100%. But the basic point remains. Having a firm grasp of the unavoidable strong negative correlation between concurrent associated accruals and cash flows helps in the interpretation and calibration of empirical results.

6.4. More attention on standard setting and "what is good accounting?"

Standard setting matters. It sets the tone in financial reporting practices, and whether and how the world sees the value-added of accounting. And to be completely honest, what worries me is that I think standard setting today is going in the wrong direction, for both U.S. GAAP and IFRS (Dichev, 2017). Standard setters espouse a balance sheet orientation of financial reporting, emphasizing the valuation of assets and liabilities, and with little care for the income statement, and the paramount importance of earnings. This balance sheet orientation is at odds with how most companies conduct their operations, and think about value creation. For most companies, assets and liabilities are just the necessary props to ensure the success of operations, and the emphasis is on making various operational bets, essentially advancing expenses to earn revenue and profit. In other words, operations inherently follow an income statement logic for most companies, and the balance sheet orientation of standard setting is at odds with that.

Whether you agree with the above assessment or not, it is probably safe to say that there is relatively little engagement between accounting academia and standard setters today. Standard setters have trouble finding value in the academic literature, and the decisions on standards are rarely driven by research findings. In turn, standard setting-oriented work seems to garner little respect from the research journals, and the research community in general. This situation seems puzzling given the importance of standard setting. The scant engagement of accounting academics in rule-making, and practice in general, also seems at odds with what our sister disciplines do in their fields. For example, economics has a keen interest in policy questions, and there is considerable interaction between practitioners and academics at all levels, including many academics serving in top policy jobs like Chairman of the Federal Reserve and Chairman of the Council of Economic Advisors.

So, what can be done to improve standard setting? This is a subject for a much longer conversation but in a nutshell, I suggest three things. First, we need a clear articulation of the fundamental relation between cash flows and accruals across the financial statements (complemented by disclosure). For example, we should have clear articulation between "Revenue" on the Income Statement, "Accounts Receivable" and "Deferred Revenues" on the Balance Sheet, and "Cash Collections from Customers" on the Statement of Cash Flows. The idea is that we need a clear link and articulation for all major accruals and their corresponding cash flows across the major financial statements. Right now, this articulation is greatly muddled to impossible depending on the item. Second, and partly related to the first point above, we need clear disclosure about the estimates and their realizations for the most important accounting estimates. Current GAAP already requires firms to make Critical Accounting Policies disclosure in their financial reports. And so the idea is to make this disclosure much more specific, where for each critical accounting policy firms present their estimates and realizations for the current period. Such disclosure already exists for some items, e.g., some firms reconcile their beginning and ending warranty liability with their warranty expense and warranty claims paid for the current period. The point is to extend such disclosure to all important accruals. As one immediate benefit, it will be much harder to manage earnings if this information is readily available. Third, we need a clear separation of the results of operating and financing activities since they have quite different functions and implications for firm value.

7. Conclusion

Fifty years of capital markets research in accounting is really not such a long time considering the centuries of research tradition in older fields of science. So, we can be proud of the enormous progress made in this literature, from fairly humble beginnings to the great sophistication today, especially on the technical side. And yet, I feel that we have only scratched the surface, and that there are great opportunities ahead. Ideally, future accounting research will retain its rigor but move closer to practice, including standard setting.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Working capital and financial performance in MENA region

Osama EL-Ansary and Heba Al-Gazzar
Department of Business Administration, Cairo University, Giza, Egypt

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Abstract

Purpose – This paper aims to investigate the possible non-linear effect of net working capital (NWC) level on profitability for Middle East and North Africa (MENA) region listed companies. Furthermore, the study tests the possible interactive effect of cash levels on the relationship between NWC and profitability.

Design/methodology/approach – NWC level is the independent variable and profitability is the dependent variable using two proxies, return on assets (ROA) and returns on equity (ROE). Control variables are size, leverage, gross domestic product growth and sales revenue growth. The generalized method of moments was used to analyze the data of 134 consumer-goods listed firms in 12 MENA countries for the period 2013–2019.

Findings – The results demonstrate that NWC levels had a non-linear effect on profitability using ROA as a profitability proxy while results were insignificant using ROE as a profitability proxy. Furthermore, results show the absence of interactive effects between NWC, cash levels and both profitability proxies.

Originality/value – The study fills a gap in the working capital management (WCM) literature by providing new evidence on WCM's non-linear effect of corporate performance in the MENA region emerging markets using the consumer-goods industry sample. The study contributes to the financial managers' working capital optimization efforts in the MENA region by providing evidence on the usefulness of WC optimization efforts in the region from a financial performance point of view. According to the researchers' knowledge, a few studies attempted to investigate this non-linear relationship for neither MENA region countries nor the consumer-goods industry.

Keywords GMM, Working capital management, MENA, Cash holdings, Consumer goods firms

Paper type Research paper

1. Introduction

Many of the emerging markets in the Middle East and North Africa (MENA) region, which comprises 19 developing countries, are still recovering from the 2008 crisis and the region's extreme political instability, according to the World Bank Publications (2017). The markets are yet suffering from slow growth, with fiscal deficits expected to widen and investments expected to decline.

This region's general economic condition has many implications, necessitating effective working capital management (WCM). According to the World Bank Publications (2017), while most countries in the region have equity markets and a sophisticated banking system,

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access to finance by the private sector is limited. Indeed, according to The Organization for Economic Co-operation and Development (OECD) (2008), internal funds represented the main source of funds to firms in the MENA region. The reasons pull back to high-interest rates, high economic uncertainty and higher overall collateral required by banks, which makes short-term funds more accessible and longer-term funding less available. The higher importance of efficient WCM in developing countries is even more vital for production-oriented firms whose current assets (C/A) comprise a large proportion of its total assets such as inventory (Horne and Wachowitz, 1998).

Many studies have investigated the linear effect of efficient WCM on corporate performance. Only recently, Baños-Caballero *et al.* (2014) revealed for the first time the existence of a non-linear relation between working capital and corporate performance, implying the existence of an optimal working capital investment level that can maximize corporate returns. With the daily remarkable effort that financial managers exert to manage and optimize their working capital levels, these results have important practical implications.

Being recently proposed and confirmed by several later studies (Mun and Jang, 2015), a wide literature gap exists in confirming the existence of this effect in different industries and under different market structures. Specifically, to the researchers' knowledge, no study attempted to investigate this non-linear relationship for neither developing countries nor the consumer-goods industry.

This paper aims to fill this gap in the literature by answering the following question: considering a possible non-linear relationship, what is the effect of net working capital rate (NWCR) level on profitability (return on assets (ROA)/returns on equity (ROE))? Furthermore, the study tests the possible interactive effect of cash levels on the relationship between net working capital (NWC) and profitability. To test the validity of the study hypotheses for listed consumer-goods firms in the MENA region for the period 2013 to 2019, the generalized method of moments (GMM) was used.

The paper is divided into seven sections, starting with the introduction and followed by WCM strategies and policies in Section 2 and the literature review in Section 3. In Section 4, hypotheses are developed. Section 5 presents the followed methodology and Section 6 reports the empirical evidence. Section 7 concludes the paper and spotlights practical implications, study limitations and future research.

2. Working capital strategies and policies

WCM is an increasingly vital area in firm finance. In this section, we will shed light on the strategies, concepts, policies and decisions that were introduced in the literature. We found the following five directions in the academic research, namely, working capital investment (WCI) and working capital finance (WCF), conservative and aggressive, maturity matching, speed adjustment for financial crises and cash holding decision and permanent versus seasonal cash flows.

The first direction explains how WC could be managed to finance C/A as a short-term investment WCI, simultaneously, selecting the appropriate current liabilities (C/L) as short-term sources of finance WCF. Achieving the required balance between short-term sources of finance and short-term investments in C/A is a real challenge facing professional financial managers to avoid solvency/deficit and to increase profitability. Besides, achieving wealth maximization for shareholders. Most of the previous studies confirmed the fact that WCM selected policy has an impact on its financial performance (Altaf and Ahmad, 2019; Baños-Caballero *et al.*, 2019).

If the financial manager achieves the balance between allocating investments in C/A and financing WC this decision is known as a WC policy (Altaf and Ahmad, 2019). Successful selection of WCM policy will directly lower/affect the firm's cost, risk, sustainability and increase profitability as pointed out by may authors (Peng and Zhou, 2019; Salehi, Mahdavi, Dari, and Tarighi, 2019; Laghari and Chengang, 2019).

Second, the WCM policy could be conservative or aggressive. Conservative policy focus on allocating large funds in C/A financed by low short-term sources of C/L or aggressive policy where allocating small funds in C/A, which are financed by a large volume of short-term sources of finance, as pointed out by Altaf and Ahmad (2019) and Kayani, De Silva, and Gan (2019). The trade-off between using the conservative or aggressive strategies for WCM may result in a non-linear relationship (inverted U-Shape) between WC finance and firm financial performance as found by Baños-Caballero *et al.* (2012); Mun and Jang (2015), Singhania and Mehta (2017); Altaf and Shah (2017), Laghari and Chengang (2019); Altaf and Ahmad (2019). They reported a concave relation between corporate profits and WCM. The simple definition for the inverted U-Shape (concave) relationship between corporate profits and WCM was explained by Altaf and Ahmad (2019, p. 473) "[. . .] when firms finance working capital with lower levels of short-term debt, firm performance improves while with the higher level of short-term debt used to finance working capital, firm performance decreases."

The third direction emphasizes the maturity structure for C/A and C/L. Many firms in the emerging market do not achieve the appropriate matching between C/A and C/L maturities. WCM theory focused on financing working capital through short-term sources of finance but empirically it is not observed as pointed out by Chauhan (2019).

The fourth direction relates to the speed adjustment of firm WC during a crisis that is very significant to achieve or at least to sustain their performance. Tsuruta (2019, p. 206) examined the effect of the financial crises on WCM and stated that "[. . .] to finance any access working capital, firms borrow from banks and reduce their internal cash both during and outside the period of crisis."

The fifth direction is concerned with the cash holding decision. Mun and Jang (2015) examined the interaction relationship between cash holding and WCM policy impact on a firm's profitability. They found that the corporate's optimal cash level is one of the important factors for profitability. Their results stated that: "[. . .] interactive effects exist among working capital, cash levels and profitability" (Mun and Jang, 2015, p. 1). Thus, for one of our research hypotheses, we used the assumption related to the interaction between WCM, cash Levels and profitability developed by Mun and Jang (2015) to test the inter-relationship between WCM and profitability. Studies extended this direction according to whether a firm faces permeant versus seasonal cash flow. As stated by Ismail (2017), firms' WC needs will increase during special seasons because of high sales and then decline as the collection from clients for accounts receivables (A/R) is more than sales.

3. Literature review

The objective of this section is to cast light on recent research related to the relation between WCM and firm performance. This section is divided into three parts. Part one is devoted to illustrate the relationship between WCM and profitability and part two addresses profitability proxies and finally, part three explains the interrelationship between investment in working capital and cash holding levels.

3.1 Working capital management and profitability

WCM is a vital element of corporate finance that requires considerable time in its day-to-day decisions. According to Ernst and Young (2018) report on working capital practices in the

MENA region, $32.7bn worth of cash opportunity has been identified in 2017. Pirttilä *et al.* (2020) have found that firms operating with efficient WCM policies are usually their supply chains' leaders and are usually considered powerful actors. WCM is important for investors as well. Dhole *et al.* (2019) showed that analysts seem to consider WCM of firms when setting the one year ahead of target price.

WCM is concerned with managing a firm's short-term capital, as per Chiou *et al.* (2006) definition. Short-term capital comprises C/A and C/L that companies use to run their daily business and operations. One measure that managers use to keep track of their working capital levels is the cash conversion cycle (CCC), which mirrors the period amid the corporate cash payments to its suppliers and the time it collects its receivables from customers.

Many studies tested the relationship between working capital and the firm's performance. The results fall into two competing views.

Under one point of view, further investments in working capital are expected to have upside effects on a firm's financial performance especially for firms with a low level of NWC. The rationale is intuitive. According to Blinder and Maccini (1991), Fazzari and Petersen (1993); Corsten and Gruen (2004), holding larger levels of inventories can decrease costs of supply, hedge against input price uncertainty and prevent operational disruptions and loss of business opportunities due to stock-outs. Granting trade credit also positively affects the sales of the firm because it can act as an effective price-cut, serve as a pledge for product quality and nurtures long-term customer relationships (Wilson and Summers, 2002; Brennan *et al.*, 1988; Long *et al.*, 1993).

Another strong explanation for the incentive of firms to hold positive NWC is that it may act as a source of internal funds that secures precautionary liquidity (Fazzari and Petersen, 1993). Furthermore, maintaining positive NWC levels allows a firm to receive a supplier's early payment discounts and enhances the firm's stakeholder relationships (Wilner, 2000; Ng *et al.*, 1999). Pestonji, and Wichitsathian (2019)'s study also revealed a statistically significant positive relationship between working capital investment policy and profitability when they examined a sample of 68 companies listed in the Stock Exchange of Thailand covering the production sector.

Despite all these tempting reasons to raise NWC levels, there are adverse effects on firm value as the working capital level rises beyond a certain point. Many studies have revealed such a negative relationship between a corporation's profitability and working capital levels such as Wang (2002); Jose, Lancaster, and Stevens (1996); García-Teruel and Martinez-Solano (2007); Dong and Su (2010); Baños-Caballero *et al.* (2014). Likewise, applying his study on the real estate and construction sector of UAE, Mehta (2014) found that the longer the CCC, the lesser will be the profitability.

The analogous results root from different intuitive reasons such as that holding inventory stock requires bearing additional costs as warehouse and insurance that increases as inventory levels rise, according to Kim and Chung (1990). Raising working capital levels also entails higher financing and opportunity costs, which, in turn, increases credit risk (Kieschnick *et al.*, 2013). Firms and practitioners are, therefore, aware that increasing working capital levels beyond a certain point put them under higher risk of financial distress and bankruptcy besides locking up more cash (Deloof, 2003).

Recently in literature, combining these potential benefits and costs has produced several studies confirming a non-linear effect of working capital levels on firms' financial performance, with the expectations of a negative relation at a high level of working capital (i.e. overinvestment in NWC) and a positive relation at a low level of working capital (i.e. underinvestment in NWC). Using a sample of small and medium-sized enterprises (SMEs), Baños-Caballero *et al.* (2012) also found a non-monotonic relationship between working capital level and firm profitability.

Baños-Caballero *et al.* (2014) later raised an argument in 2014 that there is an inverted U-shaped relationship between a firm's net trading cycle (a proxy used for WCM) and its performance, measured as the sum of the market value of equity and the book value of debt to the book value of assets. They suggested that a firm should increase investments in working capital to increase the firm's sales and early payment supplier's discounts. This should be limited, however, to a certain point where longer net trading cycles result in lower firm performance. Implications of this new evidence in working capital literature suggest that managers should maintain an optimal level of working capital that balances the tradeoffs and maximizes the firm's performance.

In 2015, Mun and Jang (2015) have criticized Baños-Caballero *et al.* (2014)'s approach in measuring WCM using CCC because it fails to capture the whole picture of WCM by ignoring the role of cash level. They argued that the effect of working capital investments on profitability would differ according to the cash level held by the firm. They also added to their criticism that a firm's value is affected by other aspects, beyond just operational ones, in their WCM measure.

Accordingly, Mun and Jang (2015) tested for non-linearity in the relationship between WCM using the traditional NWC measure and firm's profitability (using operating return on assets (OROA) as a proxy). Their results revealed a significant inverted-U shaped relationship between WCM and profitability, consistent with Baños-Caballero *et al.* (2014). The cash levels showed a significant interactive effect on the relationship between working capital and the firm's profitability only when working capital levels were positive. Similarly, in 2015, Aktas *et al.* (2015) reached similar conclusions for a comprehensive US sample over 30 years.

Evidence in the literature showed that the relationship between working capital and corporate performance is not static. Baños-Caballero *et al.* (2016)'s study reports that working capital requirement financing-performance relation changes during a financial crisis. As he studied a sample of 6,926 non-financial UK SME's for the period from 2004–2013, Afrifa (2016) recorded similar findings. Similarly, Dalci and Ozyapici (2018)'s study reveals a non-linear relationship between working capital and profitability with different leverage levels as a moderating variable. More similar results were reported (Altaf and Ahmad, 2019; Altaf and Shah, 2018).

Literature has extended the testing of this possible nonlinearity in working capital-corporate performance relationship to emerging markets. Altaf and Shah (2017)'s study on 437 non-financial Indian companies confirmed the inverted U-shape relationship between WCM and firm performance. In 2019, Laghari and Chengang (2019)'s study using a large sample of Chinese listed corporations over the period 2005 to 2015, their study revealed a significant reverse U-shaped relationship between WC and corporate profitability. Singhania and Mehta (2017) also found similar results using financial data of listed firms in 11 economies of the Asia Pacific region. Also, despite finding that the relationship between working capital and corporate performance is negative, Wang, Akbar, and Akbar (2020) reported that this relationship is not static across different stages of a firm's life cycle (Laghari and Chengang, 2019).

In his study, Abuzayed (2012) found that the CCC has a positive effect on the firm's profits. This designates that more profitable firms have weaker motives for managing their working capital levels. Moreover, financial markets failed to punish managers for inefficient WCM in emerging markets suggesting that policymakers in emerging markets need to encourage managers and shareholders to care more about managing their working capital through enhancing investors' awareness and improving information transparency.

On the contrary, to examine the impact of WCM on corporate performance and value using a sample of Egyptian firms, Moussa (2018)'s study demonstrated a positively associated with CCC length, failing to achieve optimum efficiency of WCM performance.

3.2 Profitability proxies

Authors in working capital literature used either ROA, OROA and/or ROE as measures of firm profitability. García-Teruel and Martinez-Solano (2007) examined the effects of WCM on profitability. Their sample covered small and medium enterprises in Spain, and they used ROA as a profitability proxy. Wang (2002) on 1,555 Japanese companies and 379 Taiwanese companies for a period from 1985 to 1996, used OROA and pre-tax ROE as operating performance proxies. A similar study context was conducted earlier by Jose *et al.* (1996) using both OROA and pre-tax ROE on a big sample of 2,718 corporations from 1974 to 1993. Besides, Prasad *et al.* (2019) have developed a multiplier of working capital efficiency that directly measures the WCM's profitability and is a product of three elements, namely, a ratio of the sum of trade receivables and inventories to trade payables, the ratio of NWC to net sales and weighted average cost of capital.

Another widely cited study investigating the relationship between the efficiency of WCM and its profitability was published by Shin and Soenen (1998), who investigated 58,985 samples in 8 industries for the period 1975–1994. ROA and the return on sales were used to measure profitability.

Based on these studies, we adopt two measures of profitability. First, because we are interested in the effect of NWCR levels on operating performance, we used net operating ROA as a profitability proxy measured as earnings before interest and taxes (EBIT) divided by total assets.

Second, while ROA measures the efficiency of the firm's management and is of great importance to a manager's performance evaluation, ROE on the other side is of more interest to another stakeholder; that is stockholders. According to Hagel *et al.* (2010), in their Harvard business review article, "most analysts and investors tend to focus on ROE as their primary measure of company performance [. . .], which focuses on return to the shareholders of the company." Although the former authors have preferred ROA as a more accurate financial performance metric, nonetheless, the management of liquidity affects a firm's debt structure because it involves mutually the management of assets and liabilities. Therefore, using both metrics as financial performance proxies allows us to split asset management and financing influences on profitability (Jose *et al.*, 1996).

3.3 Investment in working capital and cash holding levels

Cash is the most liquid, but least profitable asset. The benefits of holding cash go back to 1934 when Keynes (1934) explained the precautionary and transaction motives of holding cash.

Holding cash, however, does come with drawbacks. As Kim *et al.* (1998) stated, liquid assets have low returns and lead to higher taxation. Furthermore, high levels of cash holdings create more agency problems, according to Jensen (1986). Firms, should, therefore, target an optimal cash level that balances both marginal returns and costs of holding cash, as per the tradeoff theory.

Four critical factors explain the variance in corporate cash holdings, according to Bates *et al.* (2009): cash flow volatility, working capital, capital expenditures and R&D expenditures. The researchers examined cash flow uncertainty in American firms throughout the period 1980 up to 2006. Their study revealed that as cash flows become riskier and account receivables are reduced, a firm will tend to hold higher cash levels, supported by a similar conclusion by Campbell and Shiller (2001), Irvine and Pontiff (2008).

The role of cash in the working capital-corporate performance relationship was indirectly evident in a study by Tsuruta (2019) using quarterly firm-level data of listed firms in Japan, who found that working capital adjustments were weaker during the crisis. Furthermore, the negative relationship between excess working capital and corporate performance became significantly higher during crisis times, specifically for large corporations. Nevertheless, evidence point that this crisis-related working capital–firm performance effect does not continue for prolonged periods because to finance any excess working capital, corporations borrow from banks and lessen their cash throughout periods of crisis and beyond.

Generally, small-sized companies tend to hold more cash because of their higher operating and financial risks, relative to their bigger counterparties (Fazzari and Petersen, 1993; Opler, Pinkowitz, Stulz, and Williamson, 1999; Kim *et al.*, 1998). They debate that high cash flow volatility and strong growth opportunities bring firms to hold higher cash levels than their opposites, while bigger firms with higher credit ratings; and therefore, have a better ability to raise capital from debt and equity markets, hold less cash.

According to this review on cash holdings literature, "[. . .] the relationship between a firm's capability to generate cash from operations and the level of actual cash holdings is important to understanding a firm's WCM" (Mun and Jang, 2015, p. 3). Specifically, if a firm can generate cash from operations and/or able to turn working capital to cash smoothly and timely, then one might expect it to hold less cash on hand. A firm holding simultaneously positive NWC and positive cash holding positions imply that working capital is mainly driven to positive values by cash assets rather than non-cash assets (inventories, accounts receivables and accounts payable). This might be the reason for the inability to turn non-cash working capital assets to cash quickly or because of higher business risks. For either reason, the firm incurs opportunity costs, which negatively affect its profitability. While holding positive levels of working capital may have negative effects on a firm's financial performance as hypothesized in the previous section, it can be expected that holding positive cash levels will increase the steepness of the negative relation between positive WC and financial performance.

On the contrary, a firm with a positive NWC level and a negative cash holding level signals the dominance of the non-cash assets in generating positive NWC values. This implies a good ability of a firm to generate internal cash easily, and thus, holding negative cash levels, which are rather invested in accounts receivables, inventory or paying off accounts payable to enhance the performance of its operations. In other words, a firm that aims to increase working capital targets non-cash asset increases rather than cash holdings. One would expect that the negative relationship between NWCR and profitability will be enhanced by holding negative cash levels. Therefore, the researchers propose that the level of cash has an interactive effect on the effect of NWCR on profitability (using ROA and ROE).

A firm, on the other side that holds negative NWCR levels, but a positive cash level might imply insufficient cash generated internally. With the motives of holding cash reviewed earlier, we expect such firms with weak cash-generating abilities to hold positive cash levels. Thus, these firms are likely to increase their NWC levels by rather increasing cash levels than non-cash assets, which imply higher opportunity costs. Consequently, the positive effect of NWCR and profitability is expected to worsen by holding positive cash levels.

In the case of both negative NWCR and cash holding levels, implications are mixed. First, a negative cash holding level might signify a good cash generation capability where firms would rather increase the non-cash assets portion of the working capital to achieve operational benefits than increasing cash levels. Accordingly, the positive relationship between negative NWCR and profitability is expected to improve. If this situation, however, implies a bad cash-generating ability, the probability of the firm to survive is doubtful and should not be considered in the analysis.

4. Hypotheses development

4.1 Net working capital level and profitability

Controversial results on the effect of NWC levels on profitability go back for decades in the literature as presented in the previous section. These competing views about the effect of NWC investments on profitability have produced recent studies suggesting an inverted U-shaped relationship between NWC and firm's profitability such as Baños-Caballero *et al.* (2014); Mun and Jang (2015).

To test this possible non-linear relationship, this paper divided the sample into two groups according to their WCR levels (positive and negative) and hypothesized the following:

H1. "There is a statistically non-linear effect of NWC on profitability."

H2. "If a firm's NWC is positive, there is a statistically negative effect of NWC on profitability."

H3. "If a firm's NWC is negative, there is a statistically positive effect of NWC on profitability."

The independent variable is NWCR measured as the NWC divided by sales to provide a relative measure across different countries and currencies. NWC is the difference between C/A and C/L; both classified into cash and non-cash items.

To measure profitability, the study uses two proxies, one at a time, to explore the effect of NWC on different proxies for profitability, namely, OROA and ROE. OROA measures the effect of NWC levels on operating performance, measured as EBIT divided by total assets. ROE, on the other hand, is of more interest to stockholders. Testing both metrics as profitability proxies allow us to separate asset management and financing influences on profitability (Jose *et al.*, 1996).

4.2 Cash holding level

"The relationship between a firm's capability to generate cash from operations and the level of actual cash holdings is important to understanding a firm's WCM" (Mun and Jang, 2015). Their study showed a significant interactive impact of cash holding levels on the relation between working capital and the firm's profitability only when working capital levels were positive.

To test for the presence of the interaction effect of cash level, this paper further divided the firms into two sub-groups according to their cash holding levels (positive and negative, using a dummy variable for cash levels; (1) for positive and (0) for negative, hypothesizing the following:

H4. "If a firm's NWC is positive, the negative effect of its NWC on profitability will significantly differ based on its cash level (positive or negative)."

H5. "If a firm's NWC is negative, the positive effect of NWC on profitability will significantly differ based on its cash level (positive or negative)."

Cash level is measured using the cash level rate (CASHR) calculated as cash and cash equivalents minus current debts.

5. Methodology

5.1 Samples and data

The sample analyzed covers 134 listed consumer goods corporations in the MENA region from the period 2013 to 2019. A specific industry has been analyzed because the WCM practices differ between industries suggesting the non-homogenous effects of WCM on different corporate performance metrics (Boisjoly *et al.*, 2020). Therefore, our study focuses on a certain sector because of the different practices and norms across different industries (Chauhan, 2019).

The financial data in this paper comes from the annual financial statements on the Decypha database (www.decypha.com). To include the economic cycle effects on working capital investment levels, the researchers gathered the annual gross domestic product (GDP) growth data for the MENA region countries from the World Bank database (www.worldbank.org).

The study follows the industry classification standards of FTSE Russell Industry classification standard (2018). According to FTSE Russell Industry classification standard (2018), the consumer goods industry includes the following super-sectors, namely, automobiles and parts, food and beverages, personal and household goods, which are further divided into sectors and sub-sectors. Table 1 below illustrates the sample details.

5.2 Model specification and methodology

To test *H1* of a possible concave relationship between working capital and firm profitability, we estimate the following quadratic model using two profitability proxies interchangeably, namely, ROA and ROE. Table 2 follows with variables description.

Model (1):

#	Country	No. of listed corporations analyzed	Country's share from total sample "Rounded figures" (%)
1	Egypt	37	27
2	United Arab of Emirates	9	6
3	Morocco	8	5
4	Saudi Arabia	16	12
5	Kuwait	4	3
6	Qatar	4	3
7	Oman	16	12
8	Palestine	6	4
9	Tunisia	14	10
10	Iraq	12	9
11	Bahrain	2	1
12	Jordan	6	4
	Total	134	100%

Notes: According to the World Bank, the MENA region comprises 19 countries. Our sample only covered 12 countries excluding Yemen, Djibouti, Algeria, Iran, Lebanon, Libya and Syria due to data unavailability or firms listed had mixed lines of business besides consumer goods

Table 1. Study sample

Table 2.
Variables description table

Variable	Acronym	Formula	Description and citation
Dependent variable/s			
Return on assets	ROA	Earnings before interest and tax (EBIT) divided by total assets = EBIT/total assets	Following (Jose *et al.*, 1996; Wang, 2002) we apply both ROA and ROE to separate asset management and financing influences on profitability - ROA, used as a profitability proxy, is calculated using EBIT to reflect the net operating profits of the firm and avoid non-homogenous interest and tax rates across countries - Authors who used ROA as a profitability proxy (Wang, 2002; Falope and Ajilore, 2009; Şen *et al.*, 2009; Alavinasab and Davoudi, 2013; Erasmus, 2010; Pirttilä *et al.*, 2020; Singhania and Mehta, 2017; Laghari and Chengang, 2019; Baños-Caballero *et al.*, 2012)
Return on equity	ROE	Net income divided by total shareholders' equity ROE = net income/shareholder's equity	ROE, used as another profitability proxy that reflects a more investor-oriented profitability proxy and reflects firms' financing strategies - Authors who used ROA as a profitability proxy (Wang, 2002; Samiloglu and Akgün, 2016; Sharma and Kumar, 2011; Jose *et al.*, 1996)
Independent variables			
Net working capital rate	NWCR	$NWCR = \frac{\text{Inventories} + \text{Trade Receivables} - \text{Trade Payables}}{\text{Sales}}$	Working capital level neutralized across firms by dividing net working capital by sales (Tsuruta, 2019; Hill *et al.*, 2010; Aktas *et al.*, 2015; Afrifa, 2016)
Control variables			
Firm size	Size	Natural logarithm of total assets	Size is controlled because of the economies of scale concept that directly affect firms' profitability (Laghari and Chengang, 2019; Baños-Caballero *et al.*, 2012; Wang *et al.*, 2020; Moussa, 2019; Şen, *et al.*, 2009)
Leverage	LEV	Total liabilities divided by total assets	Leverage affects working capital management practices and is controlled for in this study (Laghari and Chengang, 2019; Baños-Caballero *et al.*, 2012; Wang *et al.*, 2020; Moussa, 2019)
Sales growth	Growth	Sales growth rate calculated as = $(Sales_{n} - Sales_{n-1})/Sales_{n-1}$	Sales growth is used as a proxy for firm growth that directly affects working capital management practices

(continued)

Variable	Acronym	Formula	Description and citation
			(Laghari and Chengang, 2019; Baños-Caballero *et al.*, 2012; Wang *et al.*, 2020; Afrifa, 2016; Hill *et al.*, 2010)
Cash level	Cash	(Cash and cash equivalents)/sales	To test whether cash levels play a moderating role in the relationship between working capital and profitability, cash level was used as a dummy variable and an interaction term "cash level * NWCR" is added to the model For authors who used cash as a control variable (Afrifa, 2016; Laghari and Chengang, 2019)
Economic growth	GDP	Real GDP growth rate calculated as = $(GDP_{n} - GDP_{n-1})/GDP_{n-1}$	Because this study applies cross-country analysis, it controls for different gross domestic growth rates and different inflation levels According to Baños-Caballero *et al.* (2019), the value of net working capital varies across countries and that it depends on both investor protection and a country's financial and economic development (Wang *et al.*, 2020; Altaf and Shah, 2018; Tsuruta, 2019; Moussa, 2019)

Table 2.

$$\text{Profitability} = \beta_0 + \beta_1{*}ROA/ROE_{i,t-1} + \beta_2{*}\text{NWCR}_{i,t} + \beta_3{*}NWCR^2_{i,t} + \beta_4{*}Size_{i,t} + \beta_5{*}\text{GROWTH}_{i,t} + \beta_6{*}\text{LEV}_{i,t} + \beta_7{*}\text{GDP}_{kt} + a_i + \varepsilon_{i,t}$$

where:

ROA_{it}: Operating Return on Assets using EBIT as a proxy for operating income for companies i at time t.
$ROA_{i,t-1}$: ROA one-year lag.
ROE_{it}: Return on Equity for firm i at time t.
$ROE_{i,t-1}$: ROE one-year lag.
β_0: Constant.
$NWCR_{i,t}$: Net Working Capital divided by Sales for firm i at time t.
$NWCR^2_{i,t}$: Net Working Capital divided by Sales all squared for firm i at time t.
$Size_{i,t}$: The natural logarithm of total assets for firm i at time t.
$\text{GROWTH}_{i,t}$: Sales growth rate for company i at time t.
$\text{LEV}_{i,t}$: Leverage as the ratio of total liabilities to total assets for firm i at time t.
GDP_t: Gross domestic product growth rate for country k at time t.
$\varepsilon_{i,t}$: Error term.
i: 134 Company in 12 MENA region countries (Consumer Goods Industry).
t: From 2013 to 2019.
k: 12 countries in the MENA region.

To further test the linear relationship between working capital and profitability "*H2* and *H3*," we estimate the following linear model:

Model (2):

$$\text{Profitability} = \beta_0 + \beta_1{*}OROA/ROE_{i,\ t-1} + \beta_2{*}\text{NWCR}_{i,t} + \beta_3{*}Size_{i,t} + \beta_4{*}\text{GROWTH}_{i,t} + \beta_5{*}\text{LEV}_{i,t} + \beta_6{*}\text{GDP}_t + a_i + \varepsilon_{i,t}$$

Upon testing the possible non-linear relationship between working capital and profitability, suggesting a possible optimal working capital level, we attempt to explore the impact of cash level on this optimal level. We estimate the following model to test this possible interaction effect as follows testing *H4* and *H5*:

Model (3):

$$\text{Profitability} = \beta_0 + \beta_1{*}NWCR_{i,\ t} + \beta_2{*}\text{CASH}_{i,t}(\text{Dummy}) + \beta_3{*}\left[\text{N}WCR_{i,t}{*}\text{CASH}_{i,t}(\text{Dummy})\right] + \beta_4{*}\text{GROWTH}_{i,t} + \beta_5{*}\text{Size}_{i,t} + \beta_6{*}\text{LEV}_{i,t} + \beta_7{*}GDP_t + a_i + \varepsilon_{i,t}$$

To test whether the independent variables can explain the profitability's variance significantly, this study applied regression analysis. Diagnostic tests were applied to test normality, multi-collinearity, heteroskedasticity, autocorrelation and heterogeneity to confirm whether the ordinary least squares (OLS) assumptions have been met or not.

Normality was tested using Jarque-Bera, which confirmed that none of the variables is distributed normally, but because of the large sample of the study (Field, 2009, p. 134) and the use of the GMM as a statistical tool of regression analysis, this will not cause major problems.

Besides, we used the variance inflation factor (VIF) to test the absence of multi-collinearity in our independent variables. A common cutoff value/point is a tolerance value of 0.10, which corresponds to a VIF of 10. As the largest VIF value was 1.8, we conclude the absence of multi-collinearity if the value is less than 10 as stated by Sekaran and Bougie (2009, p. 316).

The Hausman test was conducted to detect the endogeneity of unobserved errors and consequently select among fixed-effects and random-effects models. Because the data is unbalanced, we favored a random-effects model over a fixed-effects model as per Bell and Jones (2015) because it is more capable of controlling unobserved heterogeneity, and, hence, mitigate the risk of attaining inclined results stemming from this heterogeneity (Hsiao, 1985).

With these diagnostic tests' results, it is evident that the OLS assumptions are not met. One of the effective approaches to solve autocorrelation and heterogeneity is using a panel data methodology, specifically; the research's models were estimated using the GMM estimator depend on Arellano and Bond (1991). This methodology offers several benefits. According to Himmelberg *et al.* (1999), firms are heterogeneous and it is almost unavoidable to find characteristics that are difficult to measure or obtain and that could affect their value.

The dynamic panel data methodology allows us to control for unobservable heterogeneity (Hsiao, 1985). Besides, it solves the problem of possible endogeneity by using a lagged regressor as an instrument to avoid endogeneity issues (Arellano and Bond, 1991). In our models, ROA and ROE were lagged twice and used as instruments for differenced variables. Therefore, the (GMM) using random effects was used to test for the study's hypotheses.

5.3 Descriptive statistics

Table 3 presents descriptive statistics for the variables under study, using several NWCR sample classifications.

Using the overall study sample, the mean of ROA was 3.5% and ROE was 8%. These figures differed substantially when the sample was divided into positive and negative NWCR. ROA mean was 4% under the positive NWCR sample, and only averaged 1.9% under the negative NWCR sample. ROE was also 6% and 1.7% under positive and negative NWCR samples, respectively.

With an average NWCR of approximately 30% across the overall study sample, the table displays an NWCR mean of 38.3% under the positive NWCR sample and scores a negative 25.6% rate under the negative NWCR sample. Firms within the negative NWCR sample had a bigger size value on average than firms in the positive NWCR sample.

It can also be noticed that larger firms had higher leverage than smaller ones across all sample groups. This conclusion matches literature that smaller firms face higher financing constraints, and therefore, hold more cash than their larger counterparties (Fazzari and Petersen, 1993; Kim *et al.*, 1998; Opler *et al.*, 1999). Practically, this result confirms the fact that a large firm's ability to source external funds and loans is easier than small firms.

Table 4 Follows and displays the Pearson correlation matrix among the variables and supports our previous section's VIF diagnostic test, confirming the absence of multi-collinearity.

6. Empirical evidence

6.1 Working capital effects on profitability

The objective of this section is to cast light on data analysis and testing research hypotheses.

Table 3.
Descriptive statistics

Sample	Statistic	ROE	ROA	NWCR	SIZE	LEV	GROWTH	CASH	GDP
Overall-obs.	Mean	0.080298	0.035789	0.30174	2.508914	0.451264	0.017799	0.335115	0.030061
(938)	Std. dev.	0.248341	0.130878	0.46132	1.047824	0.273893	0.256944	0.680599	0.023329
	Min.	1.534063	−0.90019	−2.68993	0.016302	0.003998	−0.97671	0.000116	−0.04712
	Max.	2.02158	0.847223	4.176276	9.300226	1.826955	0.9998	4.86534	0.152125
Positive NWCR-obs.	Mean	0.065506	0.044904	0.383643	2.409263	0.432476	0.029789	0.268529	0.029359
(756)	Std. dev.	0.245848	0.108958	0.407437	1.028798	0.260387	0.234903	0.551989	0.020438
	Min.	−2.02158	−0.73953	0.000584	0.208431	0.020354	−0.7999	0.000116	−0.04712
	Max.	1.534063	0.847223	4.176276	7.813039	1.464309	0.9998	4.821313	0.152125
Negative NWCR-Obs.	Mean	0.175727	0.019666	−0.25682	3.186721	0.58651	−0.00003	0.403656	0.035891
(111)	Std. dev.	0.243728	0.218984	0.418908	0.891756	0.248272	0.327684	0.731173	0.029543
	Min.	−1.05078	−0.90019	−2.68993	1.646528	0.126193	−0.83668	0.005066	−0.02495
	Max.	0.7064	0.357554	−0.00011	9.300226	1.826955	0.967	4.286249	0.152125

Notes: ROA = return on assets = EBIT/total assets; ROE = return on equity = net income/total equity; NWCR = (trade receivables + inventory − trade payables)/sales; size = logarithm of total assets; GROWTH = sales growth rate ($Sales_n - Sales_{n-1})/Sales_{n-1}$; LEV = total liabilities/total assets; GDP = real GDP growth rate calculated as $(GDP_n - GDP_{n-1})/GDP_{n-1}$; cash = (cash and cash equivalents)/sales; Obs. = number of observations

Sample	ROA	ROE	NWCR	Growth	Leverage	Size	GDP	Cash
ROA	1							
ROE	0.390809***	1						
NWCR	−0.12462***	−0.16386***	1					
Growth	0.171633***	0.137923***	−0.13761***	1				
Leverage	−0.1431***	0.050838	−0.20168***	0.078221**	1			
Size	0.138977***	0.102365***	−0.14412***	0.082705***	0.065163*	1		
GDP	0.131512***	0.070265**	−0.04776	0.06733*	0.044262	0.142652***	1	
Cash	−0.10136***	−0.01562	0.032457	−0.23565***	−0.24056***	0.047614	−0.01486	1

Notes: *Significant @ 10%; **Significant @ 5%; and ***Significant @ 1%

Table 4. Pearson correlation matrix

Table 4 below refers to the GMM regression analysis results to test the relationship between working capital and profitability using Models (1) and (2).

To conclude a concave relation between working capital and profitability, we expect to observe a statistically significant positive *NWCR* coefficient and a negative $NWCR^2$ coefficient in the quadratic Model (1). Under ROA, the results are as expected and *H1* is accepted, implying the presence of a non-linear relationship between working capital and ROA. This result is consistent with the literature (Baños-Caballero *et al.*, 2014; Afrifa, 2016; Mun and Jang, 2015; Singhania and Mehta, 2017; Altaf and Shah, 2017; Laghari and Chengang, 2019; Wang *et al.*, 2020) suggesting the possibility of working capital level optimization.

Conversely, using ROE as a profitability proxy, *H1* was rejected. While many studies tested the linear relationship between ROE and working capital (Jose *et al.*, 1996; Wang, 2002; Sharma and Kumar, 2011; Samiloglu and Akgün, 2016), none to our knowledge has tested the possible quadratic relationship between working capital and ROE.

The reason for ROE model insignificance could be interpreted as MENA region financial managers focus on profit maximization objective to empower their success on the account of achieving wealth maximization when they practice and select their WCM policies and decisions. This strategy will create a serious problem for shareholders and may affect their shares prices in the stock exchange as all the sample firms are listed.

To further investigate the breakdown of these quadratic model results, Model (2) is estimated to examine the linear relationship between working capital and the different profitability proxies using a positive and negative NWCR sample classification (*H2* and *H3*).

H2 states that if a firm's NWCR is positive, there is a statistically negative effect of NWCR on profitability. As shown in the table, *H2* is accepted with a significant negative NWCR coefficient with ROA (−0.02835) and ROE (−0.07012). These results confirm one side of the literature that resulted in a significantly negative relationship between WCM and profitability (Wang, 2002; García-Teruel and Martinez-Solano, 2007; Dong and Su, 2010).

On the other hand, *H3* expects that if a firm's NWCR is negative, its WC will have a positive effect on profitability, is accepted using ROA as a proxy, with a significant positive NWCR coefficient of (0.141723). This result is consistent with many studies in the literature

(Corsten and Gruen, 2004; Fazzari and Petersen, 1993; Blinder and Maccini, 1991). In contrast, the same hypothesis using ROE is rejected due to an insignificant positive coefficient of NWCR. For more comprehensive literature review results regarding the sign direction (+ or −) of the relationship between WCM components and firm performance (Kayani *et al.*, 2019, Table 3, page 356).

This linear Model (2) breaks down the quadratic results, supporting our earlier findings. ROA is found to have an inverted U-shaped relationship with working capital, while ROE only had a significant negative relationship with working capital, and thus, confirming our earlier rejection of a quadratic ROE-NWCR relationship (Table 5).

6.2 Interaction effects of working capital and cash level in the generalized method of moments model

Researchers such as Baños-Caballero *et al.* (2014) and Hill *et al.* (2010) pinpointed that the level of cash flow available will result in more investments in working capital. Furthermore, a study by Fazzari and Petersen (1993) showed that working capital investments are cashflow-sensitive. Thus, this section investigates the possible influence of cash flow availability measured by CASH on the relationship between NWCR and profitability.

To test whether a firm's cash level (cash level) has an interactive effect on the relationship between NWCR and profitability, an interaction term (cash level * NWCR) is added to the GMM model. The (cash level) variable is dummy: (1) for cash levels above sector median and (0) for below sector median levels. Table 6 below illustrates the results of these hypotheses (*H4* and *H5*) using the Model (3).

To confirm a significant moderating effect of cash level on the relationship between working capital and profitability, we expect to find a statistically significant interaction term as explained previously. Using both profitability proxies, ROA and ROE, the interaction term coefficients in both models were insignificant.

This result partly agreed with Mun and Jang (2015)'s results as they found a significant moderating effect for cash levels on the relationship between working capital and profitability, only with firms of positive working capital levels. More specifically, they found that when firms have positive working capital levels, and thus, a negative relationship with profitability, the severity of this negative relationship increases when these firms hold positive cash levels because of the increased opportunity costs of holding cash. They did not find this interaction cash effect when firms held negative working capital levels. Accordingly, our results do not suggest that cash plays any moderating role in the working capital-profitability relationship. This result may direct the attention of financial managers in the MENA region to plan a short and medium WCM policy, cash budget, cash inflow and cash outflow and to provide cash at the appropriate time to achieve the interaction relationship between cash and performance. According to Salehi *et al.* (2019), financial managers should pay more attention to keep cash to finance and control WC to achieve profitability and sustainability of their firm's operations.

Contrary as well to our results, another study conducted by Afrifa (2016) indicated a significant cash flow effect on the relationship between NWC and corporate performance that turns from a strong inverted U-shaped relationship in the absence of cash flow to a convex relationship when cash flow is introduced. Their results suggest that managers should look at their firms' cash flow when determining the appropriate investment to be made in working capital, to improve performance.

Table 5. The GMM regression coefficient analysis of the relationship between working capital and profitability (ROA/ROE) testing *H1*, *H2* and *H3*

ROA	Overall NWCR *H1*	Positive NWCR *H2*	Negative NWCR *H3*	ROE	Overall NWCR *H1*	Positive NWCR *H2*	Negative NWCR *H3*
ROA (−1) $_{Y-1}$	0.514841***	0.445911***	0.530915***	ROA (−1) $_{Y-1}$	0.373202***	0.352652***	0.327809***
ROA (−2) $_{Y-2}$	0.232469***	0.220483***	0.268951***	ROA (−2) $_{Y-2}$	0.15322***	0.117372***	0.467946***
NWCR	0.02539**	−0.02835***	0.141723**	NWCR	−0.06016*	−0.07012***	0.012695
NWCR^2	−0.02131***	–	–	NWCR^2	−0.00258	–	–
Size	0.007563**	0.005904**	0.03308**	SIZE	0.005886	0.005951	−0.01407
Growth	0.081859***	0.067365***	0.076458	GROWTH	0.112215***	0.087922**	0.209923***
Leverage	−0.02573**	−0.01942*	−0.11865**	LEVERAGE	0.010811	0.001004	0.028632
GDP	0.741988***	0.582212***	1.177099***	GDP	0.22688	0.160313	0.053533
Obs.	577	496	81	Obs.	568	487	81

Notes: ROA = return on assets = EBIT/total assets; ROE = return on equity = net income/total equity; NWCR = (trade receivables + inventory − trade payables)/sales; SIZE = logarithm of total assets; Growth = sales growth rate ($Sales_n - Sales_{n-1}$)/$Sales_{n-1}$; LEV = total liabilities/total assets; GDP = real GDP growth rate calculated as ($GDP_n - GDP_{n-1}$)/GDP_{n-1}; Obs. = number of observations. *Significant @ 10%; **Significant @ 5%; and ***Significant @ 1%

Sample	ROA Positive working capital *H4*	ROA Negative working capital *H5*	ROE Positive working capital *H4*	ROE Negative working capital *H5*
NWCR	−0.03005***	0.114142	−0.07231***	0.07087
Cash level (dummy)	−0.00406	0.09231**	0.014925	0.066132
NWCR * cash level (dummy)	0.006473	0.421561***	−0.00104	−0.00776
Size	0.005999**	0.025562	0.005301	−0.01174
Growth	0.067657***	0.051947	0.089586	0.225585***
Leverage	−0.02149*	−0.135903**	0.01237	0.075443
GDP	0.57326***	1.802422***	0.176366	−0.15096
Observations	496	76	487	76

Notes: ROA = return on assets = EBIT/total assets; ROE = return on equity = net income/total equity; NWCR = (trade receivables + inventory – trade payables)/sales; size = logarithm of total assets; Growth = sales growth rate ($Sales_n - Sales_{n-1}$)/ $Sales_{n-1}$; LEV = total liabilities/total assets; GDP = real GDP growth rate calculated as ($GDP_n - GDP_{n-1}$)/GDP_{n-1}; cash rate is dummy variable (1 for cash rate above sector median and 0 for cash rate below sector median) calculated as (cash and cash equivalents)/sales; NWCR*Cash rate (dummy) is interaction term; Obs. = number of observations. *Significant @ 10%; **Significant @ 5%; and ***Significant @ 1%

Table 6. Interaction effect of NWCR with cash level in the GMM model using ROA/ ROE as the dependent variable testing *H4 and H5*

7. Conclusions

7.1 Summary and discussion

This research aims at first to test the effect of working capital levels on different financial performance measures. Specifically, it uses ROA and ROE as two proxies of profitability, trying to explore the possibility of a non-linear relationship between NWCR and the firm's profitability. In this context and using a sample of 134 listed firms in the MENA region emerging markets, our quadratic model GMM model reported different effects of NWCR on both ROA and ROE. The results showed a significant concave relationship between NWCR and ROA, suggesting the presence of an optimal point to maximize ROA. This finding is consistent with Baños-Caballero *et al.'s* (2014)'s work, as well as Mun and Jang (2015) results; which point out to the presence of a non-linear effect of WC levels on firm value and performance, suggesting an optimal WC level. Moreover, the GMM models allowed us to control potential endogeneity and provide the most robust results. This evidence was not present using ROE.

To further investigate the relationship between NWCR and the profitability proxies, the overall sample was partitioned according to positive and negative NCWR levels. Using a linear model, the results confirmed our earlier results. More specifically, when the positive NWCR sample was used, a significant negative effect of NWCR on ROA was present. One perceptible finding using ROA, as our profitability measure, is that the coefficient's magnitudes of NWCR in the negative NWCR sample are greater than those in the positive NWCR group. This evidence suggests that WC enhanced corporate profits significantly faster for the negative NWCR group than its worsened profits for the opposite sample. When using the negative NWC sample, however, a significant negative relationship was evident between positive NWCR and ROE, implying a linear rather than non-linear relationship.

The study was extended to explore the interactive role of cash level (positive and negative) on the previously hypothesized relationships. Model 3 was used to test this interaction effect of NWCR and CASH in the GMM model. With an insignificant interaction term [$\boldsymbol{NWCR_{i,t}} * \boldsymbol{CASH_{i,t}}$ (Dummy)], the study concluded that the cash level did not significantly affect the relationship between NWCR and firm profitability.

7.2 Implications

7.2.1 Theoretical implications. This study provides important implications for working capital literature and the roots of cash into this literature, shedding light on the emerging MENA region markets. First, the working capital-corporate performance setting has been heavily tested in the literature. According to our knowledge, prior to Baños-Caballero *et al.* (2014)'s original paradigm of testing the non-linear functional form of working capital and corporate performance, all studies assumed a linear functional form of the working capital-corporate performance relationship and made conclusions accordingly. Baños-Caballero *et al.'s* (2014)'s work has been re-tested using samples from developed markets and a few emerging markets. This study's originality stems from testing this non-linear functional form in the emerging MENA region listed firms that, according to our knowledge, has not been investigated previously. An added layer of academic value is achieved as we target a certain sector, namely, the consumer-goods sector, which controls for industry differences and gives a deeper understanding of the working capital effect on corporate performance. This study enhances the working capital investment understanding by using a quadratic model to test the working capital-corporate performance's non-linear relationship.

Second, according to Hill *et al.* (2010) and Baños-Caballero *et al.* (2014), working capital investments are partially driven by cash flow availability, stemming from Fazzari and Petersen (1993)'s study, which indicated that investment in working capital is sensitive to cash flow.

This study addresses this line of research by attempting to investigate the interactive effect of cash level on the relationship between NWC and corporate financial performance, which has been rarely tested in developing markets literature and none was found applied to emerging markets.

Third, this study incorporates two profitability proxies and provides comparative results as to the relationship between working capital and profitability. Unlike published studies, this study used ROA and ROE, reflecting management and investor perspectives, respectively. Our results revealed the different effect working capital has on different profitability measures.

7.2.2 Practical implications. From a practical point of view, this study provides evidence on the existence of an optimal level of working capital that managers need to maintain to maximize operating ROA. This non-monotonic WCM-corporate performance relationship, which happens because of investments in working capital necessitates some proper policy implications by managers to preserve the optimum level of working capital by balancing costs and benefits in an efficient way that maximizes corporate performance.

On a comparative attempt, the study did not find working capital optimization efforts useful if managers attempt to maximize ROE. The study provides evidence of a significant positive linear relationship between ROE and working capital implying that ROE can be maximized by implementing a conservative working capital approach. Investors should carefully and actively evaluate companies' policies regarding working capital before investing to make sure that management is achieving not only profit maximization but also, wealth maximization.

In addition, the research shows that cash flow availability did not have an interactive effect on the relationship between working capital and profitability proxies. This result is opposite to studies applied to developed countries. This suggests that cash levels in developing countries do not reflect the constraints versus availability of financial resources, and thus, does not affect working capital practices and should not affect managers' attempt to maximize ROA. On the other hand, financial managers should concentrate on achieving wealth maximization when selecting their WCM strategies and policies.

7.3 Study limitations and further research

Even though this study contributes toward a better understanding of WCM for consumer goods firms in emerging markets, it unavoidably has some limitations. First, findings may not apply to other industries or similar industries in more developed countries. Second, management practices may differ across countries. Third, although the study sample is based on the Financial Times Stock Exchange (FTSE) Russell industry classification standards, the consumer goods industry inescapably includes many sub-sectors that may not be completely homogenous in their WCM practices, which might affect results.

Thus, it is recommended for future research to test the hypotheses based on country-by-country analysis or in different contexts such as other industries, longer periods; comparing results before and after political disorder or by categorizing MENA countries into more and less developed or by income levels to control for country variances. The inclusion of more firms and country-specific variables in the model could reveal different empirical results and provide a deeper understanding of the relationship between working capital and the firm's profitability.

Besides, it is recommended to research, study and compare the relationship between WCM and profitability for a selected number of seasonal cash flow firms versus a sample of permeant cash flow firms in emerging countries.

Furthermore, according to Kayani *et al.* (2019) 's a systematic literature review on WCM, future research needs to investigate behavioral aspects, qualitative studies, survey studies and systematic theory development when studying WCM (Singh and Kumar, 2014). More attention should be given for investigating the impact of WC on firm value and share market prices to achieve the shareholders' wealth maximization objective.

The international financial crisis and non-financial substantial information have a critical significant effect on WCM practices and short-term cash flow for many emerging capital markets for both listed and unlisted corporations. The current internal financial environment is very volatile and given these circumstances, firms may not be able to fulfill their short-term obligations. Kayani *et al.* (2019) stated that although the world economy faced a liquidity shortage after the financial Tsunami in 2008, little academic attention was given to WCM.

Furthermore, the same phenomena exist now with Covid-19 (CORONA virus), therefore, more research should be directed toward the WCM speed adjustment/recovery during financial crises or eras of pandemics.

Moreover, researching WCM-specialized corporations worldwide that help firms in managing their working capital in new and innovative ways such as factoring, forfeiting, A/R collection and even securitization for medium-term loans or notes might provide valuable insights to the literature.

New variables should also be added to the WCM-corporate performance model such as liquidity risk, which is neglected by most researchers. More research could also be guided toward the management of working capital using the maturity weighted assets and liabilities management gap (duration gap) models between C/A and C/L or weighted by the cost of finance to achieve the required balance between WCF and WCI.

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About the authors

Osama EL-Ansary is a Professor of Finance and Banking at Cairo University. He holds an MSc of Business Administration from Cairo University (1980) and a PhD of Business Finance from the University of Edinburgh (1985). He was Vice Dean of Graduate Studies, Research and International Relations, Faculty of Commerce, Cairo University, regional capital markets expert and an external auditor for accrediting higher education institutions. His main research interests include financial performance and analysis, asset-liability management and capital adequacy of banks, corporate governance, securities market, e-finance and banking, e-commerce and Islamic banking and finance.

Heba Al-Gazzar, CFA is an Assistant Lecturer at Cairo University. She holds an MSc of Business Administration from Cairo University (2017) and is currently a PhD candidate in Finance at Cairo University. Heba is also a Chartered Financial Analyst. Heba Al-Gazzar is the corresponding author and can be contacted at: heba.gazzar@outlook.com

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Related party transactions and firm value: The moderating role of corporate social responsibility reporting

Tifanny Dwijaya Hendratama, Zuni Barokah *

Department of Accounting, Faculty of Economics and Business, Universitas Gadjah Mada, Yogyakarta, Indonesia

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A B S T R A C T

This study investigates the influence of related party transactions (RPTs) on firm value. Further, it examines whether a firm's corporate social responsibility (CSR) reporting reflects its corporate values and ethical concerns, therefore mitigating the value-destroying effects of RPTs. Based on 274 observations from publicly listed firms in Indonesia, our results show that RPTs (i.e., related party sales) are negatively related to firm value. Further, we find that in the presence of better CSR reporting, the relationship between RPTs and firm value becomes more positive. This is in line with the view that CSR reporting, which reflects firms' ethical concerns, may serve as a mechanism against managers' opportunism. However, we find that related party payables have a positive relationship with firm value. Further investigation reveals that, although certain RPTs show a short-term, value-enhancing effect, these transactions seem to result in subsequent tunneling activities, suggesting managerial opportunism in the long term.

1. Introduction

Transparency is an important topic in areas such as management, finance and public relations, and it is essential to enhancing stakeholder trust in a firm (Hultman and Axelsson, 2007; Albu and Flyverbom, 2016; Schnackenberg and Tomlinson, 2016). The disclosure of information is particularly important to minimize information asymmetry, to meet the information needs of external stakeholders and to develop trust. Armitage and Marston (2008) find that managers are motivated to provide greater voluntary disclosure transparency because they want to ensure firms' reputation for openness and shareholders' confidence, which may

* Corresponding author.
E-mail addresses: tifanny.hendratama@gmail.com (T.D. Hendratama), zuni.b@ugm.ac.id (Z. Barokah).

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result in a higher share price or other commercial benefits. Nevertheless, as firms in many Asian countries are generally characterized by a highly concentrated ownership structure (OECD, 2017) and with concern regarding agency conflict shifting toward the conflict of interest between majority and minority shareholders (Shleifer and Vishny, 1997), insiders of highly concentrated firms (i.e., managers or directors and controlling owners) with better bargaining positions and better access to information have the ability and power to expropriate minority shareholders' interests. One method for such expropriation is related party transactions (hereinafter, "RPTs").

There are two opposing viewpoints regarding RPTs. The first view considers RPTs as potentially opportunistic as they may be used by insiders to maximize self-serving interests at the expense of other shareholders (Gordon et al., 2004; Cheung et al., 2006; Kohlbeck and Mayhew, 2010). However, the second view considers RPTs as potentially efficient as they may provide benefits to firms through a simplified negotiation process, lower transaction costs (Gordon et al., 2004), strategic partnership, risk sharing and the facilitation of contracts (Kohlbeck and Mayhew, 2010).

Some prior studies suggest that firms operating under better ethical concerns, as reflected by their corporate social responsibility (CSR), tend to have less opportunistic behavior (e.g., Garriga and Melé, 2004; Kim et al., 2012; Scholtens and Kang, 2013). Nevertheless, whereas Kim et al. (2012) find that firms that are considered to be socially responsible tend to be more transparent, to have more reliable financial reporting and to be less likely to manipulate reported earnings, another view is that firms may use CSR reporting to conceal corporate misconduct based on opportunistic incentives (Muttakin et al., 2015). Accordingly, using a sample of 274 observations from firms listed in Indonesia, this study investigates whether RPTs enable manager opportunism or efficiency and whether CSR reporting mitigates opportunistic or value-destroying RPTs.

Studies suggest that RPTs in Indonesia are potentially abusive and may lead to the expropriation of wealth by controlling shareholders (Utama and Utama, 2009; Sari and Baridwan, 2014). In addition, Indonesian firms are characterized by high ownership concentration (La Porta et al., 1998; Carney and Child, 2013; Utama et al., 2017). Therefore, conflicts of interest between majority and minority shareholders are more likely to arise. Further, investor protection in Indonesia is still relatively weak compared with other countries (La Porta et al., 2006; Barokah, 2013). Although OJK, then BAPEPAM-LK, has tightened the rules to mitigate opportunistic RPTs, it cannot truly cover all such transactions (Utama et al., 2017).[1] Rule number IX.E. I excludes the obligation to disclose RPTs in relation to a firm's main business activities. However, prior studies argue that such transactions are potentially abusive and thus require more transparency for users of financial statements (Cheung et al., 2006, 2009).

Our findings indicate that concerns about RPTs being both value destroying and value enhancing are warranted. Specifically, this study finds that related party sales are negatively related to firm value. This implies that because the fairness of RPT prices may be doubtful, the market may perceive related party sales as opportunistic and less credible than other sales. However, in the presence of more CSR reporting, the relationship between related party sales and firm value becomes more positive. This finding indicates that ethical concerns may drive firms to be less opportunistic and that CSR reporting reflects firm's incentives to be trustworthy and ethical. Moreover, the relationship between related party payables and firm value is positive, suggesting that the market perceives related party payables as beneficial to listed firms. Interestingly, although these transactions show a short-term, value-enhancing effect, they seem to result in subsequent tunneling activities.

This study makes a number of contributions. First, although CSR has received public attention worldwide, there are relatively few empirical studies on CSR in the context of developing countries, such as Indonesia. This study provides evidence regarding whether RPTs in Indonesia are opportunistic or efficient. Second, this study provides evidence regarding whether ethical concerns drive firms to engage in value-enhancing RPTs instead of opportunistic RPTs. Third, this study sheds light on how CSR reporting affects other corporate behavior besides earnings management and financial performance, namely RPTs. Fourth, this study may be useful to current and potential investors making investment decisions. In particular, as the results confirm the view that firms with more CSR reporting are less likely to behave opportunistically, investors can be assured that resources provided to such firms will be managed efficiently. Lastly, in light of CSR reporting,

[1] BAPEPAM-LK, *Otoritas Jasa Keuangan (OJK),* is the regulator of Indonesia's capital market.

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the findings of this study may help regulators and policymakers better understand firms' business practices and the motives for using RPTs and CSR reporting.

The remainder of this paper is organized as follows: Section 2 presents a literature review and the research hypotheses. Section 3 discusses the study's research design. Section 4 presents and discusses the results. Section 5 provides additional analysis on the potential occurrence of subsequent tunneling. Section 6 summarizes the key findings and provides conclusions.

2. Literature review and hypotheses

There are two alternative viewpoints about RPTs: The first considers them to be abusive (opportunistic) transactions, whereas the second view considers them to be efficient (Gordon et al., 2004). Kohlbeck and Mayhew (2017) suggest that RPTs contain potential self-dealing between directors, material owners, officers and investors. Several studies support this view and suggest that as RPTs can be an indicator of agency problems, investors consider them to be opportunistic (e.g., Jian and Wong, 2004; Cheung et al., 2006; Kohlbeck and Mayhew 2010). As insiders of highly concentrated firms, such as managers, directors and controlling owners, have better access to information, they are in a better bargaining position than outsiders, such as non-controlling (minority) shareholders and corporate creditors. Consequently, expropriation by insiders against outsiders' interests are more likely to occur. In such a setting, La Porta et al. (1999, 471) argue that controlling owners tend to have more power to expropriate minority shareholders' interests.

Several other studies, however, argue that RPTs can be beneficial as they may result in saving transaction costs and improving a firm's resource utilization (Chang and Hon, 2000; Chen et al., 2009; Chien and Hsu, 2010). Accordingly, RPTs do not necessarily represent transactions based on fraudulent or deceptive purposes. Instead, RPTs may represent ordinary trade and business activities (Wong et al., 2015). Studies indicate that socially responsible firms tend to be more trustworthy and are more likely to engage in ethical operating decisions. Kim et al. (2012) and Scholtens and Kang (2013) find that socially responsible firms are less likely to engage in earnings management. Similarly, Bénabou and Tirole (2010) argue that CSR can reduce the likelihood of short-term opportunistic behavior by managers. Gao et al. (2014) contend that executives of socially responsible firms are less likely to engage in trading prior to news announcements and profit significantly less from insider trading. Consequently, it is expected that, on the basis of ethics, firms that are perceived as socially responsible are less likely to engage in opportunistic behavior such as value-destroying RPTs; although studies also suggest that firms may be presenting socially responsible behavior to shift stakeholders' focus (Salewski and Zülch, 2014; Muttakin et al., 2015).

Related party sales are undertaken to improve resource allocation efficiency (Wong et al., 2015). However, as the prices charged in related party sales transactions may be unfair compared with industry average prices (Kang, et al., 2014, 277), expropriation may occur. Therefore, RPTs allow shifting earnings between firms, particularly from listed firms to their related parties (Cheung et al., 2006). Several studies have explored the relationship between related party sales and market reactions and contend that the market responds less positively to related party sales transactions (e.g., Jian and Wong, 2004; Cheung et al., 2009). Specifically, in the Chinese context, Aharony et al. (2010) find an association between tunneling in the post-IPO period and upward earnings management through abnormal related party sales in the pre-IPO period. Further, although there may be indications that related party purchases may be conducted at prices higher than independent transactions, studies argue the value-enhancing effect of related party purchases. Chen et al. (2009) argue that RPTs may lower transaction costs, which may in turn improve operational performance and maximize profit. In the same way, Tambunan et al., (2017) provide evidence of the value-enhancing effect of related party purchases, although only in the short term. Accordingly, the following hypotheses are proposed:

H1a. Related party sales negatively influence firm value.

H1b. Related party purchases positively influence firm value.

Prior studies by Jiang et al. (2010) and Tambunan et al. (2017) argue that controlling shareholders may expropriate through related party receivables transactions as they may affect a firm's productive assets and firm value negatively. Stated differently, transactions that involve the payment of cash to related parties (in-

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cluding loans and cash assistance) are likely to result in the expropriation of minority shareholders' interests (Cheung et al., 2006). Hence, it is expected that the higher the related party receivables, the worse the firm value. In contrast, cash assistance or loans received from listed firms from related parties are likely to benefit non-controlling shareholders (Cheung et al., 2006, 358). Unsurprisingly, listed firms that are in severe financial difficulty generally receive cash assistance from related parties. Accordingly, we test the following hypotheses:

H1c. Related party receivables negatively influence firm value.

H1d. Related party payables positively influence firm value.

This study further investigates whether CSR reporting, as the reflection of a company's ethical concerns, can explain the negative relationship between a firm's CSR and corporate opportunistic behavior. As pointed out by Kim et al. (2012) and Scholtens and Kang (2013), a firm's CSR generally has an inverse relation to its earnings management. Although this study focuses on the ethical implications of CSR, other motivations might also explain a negative relation between CSR and opportunistic behaviors. Several studies (Verschoor, 2005; Linthicum et al., 2010; Choi and Moon, 2016) argue that as social responsibility may provide positive signals regarding a firm's reputation, firms that value their reputation want to protect it, and therefore, they avoid socially unacceptable activities that may potentially damage their reputation.

In contrast, although ethical and reputational motivations for CSR may explain a negative association between CSR and corporate opportunistic behaviors, other studies argue the opposite. For example, Prior et al. (2008) argue that firms may use CSR to overshadow their value-destroying practices. Similarly, Muttakin et al. (2015) contend that CSR reporting may be used to divert stakeholders' attention and reduce the likelihood of opportunistic practices being scrutinized. Accordingly, if firms engage in CSR reporting in the context of a moral imperative, firms may be less likely to engage in value-destroying (opportunistic) RPTs and more likely to engage in value-enhancing (efficient) RPTs. Nevertheless, if firms engage in CSR reporting to disguise value-destroying practices as a means to pursue self-interest, then firms are likely to engage in value-destroying RPTs. Thus, this study proposes the following hypotheses:

H2a. CSR reporting moderates the relationship between related party sales and firm value.

H2b. CSR reporting moderates the relationship between related party purchases and firm value.

H2c. CSR reporting moderates the relationship between related party receivables and firm value.

H2d. CSR reporting moderates the relationship between related party payables and firm value.

3. Research design

We tested the hypotheses by using multiple regression analysis. The required data are collected from the Indonesia Stock Exchange (IDX) website and BvD Osiris database. Data on RPTs and CSR are hand-collected from annual reports.

3.1. Sample selection

This study includes firms listed on the IDX in 2014 and 2015 because the first phase of the IFRS convergence process in Indonesia was completed in 2012, and the second phase was completed in 2015.[2] This

[2] The first phase of the IFRS convergence process in Indonesia was completed in 2012; in this phase the Financial Accounting Standards Board (i.e., DSAK) endorsed 35 financial accounting standards (PSAKs) adopted from IFRS, including PSAK 7 Related Party Disclosures (Maradona and Chand, 2018; Ikatan Akuntan Indonesia, 2012). PSAK 7 was then adjusted in 2014 and amended in 2016 (effective January 1, 2016). Based on the timeframe of adjustment and amendment to PSAK 7 Related Party Disclosures, we choose 2014–2015 to have a consistent applicable standard on related party disclosures (i.e., the period before the standard was amended) (Ikatan Akuntan Indonesia, 2015).

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progress is essential to enhance the quality of Indonesian accounting standards and to convince external stakeholders of the quality of the financial reporting practices of Indonesian firms. The study sampling method includes the following criteria: (1) the firm must issue an annual report; (2) it must not be part of the financial industry; (3) its accounting cycle must end on December 31; (4) it must not have negative book value of equity; (5) it must engage in RPTs; and (6) it must disclose social responsibility activities.

3.2. Variables and research models

The independent variables include four types of RPTs. Following previous studies (Cheung et al., 2006, 2009; Chen et al., 2009), this study uses related party sales (*RP_Sales*), purchases (*RP_Purchases*), receivables (*RP_Rec*) and payables (*RP_Pay*). Each type of RPT is measured by the total of transactions (i.e., sales, purchases, receivables, and payables) scaled by total assets. Firm value is measured by Tobin's q and PBV. Subramanyam (2014, 628) and Ahmad and Jusoh (2014, 480) contend that accounting-based valuation methods are more likely to contain management manipulations and distortions as personal goals and interests may depend on the reported accounting data. Therefore, market-based measures are considered to be superior. CSR reporting indices are gathered from content analysis using the checklist proposed by Gunawan et al., (2009) with eight themes: environment, energy, human resources, community involvement, products, sustainability, external relations and others. Each category is elaborated into a few items with 45 disclosure items in total, which are scored for both quantity and quality of CSR reporting.

Several control variables commonly found in the literature are included in the analysis. This study includes firm age, size, leverage, profitability and RPT disclosure as determinants of firm value and controls for industry and year fixed effects. The regression equations are described as follows:

$$\begin{aligned} FValue_{i,t+1} = {} & \beta_0 + \beta_1 RP\_Sales_{i,t} + \beta_2 RP\_Purchases_{i,t} + \beta_3 RP\_Rec_{i,t} + \beta_4 RP\_Pay_{i,t} + \beta_5 FAge_{i,t} \\ & + \beta_6 FSize_{i,t} + \beta_7 Lev_{i,t} + \beta_8 ROA_{i,t} + \beta_9 RPD_{i,t} + \beta_{10-16} Ind_{i,t} + \beta_{17} Year_{i,t} \\ & + \varepsilon \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \end{aligned} \tag{1}$$

$$\begin{aligned} FValue_{i,t+1} = {} & \beta_0 + \beta_1 RP\_Sales_{i,t} + \beta_2 RP\_Purchases_{i,t} + +\beta_3 RP\_Rec_{i,t} + \beta_4 RP\_Pay_{i,t} + \beta_5 CSRI_{i,t} \\ & + \beta_6 RP\_Sales * CSRI_{i,t} + \beta_7 RP\_Purchases * CSRI_{i,t} + \beta_8 RP\_Rec * CSRI_{i,t} + \beta_9 RP\_Pay \\ & * CSRI_{i,t} + \beta_{10} FAge_{i,t} + \beta_{11} FSize_{i,t} + \beta_{12} Lev_{i,t} + \beta_{13} ROA_{i,t} + \beta_{14} RPD_{i,t} + \beta_{15-21} Ind_{i,t} \\ & + \beta_{16} Year_{i,t} + \varepsilon \cdots\cdots\cdots\cdots\cdots\cdots\cdots.. \end{aligned} \tag{2}$$

where *FValue* = firm value as measured by Tobin's q and PBV; *RP_Sales* = the value of sales of goods and provision of services to related parties divided by total assets; *RP_Purchases* = the value of purchases of goods and receipt of services from related parties divided by total assets; *RP_Rec* = related party receivables divided by total assets; *RP_Pay* = related party payables divided by total assets; *CSRI* = CSR reporting as measured by observing a firm's CSR disclosure quantity (*CSRI_Quan*) and quality (*CSRI_Qual*); *FAge* = natural logarithm of the number of years since listing; *FSize* = natural logarithm of a firm's total market value of equity; *Lev* = total debts scaled by total assets; *ROA* = net income scaled by average total assets; *RPD* = RPT disclosure regarding terms and conditions, pricing policy and arm's length condition of RPTs.

4. Results

This section presents the data analysis, including the descriptive statistics and regression analysis. The final number of observations in the sample is 274 firm-year observations. The sample selection is described in Table 1.

4.1. Descriptive statistics

Table 2 provides a summary of the descriptive statistics of the variables. It shows that although loans provided to and given by related parties are less prevalent, related party sales transactions are common in firms

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Table 1
Sample Selection.

Criteria	Number of Firms		Number of Observations
	2014	2015	
Firms listed on Indonesia Stock Exchange (IDX)	514	533	1.047
Less: Firms in the financial industry	(87)	(90)	(177)
Less: Firms with a different fiscal year	(6)	(6)	(12)
Less: Firms with a negative book value of equity	(18)	(20)	(38)
Less: Firms with incomplete data	(272)	(274)	(546)
Total	131	143	274

listed in Indonesia. The results also show that the market value of firms listed on the IDX is generally higher than their book value as indicated by the mean values of 1.7749 and 2.7771 for Tobin's q and PBV, respectively. Moreover, the results indicate that Indonesian firms may put more emphasis on CSR reporting quantity than CSR reporting quality; nevertheless, the disclosure of CSR is still not a common practice among firms, and therefore, CSR reporting by Indonesian firms is still relatively limited.

4.2. Main results

Table 3 presents the analysis of the influence of RPTs on firm value. The results show that the first hypothesis, which states that related party sales negatively influence firm value, is supported ($p < .01$ and $p < .05$, respectively). These findings are consistent with studies suggesting that related party sales are value destroying (e.g., Cheung et al., 2006, 2009). This implies that the market views related party sales figures to be less credible and such transactions to be opportunistic (Jian and Wong, 2004); therefore, the market responds negatively to RPTs.

Contrary to expectation, Hypothesis 1b, which predicts a positive influence of related party purchases on firm value, is not supported because the coefficients of related party purchases are not significant in either model. This implies that related party purchase transactions are not used by related parties to prop up listed firms. A possible explanation for this non-significance may be that as the last-in-first-out (LIFO) method is not allowed, related parties may prefer other methods, which may be more timely and efficient, to prop up listed firms (Jian and Wong, 2010).

In addition, the results show that Hypothesis 1c is not supported, as there is no statistically significant association between related party receivables and firm value, suggesting that the market does not discount firms with high related party receivables. This may be due to the nature of related party receivables, which contain all types of receivables, including loan receivables that may be perceived negatively and sales receivables that may signify an increase in earnings and market confidence in the collection of related party credits (Jiang et al., 2010; Utama and Utama, 2014). According to Wang and Ye (2014), receivables represent the reallocated resources of a firm, namely operational and non-operational reallocated resources. Whereas operational resources are derived from activities such as the sale of goods and services, non-operational receivables may arise from non-operating activities such as loans. Consequently, receivables generated from the sale of goods and services are viewed as part of a firm's normal operating activities; whereas other receivables are non-operational and are often used opportunistically. Therefore, the efficiency and expropriation effects of related party receivables may offset each other, leading to non-significant results.

Regarding H1d, the empirical results show that related party payables positively influence Tobin's q and PBV ($p < .01$); therefore H1d is supported. This is in line with Cheung et al. (2006) who suggest that related party payables are viewed as beneficial by the market. Hence, related party payables tend to have a value-enhancing effect.

The empirical results in Tables 4 and 5 show that the coefficients of the interaction terms between CSR reporting (quantity and quality) and *RP_Sales* on Tobin's q as well as PBV are significant at the 1% and 5% levels, respectively. Hence, Hypothesis 2a, which states that CSR reporting moderates the relationship between related party sales and firm value, is supported. This confirms the view that CSR reporting reflects

Table 2
Descriptive Statistics.

Variable	Data Type	Min.	Max.	Mean	Std. Dev.
RP_Sales	Ratio	0.0000	5.4671	0.1909	0.4436
RP_Purchases	Ratio	0.0000	2.3090	0.1487	0.3432
RP_Rec	Ratio	0.0000	0.4958	0.0434	0.0742
RP_Pay	Ratio	0.0000	0.9515	0.0541	0.1127
$Tobin_{t+1}$	Ratio	0.2268	18.6404	1.7749	2.3531
PBV_{t+1}	Ratio	0.0500	62.9311	2.7771	6.6006
CSRI_Quan	Ratio	0.0844	0.6089	0.2622	0.1032
CSRI_Qual	Ratio	0.0635	0.5556	0.2147	0.0873
FAge	Year	1	45	15	10
FSize	Mil. Rupiah	64,716	437,355,969	18,483,212	53,726,170
Lev	Ratio	0.0401	1.2486	0.5012	0.2070
ROA	Ratio	−0.2253	0.4470	0.0553	0.1011
RPD	Ratio	0	1.0000	0.4197	0.3090

N = 274. *RP_Sales*, *RP_Purchases*, *RP_Rec* and *RP_Pay* = firms' RPTs (sales, purchases, receivables and payables, respectively) scaled by total assets. Tobin = Tobin's Q. PBV = Price-to-book value. *CSRI_Quan* = CSR disclosure quantity. *CSRI_Qual* = CSR disclosure quality. *FAge* = natural logarithm of the number of years since listing. *FSize* = natural logarithm of a firm's total market value of equity. *Lev* = total debts scaled by total assets. *ROA* = net income scaled by total assets. *RPD* = disclosure regarding terms and conditions, pricing policy and arm's length condition of RPTs.

Table 3
RPTs and Firm Value.

Variable	Predicted Sign	Model 1		Model 2	
		Unstd. Coeff. B	*t*-Statistic (*p*-value)	Unstd. Coeff. B	*t*-Statistic (*p*-value)
(Constant)		−1.140	−8.925***	−1.909	−8.088***
RP_Sales	**–**	**−0.023**	**−2.926*****	**−0.034**	**−2.274****
RP_Purchases	+	−0.001	−0.196	0.001	0.113
RP_Rec	–	0.006	0.837	0.007	0.504
RP_Pay	**+**	**0.021**	**2.951*****	**0.040**	**2.999*****
FAge		**−0.035**	**−2.536*****	**−0.068**	**−2.718*****
FSize		**0.075**	**11.156*****	**0.130**	**10.430*****
Lev		**0.285**	**4.404*****	**0.534**	**4.459*****
ROA		**1.262**	**8.446*****	**1.431**	**5.184*****
RPD		−0.003	−0.064	0.001	0.018
Industry Dummy	Included			Included	
Year Dummy	Included			Included	
Adjusted R^2			0.598		0.508
Fvalue			24.921		17.564
Sig. (F)			0.000		0.000
Dependent Variable	$Tobin_{t+1}$			PBV_{t+1}	

***, **, * indicate significance at the 0.01, 0.05 and 0.1 levels, respectively.

a firm's corporate values and ethical concerns (Garriga and Melé, 2004; Kim et al., 2012). As a result, firms with strong ethical values as reflected by high quantity and quality CSR reporting tend to have less opportunistic RPTs. However, we do not find support for the moderating effect of CSR reporting on the relationship between other types of RPTs on either firm value measure. Although the coefficients are generally positive, the results are not significant. Nonetheless, this may provide initial but mild support for the negative relationship between CSR reporting and abusive behavior. Overall, our findings suggest that on the basis of ethics, firms with better CSR reporting tend to engage in more responsible operating decisions. Therefore, such firms are less likely to engage in opportunistic and value-destroying transactions that may harm the interests of minority shareholders, but rather they engage in efficient (value-enhancing) transactions.

The empirical results also show that the control variables, namely, firm age (*FAge*), firm size (*FSize*), leverage (*Lev*) and profitability (*ROA*) affect both Tobin's q and PBV with *p*-values less than 1%. More specifically,

Table 4
RPTs, CSR Reporting Quantity and Firm Value.

Variable	Predicted Sign	Tobin		PBV	
		Unstd. Coeff. B	*t*-Statistic (*p*-value)	Unstd. Coeff. B	*t*-Statistic (*p*-value)
(Constant)		−1.071	−6.962***	−1.917	−6.663***
RP_Sales	**–**	**−0.420**	**−3.713*** **	**−0.505**	**−2.387*** **
RP_Purchases	+	0.001	0.112	−0.003	−0.163
RP_Rec	–	0.008	0.939	−0.000	−0.015
RP_Pay	**+**	**0.016**	**1.735** **	0.042	**2.454*** **
CSRI_Quan	+/-	−0.230	−1.565	−0.492	**−1.791***
CSRI_Quan*RP_Sales	**+/-**	**0.866**	**3.198*** **	1.048	**2.069** **
*CSRI_Quan*RP_Purchases*	+/-	−0.153	−0.602	0.050	0.106
*CSRI_Quan*RP_Rec*	+/-	0.230	0.242	1.017	0.573
*CSRI_Quan*RP_Pay*	+/-	0.697	1.011	0.110	0.086
FAge		**−0.034**	**−2.450*** **	−0.068	**−2.644*** **
FSize		**0.077**	**9.440*** **	0.137	**8.994*** **
Lev		**0.361**	**4.183*** **	0.660	**4.081*** **
ROA		**1.266**	**8.354*** **	1.378	**4.863*** **
RPD		0.003	0.067	0.003	0.034
Industry Dummy	Included			Included	
Year Dummy	Included			Included	
Adjusted R^2			0.600		0.498
F-value			19.637		13.299
Sig. (*F*)			0.000		0.000
Dependent Variable	$Tobin_{t+1}$			PBV_{t+1}	

***, **, * indicate significance at the 0.01, 0.05, and 0.1 levels, respectively.

Table 5
RPTs, CSR Reporting Quality and Firm Value.

Variable	Predicted Sign	Tobin		PBV	
		Unstd. Coeff. B	*t*-statistic (*p*-value)	Unstd. Coeff. B	*t*-statistic (*p*-value)
(Constant)		−0.747	−5.180***	−1.347	−4.966***
RP_Sales	**–**	**−0.436**	**−4.077*** **	**−0.527**	**−2.621*** **
RP_Purchases	+	0.002	0.255	0.000	0.009
RP_Rec	–	0.007	0.856	−0.001	−0.089
RP_Pay	**+**	**0.015**	**1.610***	**0.041**	**2.370*** **
CSRI_Qual	**+/-**	**−0.318**	**−1.804***	**−0.722**	**−2.181** **
CSRI_Qual*RP_Sales	**+/-**	**1.054**	**3.468*** **	**1.267**	**2.217** **
*CSRI_Qual*RP_Purchases*	+/-	−0.255	−0.828	−0.099	−0.170
*CSRI_Qual*RP_Rec*	+/-	0.815	0.660	2.049	0.882
*CSRI_Qual*RP_Pay*	+/-	1.101	1.290	0.575	0.358
FAge		**−0.032**	**−2.378*** **	**−0.065**	**−2.546*** **
FSize		**0.077**	**9.477*** **	**0.140**	**9.098*** **
Lev		**0.102**	**4.014*** **	**0.172**	**3.611*** **
ROA		**1.248**	**8.296*** **	**1.321**	**4.674*** **
RPD		0.006	0.163	0.013	0.175
Industry Dummy	Included			Included	
Year Dummy	Included			Included	
Adjusted R^2			0.602		0.495
F-value			19.765		13.157
Sig. (*F*)			0.000		0.000
Dependent Variable	$Tobin_{t+1}$			PBV_{t+1}	

***, **, * indicate significance at the 0.01, 0.05, and 0.1 levels, respectively.

firm age affects firm value negatively; whereas firm size, leverage and profitability affect firm value positively. This suggests that firms may become less valuable with age (Chay et al., 2015; Fauver et al., 2017). Moreover,

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the market values larger firms more positively (Dang et al., 2017), perceives increased leverage as a signal of stability in future cash flows (Ararat et al., 2017; Kang et al., 2017) and values firms with better performance more highly (Xia, 2008; Chen et al., 2009). In contrast, the coefficients of RPD are insignificant, implying that RPD does not influence firm value.

5. Test of subsequent tunneling

Further testing examines whether RPTs are of a propping nature and indeed add real value to a firm or merely boost performance temporarily and, in turn, enable subsequent tunneling. Ying and Wang (2013) posit that although there is a motivation to support the long-term interests of listed firms, when firms engage in RPTs for short-term purposes, such as to obtain a refinancing qualification, subsequent tunneling may occur in the year after such propping. Moreover, although certain RPTs improve current performance, due to subsequent tunneling, firm performance significantly declines in the following year. This study follows Ying and Wang (2013) and uses a model to test whether RPTs represent temporary propping transactions and enable subsequent tunneling activities.

$$Tunnel_{i,t+1} = r_0 + r_1 Prop_{i,t} + State_{i,t} + \varepsilon \cdots\cdots\cdots\cdots \tag{3}$$

$Prop_{it}$ represents the possible propping (value-enhancing) transactions found in this study. $State_{it}$ is a control variable measured by a dummy variable that takes the value of 1 for state-owned enterprises and 0 otherwise. Following Ying and Wang (2013), who find that state-owned enterprises display significantly more subsequent tunneling behavior than non-state-owned enterprises, this study includes $State_{it}$ as a control variable. Similarly, Cheung et al. (2009) examine RPTs between state-owned Chinese firms and find that minority shareholders seem to be subject to expropriation through tunneling, negatively affecting firm value.

$Tunnel_{i,t+1}$ is a dummy variable derived from the residual term of Eq. (4), which indicates possible abnormal tunneling in the following period. As Eq. (3) considers only possible abnormal tunneling transactions, this study removes the normal components of RPTs that are associated with firm characteristics and industry classifications following Jian and Wong (2010, 84) and using the following regression equation.

$$\begin{aligned} Tunnel\_rate_{i,t+1} = {} & r_0 + r_1 FSize_{i,t+1} + r_2 Lev_{i,t+1} + r_3 MBRatio_{i,t+1} + +r_j \sum Ind_{i,t+1} + r_j \sum Year_{i,t+1} \\ & + \varepsilon \cdots\cdots\cdots. \end{aligned} \tag{4}$$

This regression model removes the normal components of RPTs by adding variables associated with firm characteristics and industry classifications, such as size as measured by the natural logarithm of total assets, leverage as measured by total debt over total assets and growth as measured by market-to-book equity. This study also adds industry and year dummy variables. $Tunnel\_rate_{i,t+1}$ represents the ratio of the following period's possible tunneling arising from the purchase of goods or assets, guarantees, mortgages and other projects that generate income for related parties (Ying and Wang, 2013).

The results in Table 6 show that the coefficient of *Prop* is positive and significant, suggesting that transactions that boost current performance may actually be subject to subsequent tunneling as pointed out by Ying and Wang (2013). Further, these results suggest that state-owned enterprises display more subsequent tunneling behavior. This provides an early indication that RPTs may be subject to subsequent tunneling after propping.

6. Sensitivity tests

We also performed sensitivity tests for possible fixed effects. We re-estimated the models controlling for individual firm and year fixed effects in each model. Table 7 reports the results for Model 1 (main effects), and Tables 8 and 9 report the results for Model 2 (moderating effects).

As shown in Table 7, *RP_Sales* is now positive but not significant ($p > .10$). *RP_Purchases* has a positive and marginally significant relation with Tobin's q ($\beta = 0.016$, $p < .1$), consistent with H1b. *RP_Receivables* shows a negative and marginally significant association with Tobin's q ($\beta =$ -0.015, $p < .1$), in line with H1c. *RP_Payables* has a positive and significant association ($p < .001$) with both measures of firm value,

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Table 6
Additional Analysis Result.

Variable		B	Sig.
Step 1[a]	Prop	0.252	0.001
	State	0.647	0.092
	Constant	0.100	0.770
Dependent	$Tunnel_{t+1}$		

***, **, * indicate significance at the 0.01, 0.05 and 0.1 levels, respectively.

Table 7
Regression Results for RPTs and Firm Value.

Variable		Tobin's q	PBV
(Constant)		1.925 (−8.235***)	−2.457 (−6.935***)
RP_Sales	−	0.018 (0.536)	0.047 (0.827)
RP_Purchases	+	0.016 (1.363*)	0.004 (0.179)
RP_Rec	−	−0.015 (−1.592*)	−0.016 (−0.925)
RP_Pay	**+**	**0.023 (2.482***)**	**0.040 (2.494***)**
Fage		−0.010 (−0.385)	0.016 (0.340)
Fsize		**0.136 (10.564***)**	**0.183 (8.111***)**
Lev		0.237 (1.373*)	0.003 (0.030)
ROA		0.254 (1.028)	−0.248 (−0.562)
RPD		−0.010 (−0.191)	−0.050 (−0.569)
Firm Fixed Effects		Included	Included
Year Fixed Effects		Included	Included
Adj. R^2		0.823	0.804
F-value		9.036	8.096
Sig. (*F*)		0.000	0.000

Presents results for RPT and firm value, with unstandardized coefficients B and *t*-statistics. ***, **, * indicate significance at the 0.01, 0.05 and 0.1 levels, respectively.

i.e., Tobin's q ($\beta = 0.023$, $p < .01$) and PBV ($\beta = 0.040$, $p < .01$), consistent with H1d. We re-run the model including each type of related party transaction (i.e., *RP_Sales*, *RP_Purchases*, *RP_Rec*, *RP_Pay*) separately and control for year and firm fixed effects. The results are similar. The result on *RP_Sales* differs from the main effect after controlling for firm fixed effects, indicating that there are other firm-specific factors that affect firm value that are not controlled in this study. For example, previous studies find that Indonesian firms with political connections are associated with higher firm value (Fisman, 2001). Further, Habib et al. (2017) argue that politically connected firms tend to engage more in abusive or opportunistic RPTs, which eventually affects firm value. Specifically, they find that politically connected firms in Indonesia are more likely to use related party loans to tunnel resources and to involve in earnings management. Furthermore, a study in the U.S. context finds that family firms are more likely to engage in RPTs and that their firm value premium tends to decline when they report RPTs, particularly opportunistic RPTs (Kohlbeck et al., 2018).

Hypotheses 2a-2d test the moderating effect of CSR reporting on the association between RPTs and firm value. We re-estimate Model 2 controlling for firm and year fixed effects. Tables 8 and 9 present the results for Eq. (2), considering CSR quantity and quality as moderating variables. The empirical results show that the associations between the interaction terms of CSR reporting (quantity and quality) and *RP_Purchases* with Tobin's q and PBV are significant at the 1% and 5% levels, respectively. The results for the moderating effects of CSR differ from the main effect after controlling for firm fixed effects, indicating that there are other firm-specific factors affecting firm value that are not controlled in this study, for example, political connections (Fisman, 2001; Habib et al., 2017) and family ownership (Kohlbeck et al., 2018).

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Table 8
Regression Results for RPT, CSR and Tobin's Q.

Variable	CSR Quantity	CSR Quality
(Constant)	−1.565 (−7.635***)	−1.573 (−7.788***)
RP_Sales	0.018 (1.211)	0.017 (1.148)
RP_Purchases	0.027 (1.986**)	0.027 (2.053**)
RP_Rec	−0.011 (−0.909)	−0.013 (−1.029)
RP_Pay	0.016 (1.448*)	0.011 (0.994)
CSRI_Quan	0.475 (2.324**)	
*CSRI_Quan*RP_Sales*	−0.009 (−0.055)	
CSRI_Quan*RP_Purchases	**−1.449 (−3.428***)**	
*CSRI_Quan*RP_Rec*	0.315 (0.313)	
*CSRI_Quan*RP_Pay*	0.320 (0.346)	
CSRI_Qual		0.521 (2.272**)
*CSRI_Qual*RP_Sales*		0.007 (0.036)
CSRI_Qual*RP_Purchases		**−1.615 (−3.151***)**
*CSRI_Qual*RP_Rec*		0.606 (0.465)
*CSRI_Qual*RP_Pay*		0.847 (0.726)
FAge	−0.002 (−0.709)	−0.003 (−0.929)
FSize	**0.126 (9.586***)**	**0.124 (9.233***)**
Lev	**0.091 (1.835**)**	**0.077 (1.538*)**
ROA	**0.417 (1.518*)**	**0.456 (1.685**)**
RPD	0.033 (0.680)	0.018 (0.371)
Firm Fixed Effects	Included	Included
Year Fixed Effects	Included	Included
Adj. R^2	0.830	0.829
F-value	9.340	9.291
Sig. (F)	0.000	0.000

This table presents the results for RPT, CSR reporting quantity, CSR reporting quality and firm value, with unstandardized coefficients B and t-statistics. ***, **, * indicate significance at the 0.01, 0.05 and 0.1 levels, respectively.

7. Conclusion, implications and future research

This study provides evidence that concerns regarding RPTs being value destroying and value enhancing are warranted, particularly for certain types of RPTs. The results of all models show that related party sales transactions have a value-destroying effect. Further, we find that related party payables are positively related to both Tobin's q and PBV, suggesting that the market perceives loans or cash assistance provided to listed firms as beneficial. As certain RPTs are found to be abusive (value destroying), it is important that those transactions be reviewed and disclosed properly to ensure that such transactions are conducted in the best interest of stakeholders. Hence, to improve market confidence, regulators should pay more attention to the RPT types that tend to be abusive.

Further, this study provides evidence of moderating effects of both the quantity and quality of CSR reporting on the relationship between RPTs and firm value. Particularly, firms with high CSR reporting quantity and quality tend to have less abusive RPTs. Therefore, investors, policymakers and other stakeholders are encouraged to pay attention to both the quantity and quality of CSR reporting. More importantly, an assurance service and standard could be established to provide guidance for the preparation of CSR reports and to ensure the credibility of a firm's CSR reporting.

This study has several limitations and hence suggestions for future studies are offered. First, the main results differ slightly when individual firm fixed effects are included in the model. As presented in the sensitivity tests section, the statistical results show that firm value is positively influenced by related party purchases and payables, suggesting that these transactions have value-enhancing effects. In addition, firm value is negatively influenced by related party receivables, indicating a value-destroying effect. However, there is no support for

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Table 9
Regression Results for RPT, CSR and PBV.

Variable	CSR Quantity	CSR Quality
(Constant)	−2.240 (−6.274***)	−2.256 (−6.441***)
RP_Sales	0.052 (1.978**)	0.049 (1.876**)
RP_Purchases	0.011 (0.477)	0.014 (0.599)
RP_Rec	−0.023 (−1.048)	−0.025 (−1.146)
RP_Pay	0.021 (1.080)	0.014 (0.720)
CSRI_Quan	**0.746 (2.097**)**	
*CSRI_Quan*RP_Sales*	−0.099 (−0.345)	
CSRI_Quan*RP_Purchases	**−1.306 (−1.774**)**	
*CSRI_Quan*RP_Rec*	−0.115 (−0.065)	
*CSRI_Quan*RP_Pay*	1.232 (0.764)	
CSRI_Qual		0.817 (2.055**)
*CSRI_Qual*RP_Sales*		−0.074 (−0.222)
CSRI_Qual*RP_Purchases		**−1.493 (−1.681**)**
*CSRI_Qual*RP_Rec*		0.247 (0.109)
*CSRI_Qual*RP_Pay*		2.257 (1.116)
FAge	−0.005 (−0.891)	−0.005 (−0.994)
Fsize	**0.168 (7.357***)**	**0.165 (7.118***)**
Lev	0.083 (0.951)	0.060 (0.695)
ROA	0.241 (0.504)	0.278 (0.592)
RPD	0.018 (0.219)	0.002 (0.020)
Firm Fixed Effects	Included	Included
Year Fixed Effects	Included	Included
Adj. R^2	0.815	0.816
F-value	8.522	8.557
Sig. (F)	0.000	0.000

related party sales. In addition, robustness tests support the negative moderating effect of CSR on the association between related party purchases and firm value. These different results, compared with the main effects, indicate that there are other firm-specific variables that explain the dependent variables. A future study could consider other firm-specific factors such as political connections (Fisman, 2001; Habib et al., 2017) and family control (Kohlbeck et al., 2018) as explanatory variables. Second, this study only considers related party sales, purchases, receivables and payables. Therefore, future studies could consider other types of RPTs or break the RPT categories examined in this study into more detailed components. Further, future studies could explore other possible determinants of opportunistic RPTs, such as the risk of expropriation arising from a firm's ownership structure, corporate governance and financial constraints. Last, this study provides an early indication of the occurrence of tunneling after propping; future studies could further confirm this indication.

Declaration of Competing Interest

The authors declared that there is no conflict of interest.

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Effects of accounting conservatism on investment efficiency and innovation☆

Volker Laux [a,*], Korok Ray [b]

[a] University of Texas at Austin, USA
[b] Texas A&M University, USA

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ABSTRACT

We study how biases in financial reporting affect managers' incentives to develop innovative projects and to make appropriate investment decisions. Conservative reporting practices impose stricter verification standards for recognizing good news, and reduce the chance that risky innovations will lead to favorable future earnings reports. Holding all else constant, more conservative reporting therefore weakens the manager's incentive to work on innovative ideas, consistent with informal arguments in the extant literature. However, all else does not stay constant because the manager's pay plan will change in response to changes in the accounting system. We show that under optimal contracting, more conservative accounting does not stifle innovation in organizations, but rather increases incentives for innovation, as long as conservatism reduces the risk of an overstatement.

1. Introduction

This paper studies the role of conservative financial reporting on investment efficiency and innovation in corporations. Conservative accounting practices and innovation seem to conflict with one another. On the one hand, innovation requires an environment that protects managers from failure and encourages risk-taking (Manso, 2011; Reis, 2011). On the other hand, conservative reporting practices impose stricter verification standards for recognizing good news relative to bad news (Basu, 1997; Watts, 2003), and reduce the chance that risky investments will translate into favorable earnings reports. Conservatism may thereby foster prudence and risk avoidance, and inhibit innovation in organizations.

What is missing from this intuition, however, is the role of incentive contracting. Corporate boards design optimal incentive pay plans to control managerial actions, and these incentive plans will change when the reporting system changes. The aim of this manuscript is to examine how conservative accounting practices affect innovation in organizations taking into account optimal incentive contracting. We find that contrary to conventional wisdom, more conservative accounting does not impede innovation, but instead fosters innovation. Understanding the relation between conservative accounting rules and incentives for innovation is important, as innovation is vital for the continued growth of the economy.

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* Corresponding author.
E-mail address: volker.laux@mccombs.utexas.edu (V. Laux).

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We consider a model that captures the following key features of innovation: (i) the manager must spend costly effort to develop innovative ideas, and more effort increases the probability that her idea is viable; (ii) after the manager has worked on the innovation, she privately observes a signal about its success probability and chooses to either implement the innovation or continue with the status quo; (iii) pursuing the innovation is more risky than maintaining the status quo; and (iv) the innovation generates results in the long run.

Due to the long-term nature of innovation, the manager's compensation is linked to an interim earnings report that is informative about the firm's economic performance. We define the firm's accounting system as being more conservative when the verification requirements for issuing a favorable report are more stringent. More conservative accounting policies therefore render the firm less likely to issue a favorable report, but if it does issue a favorable report, it is a more accurate indicator that firm performance is indeed high.

The extant informal accounting literature evaluates conservative accounting by how it *directly* affects innovation and investment efficiency, taking other governance tools, such as incentive contracting, as exogenously fixed. Our model generates results that are similar to the arguments presented in the literature if we also view the manager's pay plan as exogenous. Specifically, since a shift to more conservative accounting reduces the probability that risky investments translate into favorable future earnings reports, conservatism weakens the manager's incentive to spend effort developing innovative ideas, consistent with arguments in Chang et al. (2015). Conservatism not only affects the manager's ex ante effort incentive, but also her decision whether to invest in the new idea ex post based on her private information about its profitability. More conservative accounting renders investing in the innovation less attractive for the manager, which improves investment efficiency if the manager is inclined to overinvest in the innovation, but aggravates investment efficiency if she is inclined to underinvest in the innovation, consistent with arguments in Roychowdhury (2010). Given these effects, more conservative accounting can either decrease or increase firm value.

While these arguments are intuitive, the desirability of conservative accounting should be evaluated in a broader framework that takes into account that contracts are chosen optimally and that contracts change when the reporting environment changes. In our setting, when designing the optimal pay plan, the board must address two incentive problems: motivate the manager to spend effort on developing innovative ideas, and induce her to make an efficient investment decision based on her private information about the innovation's success probability. These two incentive problems, however, conflict with each other. The optimal contract that encourages the manager to work hard on developing innovative ideas induces her to invest in an innovation even when its success probability is relatively low. Due to this tension, the optimal contract implements two types of inefficiencies: insufficient innovation effort and overinvestment in the innovation relative to first-best.

We are interested in how an increase in conservative accounting affects these agency frictions, and hence the manager's equilibrium actions. As discussed earlier, holding all else equal, an increase in conservatism reduces the probability that risky investments lead to favorable future earnings reports, and hence weakens the manager's incentive to work on innovative ideas. All else does not stay equal, however. We find that the board responds to an increase in conservatism by offering the manager stronger incentives to innovate. As a result, conservatism does not impair, but fosters innovation in organizations. The intuition for this result is as follows. By imposing stricter verification requirements for issuing a favorable report, conservative accounting increases the probability that a favorable report is an accurate representation of firm performance. This feature of conservatism allows the board to design incentive contracts that tie the manager's pay more closely to the profitability of the innovation. Offering a pay plan that is more sensitive to the innovation's profitability is beneficial not just because it induces the manager to work harder on developing innovative ideas. Rather, the advantage of a higher pay-performance sensitivity is that it induces higher innovation effort *without* creating excessive incentives to subsequently overinvest in the innovation. In short, more conservative accounting enables the board to better tackle the twin problems of inducing effort and efficient investment, and thus reduces contracting frictions.

As long as an increase in conservative accounting reduces the risk of an overstatement (which permits the board to offer contracts with a higher pay-performance sensitivity), an increase in conservatism (i) increases the manager's incentive to work on innovative ideas, (ii) reduces the manager's incentive to overinvest in an innovation, and (iii) ultimately increases firm value. Overall, our results indicate that conservative accounting does not discourage innovation in organizations, as is typically argued, but instead encourages innovation. Our model should not be interpreted, however, as predicting that firms will always adopt conservative reporting practices that eliminate the risk of overstatements because in practice there are other forces, besides the ones discussed here, that will also influence the firm's choice of conservatism (see the discussion in Section 7).

Our paper fuses together two streams of the analytical conservatism literature. The first stream examines the effect of conservatism on investment efficiency (Gigler et al., 2009; Li, 2013; Nan and Wen, 2014; Caskey and Laux, 2017). In this literature, the principal (e.g., the board of directors or the lender) makes an investment or abandonment decision based on a public accounting report that is informative about the profitability of the project. A conservative reporting system reduces the probability that the principal invests in a failing project (Type II error) but increases the probability that she foregoes a profitable project (Type I error). If the expected cost of Type II errors exceeds (is exceeded by) the expected cost of Type I errors, the principal optimally designs an accounting system with a conservative (aggressive) bias. In contrast, in our study, the manager is in charge of the investment decision, and she bases this decision not on a public accounting report but on private information. The bias in the accounting system nevertheless matters for the manager's investment choice because, ceteris paribus, conservative accounting reduces the likelihood that risky investments will translate into favorable earnings, which reduces the manager's willingness to take risks ex ante.

The second stream of literature focuses on the role of conservatism for contracting under moral hazard and limited liability (e.g., Balsmeier et al., 2017; Kwon, 2005; Kwon et al., 2001). These studies show that conservatism reduces the expected bonus required to induce the manager to take a certain effort level. The reason behind this result is that conservatism renders a high accounting report more informative about the manager's effort (that is, the likelihood ratio of the high report increases).[1] In contrast, in our setting, if the only problem were to induce the manager to spend effort developing an innovation, the bias in the accounting system would be irrelevant. It is the combination of both the effort moral hazard problem and the investment adverse selection problem that creates a role for conservative accounting. We contribute to the literature on conservatism by providing a formal discussion of how conservative accounting relates to optimal contracting, investment efficiency, and innovation.

Other papers that study the dual problems of inducing effort and efficient interim decisions include, e.g., Lambert (1986), Levitt and Snyder (1997), and Laux (2008). These studies show that providing the manager with effort incentives comes at the cost of encouraging inefficient interim actions, such as overinvestment or CEO entrenchment. However, these papers do not study the effects of conservative accounting policies. We show that more conservative accounting allows the board to design contracts that can better address the dual problems of inducing effort and efficient investment. Conservative accounting therefore results in contracts that lead to greater innovation effort, more efficient investment, and higher firm value.

2. Model

We consider a model with two risk-neutral players: shareholders, represented by a benevolent board of directors, and a manager. The manager is responsible for the dual tasks of developing new investment opportunities and deciding whether to invest in the new opportunity based on a privately observed signal about its profitability. The board's task is to set up the firm's financial reporting system and to design the incentive contract for the manager. The timeline and the details of the model follow.

2.1. Timing

There are five dates. At date 1, the board designs the accounting system and the incentive contract. At date 2, the manager expends effort to work on new investment ideas. At date 3, the manager privately observes the success probability of the investment idea and decides whether to implement it or continue with business as usual. At date 4, the accounting system generates a public report that is informative of the long-term cash flows of the firm. Long-term cash flows, denoted by X, are realized at date 5 after the contract with the manager has expired. Hence, X cannot be used for contracting purposes.

2.2. Innovation effort

The manager has an investment idea that is either viable or nonviable. The viable idea succeeds with probability θ, where θ is drawn from a distribution $F(\theta)$, with density $f(\theta)$ and full support over the interval $[0,1]$. The nonviable idea has a success probability of zero, $\theta = 0$. As will become apparent below, the manager always prefers to reject a nonviable investment idea since it fails with certainty. The manager can take a costly and unobservable action $a \in [0,1]$ to increase the probability that her idea is viable. Specifically, with probability a the idea is viable, and with probability $(1-a)$ it is nonviable. The manager's personal cost of effort a is $0.5ka^2$, where $k > 0$ is a constant. We assume the parameter k is sufficiently large to ensure an interior solution with $a < 1$.

2.3. Project choice

After choosing effort, the manager privately learns the profitability θ of the new investment idea and decides whether to implement it or continue with business as usual. If the manager invests in the new project, the project succeeds with probability θ, yielding a future cash flow of X_h, or fails with probability $(1-\theta)$, yielding a future cash flow of X_l. If the manager continues with business as usual, cash flow is $X_m > 0$, where $X_h > X_m > X_l \geq 0$.

2.4. Accounting report

The firm issues a contractible report $R \in \{R_h, R_m, R_l\}$ that is informative about the future cash flow X.[2] If the manager continues with business as usual, there is no uncertainty, and the report is $R = R_m$, representing cash flow X_m. If the manager implements the risky innovation, the accounting report is either high $(R = R_h)$ or low $(R = R_l)$. The mapping from the output $X \in \{X_h, X_l\}$ to the report $R \in \{R_h, R_l\}$ follows a two-step process (see, e.g., Kwon et al. (2001), Dye (2002), and Gao (2015)). In

[1] Gigler and Hemmer (2001) find that aggressive accounting can reduce the cost of inducing effort in a setting in which the manager is not protected by limited liability, but instead is risk averse.

[2] While the report R can be interpreted as either an internal or external report, we focus here on external reports. This allows us to contribute to the growing literature that studies how external financial reporting systems influence investment decisions and other managerial actions.

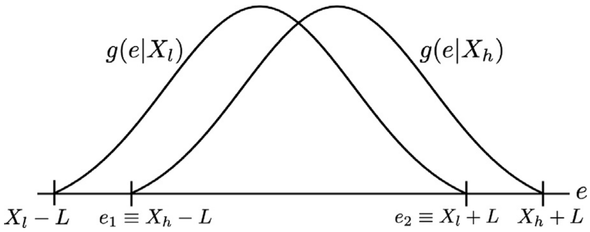

Fig. 1. A graphical illustration of the probability densities $g(e|X_l)$ and $g(e|X_h)$.

the first step, evidence $e = X + \varepsilon$ about the outcome is generated, where ε is drawn from a distribution with density $g(\varepsilon)$ and positive support over $(-L, L)$. Let $g(e|X)$ denote the probability density of e conditional on output X. Fig. 1 provides a graphical illustration of the probability densities.

We denote $e_1 \equiv X_h - L$ and $e_2 \equiv X_l + L$ and assume that $e_2 > e_1$. Thus, any evidence e below e_1 indicates a low output, $X = X_l$; any evidence above e_2 indicates a high output, $X = X_h$; and evidence in the range (e_1, e_2) is inconclusive about X. We make the standard assumption that the likelihood ratio $g(e|X_h)/g(e|X_l)$ is non-decreasing in e for all $e \in [e_1, e_2]$, that is, the monotone likelihood ratio property (MLRP) holds. This property implies that higher evidence e is good news since it indicates that the output is more likely high.

In the second step, the accounting system partitions evidence e into a binary report $R \in \{R_h, R_l\}$. Specifically, there is a threshold c such that the report is low, $R = R_l$, when $e < c$, and high, $R = R_h$, when $e \geq c$. The threshold c is observable to all players. Letting $p_{ij} \equiv \Pr(R_i|X_j)$ denote the probability that the accounting system generates report R_i when cash flow is X_j, with $i, j \in \{h, l\}$, we obtain:

$$p_{hh} = \int_c^{X_h+L} g(e|X_h)de \text{ and } p_{hl} = \int_c^{X_l+L} g(e|X_l)de, \tag{1}$$

$$p_{lh} = \int_{X_h-L}^{c} g(e|X_h)de \text{ and } p_{ll} = \int_{X_l-L}^{c} g(e|X_l)de. \tag{2}$$

The threshold c reflects a summary measure of the set of conditions that must be satisfied to issue a favorable report. An accounting system is more conservative when the requirements for a favorable report are more stringent, that is, when c is higher. This characterization is consistent with Basu (1997) and Watts (2003), who define conservative reporting practices as imposing stricter verification standards for recognizing good news than for recognizing bad news.

In practice, the degree of conservatism in a firm is determined collectively by the measurement principles the firm applies when it recognizes revenues, expenses or capitalizes development costs, impairs assets, recognizes loss contingencies, and values inventory. In general, when there is business uncertainty, more conservative accounting practices require the use of methods that are more likely to understate, rather than overstate, financial performance.

As an example, consider the treatment of research and development (R&D) costs, which can be either capitalized or expensed. Suppose expensing R&D costs leads to a low interim accounting report R_l while capitalizing R&D costs leads to a high report R_h. US-GAAP is conventionally considered more conservative than IFRS as it pertains to accounting for R&D costs. To illustrate how the accounting for R&D costs maps into the model note that higher evidence e indicates that the innovation is more likely successful. Whether R&D costs are expensed or capitalized is jointly determined by evidence e and the degree of conservatism c. Specifically, R&D costs are expensed when evidence e lies below the threshold c, resulting in R_l, and R&D costs are capitalized when evidence e exceeds the threshold c, resulting in R_h. A more conservative accounting regime is one that is characterized by a higher threshold c and implies that stronger evidence e of the project's future success is required for capitalization.[3]

In our setting (and the above R&D example), the report R does not directly depend on the manager's ex ante private information θ. Instead, the report depends on the evidence e and hence only indirectly on θ via X. It is useful to discuss the difference between θ and e. Both parameters are informative of the probability of project success but there is an important difference. θ is the manager's private information at the time she makes the investment decision and hence determines whether investing in the new project is efficient. If the report could be based on θ, the board would be able to tell if the manager made the efficient investment decision (which is to invest if θ exceeds the first-best threshold θ_{FB}, defined later). We show in Appendix A that in this case the optimal contract trivially implements the first-best investment decision (but not first-best innovation effort). In contrast, evidence e arrives only after the manager implemented the project and the evidence is not a clear indicator of whether the manager made the appropriate investment decision ex ante given the information she had at the time. This is because high evidence e could be the result of a manager who implemented the project despite a low θ,

[3] We thank the referee for suggesting we model conservatism as a threshold and for the R&D example discussed here.

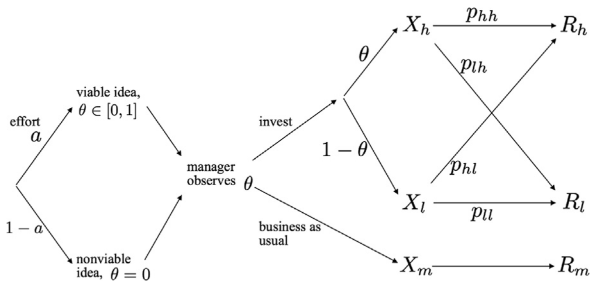

Fig. 2. Game tree of the model.

and simply was lucky. The accounting report R only captures how well the project is currently doing (evidence e) but cannot capture what the manager knew when she made the investment decision (θ). As a result, an incentive problem exists not only with respect to the manager's innovation effort but also with respect to her investment decision.

2.5. Contracting

At date 1, the board offers the manager a contract that specifies her payments contingent on the accounting report R. Specifically, the contract is given by $W = (w_h, w_m, w_l)$, where w_i denotes the manager's payment if $R = R_i$. The manager is protected by limited liability in the sense that payments must be nonnegative; that is, $w_i \geq 0$ for each $i = h, m, l$. The limited liability constraint restricts the board's ability to use punishments as a means to provide incentives. The board therefore has to rely solely on rewards as an incentive tool, which allow the manager to enjoy a positive utility. To guarantee contracting frictions, we make the standard assumption that the manager's reservation utility, $\underline{U}$, is below a certain threshold, denoted $\underline{U}_T$ (where $\underline{U}_T > 0$ is specified in (47) in Appendix D). This assumption implies that the rewards that induce the second-best actions yield the manager an expected utility that exceeds her reservation utility; that is, the manager reaps an economic rent. The board therefore faces a trade-off between the costs of granting the manager larger rents and the benefits of inducing more efficient actions.

Since the manager is privately informed about the profitability θ of the new project, the board grants the manager the authority to make the investment decision. We show in Appendix B that restricting attention to this simple contract is without loss of generality. To show this, we consider a contract in which the board retains investment authority and designs a general direct revelation mechanism that induces the manager to truthfully reveal her private information θ. This revelation mechanism does not outperform the simple contract we study.

Fig. 2 depicts the game tree of the model.

Before turning to the analysis, we briefly discuss the simplifying assumptions of the model.[4]

2.6. Distribution of θ

We assume in the model that innovation effort a increases the probability that the innovation is viable. An alternative modeling approach is to assume that the project's probability of success θ is drawn from a distribution $H(\theta|a)$ and that a higher innovation effort a shifts the probability distribution to the right in the sense of first-order stochastic dominance. This setting becomes intractable quickly, but is solvable when the effort choice is binary, $a \in \{a_l, a_h\}$. Similar to the present model, an increase in conservatism allows the board to better tackle the dual problems of inducing effort and efficient investment. An increase in c therefore leads to more efficient investment and higher firm value.

2.7. Output

In our setting, investing in the innovation leads to either a high or low report (R_h or R_l), whereas conducting business as usual involves no uncertainty and always leads to R_m. This assumption has two implications. First, the board can essentially contract on whether the manager has invested or not invested. Second, conservatism c only affects the report when the manager implements the risky innovation but not when she conducts business as usual. We can modify our setting so that the investment decision cannot be inferred from the report R and conservatism affects R even when the manager conducts business as usual. Specifically, suppose that implementing a viable project leads to a risky outcome with probability $\beta_I < 1$, in which case the outcome is high, X_h, with probability θ and low, X_l, with probability $(1-\theta)$. However, with probability $(1-\beta_I)$ the outcome is safe and $X = X_m$. In contrast, if the manager continues with business as usual, the outcome is risky with probability β_N, where $\beta_N < \beta_I$, in which case the high and low outcome are equally likely. With probability $(1-\beta_N)$ the

[4] Proofs are available upon request.

outcome is safe and $X = X_m$. The assumption $\beta_I > \beta_N$ captures the notion that investing in an innovation is more risky than conducting business as usual. The mapping from the output X to the report R is as before. We can show that as long as the probability of generating a high cash flow X_h is higher when the manager invests in an innovation than when she continues the status quo, our qualitative results continue to hold.

2.8. Number of reports

In our setting, the degree of conservatism c partitions evidence e into a binary report. Suppose instead that there are two thresholds, c_1 and c_2, with $c_1 < c_2$, that partition the evidence into three reports R_1, R_2, and R_3. In this case, the optimal contract rewards the manager for the highest report R_3 but not for the lower reports R_1 and R_2, since R_3 is most informative about the high cash flow X_h (which follows from the MLRP).[5] The threshold c_1 is then irrelevant and a change in c_2 has the same effects as a change in c in our one-threshold setting.

2.9. Reservation utility

As mentioned earlier, we focus on the case where the manager's reservation utility lies below a threshold $\underline{U}_T$ (specified in (47) in Appendix D). As is typical in limited liability settings, if the manager's reservation utility $\underline{U}$ exceeds a second threshold, which we denote by $\underline{U}_F$, the board can implement the first-best actions without leaving the manager any rents. In this case, there are no contracting frictions and the level of conservatism plays no role. However, $\underline{U}_F$ is so high that the manager must receive most of the output just to ensure her participation, leaving the shareholders with less than X_l. Since $\underline{U}_F > \underline{U}_T$, the only remaining case is the one where $\underline{U}$ lies between $\underline{U}_T$ and $\underline{U}_F$. In this case, the board cannot implement first-best actions without leaving the manager any rents and induces the highest actions that keep her at her reservation utility $\underline{U}$; that is, the manager's participation constraint determines the optimal actions. Assuming that $\underline{U} \in (\underline{U}_T, \underline{U}_F)$ does not change our main results that more conservative accounting leads to a higher innovation effort level and higher firm value (under optimal contracting).

3. Definition of conservatism

The firm's accounting system is more conservative when the requirements for a favorable report are more stringent, that is, when c is higher. This is consistent with the definition of conservatism in Gigler et al. (2009). Specifically, for any threshold $c \in [e_1, e_2)$ our setting satisfies Gigler et al.'s (2009) conditions (A1)-(A3). Translated into our setting, these conditions are as follows:[6]

(A1) The likelihood ratio $\frac{\Pr(R|X_h)}{\Pr(R|X_l)}$ is increasing in R: $\frac{p_{hh}}{p_{hl}} > 1 > \frac{p_{lh}}{p_{ll}}$.
(A2) For each outcome $X \in \{X_l, X_h\}$, the probability of a low report is increasing in c: $\frac{dp_{lh}}{dc} > 0$ and $\frac{dp_{ll}}{dc} > 0$.
(A3) The likelihood ratios $\frac{p_{hh}}{p_{hl}}$ and $\frac{p_{lh}}{p_{ll}}$ increase in c.

(A1) implies that the accounting report is informative about X, where R_h represents good news and R_l represents bad news. Thus, the posterior probability of a high (low) cash flow given a high (low) report exceeds the prior probability: $\Pr(X_h|R_h, \theta) > \theta$ and $\Pr(X_l|R_l, \theta) > (1 - \theta)$.

(A2) implies that more conservative accounting increases the probability that both X_h and X_l lead to a low rather than high accounting report. Intuitively, an increase in the threshold c strengthens the requirements that must be satisfied for a favorable report, and hence reduces the probability of a favorable report.

(A3) implies that conservative accounting increases the information content of the high report but reduces the information content of the low report:

$$\frac{d\Pr(X_h|R_h, \theta)}{dc} > 0 \text{ and } \frac{d\Pr(X_l|R_l, \theta)}{dc} < 0. \tag{3}$$

As the requirements for issuing a high report become more stringent (c increases), the high report becomes a better indicator of the high output X_h and the low report becomes a weaker indicator of the low output X_l.

When the threshold c reaches e_2, the requirements for issuing a high report are so stringent that the high report becomes a clear indicator that the firm's economic performance is high, $\Pr(X_h|R_h) = 1$. Any further increase in c above e_2 does not change the information content of R_h, but reduces the information content of R_l (since p_{lh} increases with c). Similarly, when c reaches e_1, the requirements for reporting good news are so weak that a low report becomes a clear indicator that economic performance is indeed grim, $\Pr(X_l|R_l) = 1$. Reducing c below e_1 does not change the information content of R_l, but reduces the

[5] This is related to standard agency models with limited liability and risk neutrality where the agent is rewarded only for the signal/output that is most informative of high effort.
[6] We show in Appendix C that conditions (A1)-(A3) follow from (1) and (2).

information content of R_h (since p_{hl} increases as c decreases). It is therefore without loss of generality to focus on the intermediate values $c \in [e_1, e_2]$ in what follows.

4. Managerial actions

In this section, we solve for the manager's effort and investment choices given contract W and determine the board's optimization problem. After the manager observes the profitability θ of the new investment idea, she decides whether to implement it or continue with business as usual. Conditional on θ, the manager's expected compensation if she implements the innovation is

$$\Omega(\theta) \equiv \theta E[w|X_h] + (1-\theta)E[w|X_l],$$

where

$$E[w|X_h] = p_{hh}w_h + p_{lh}w_l, \tag{4}$$

$$E[w|X_l] = p_{hl}w_h + p_{ll}w_l, \tag{5}$$

is the manager's expected pay when future cash flow is high, X_h, or low, X_l, respectively. We refer to $\Omega(\theta)$ as the manager's innovation compensation.

The manager invests in the innovation rather than continues business as usual if and only if:

$$\Omega(\theta) \geq w_m. \tag{6}$$

As will become clear later, the optimal contract W satisfies

$$E[w|X_h] > w_m > E[w|X_l]. \tag{7}$$

The first inequality in (7) implies that the manager's payoff is higher if she implements an innovation that succeeds with certainty than if she continues the status quo, and the second inequality implies that the manager's payoff is lower if she implements an innovation that fails with certainty than if she continues the status quo.

Given (7), there is a unique interior threshold, θ_T, that satisfies

$$\Omega(\theta_T) = w_m, \tag{8}$$

so that the manager implements the innovation if its profitability θ exceeds θ_T, and continues with business as usual otherwise.

At date 2, the manager chooses innovation effort a to maximize her ex ante utility

$$U = \Psi - 0.5ka^2, \tag{9}$$

where

$$\Psi = a\left(\int_{\theta_T}^{1} \Omega(\theta)f(\theta)d\theta + F(\theta_T)w_m\right) + (1-a)w_m \tag{10}$$

is her expected compensation. With probability a, the innovation is viable and the manager implements it if $\theta \geq \theta_T$, yielding her $\Omega(\theta)$, and continues the status quo if $\theta < \theta_T$, yielding her w_m. With probability $(1-a)$, the innovation is nonviable and the manager continues the status quo. Taking the first-order condition for a maximum yields:

$$a = \frac{1}{k}\int_{\theta_T}^{1} (\Omega(\theta) - w_m)f(\theta)d\theta. \tag{11}$$

Fig. 3 illustrates the manager's incentives graphically. We assume in the figure (and in all figures that follow) that the profitability θ of a viable project follows a uniform distribution over the interval $[0, 1]$. The manager's investment threshold θ_T is determined by the intersection between the expected pay she receives when pursuing the innovation, $\Omega(\theta)$, and the pay w_m she receives when conducting business as usual.

Region A in Fig. 3 represents the increase in the manager's ex ante compensation if she develops a viable idea, and hence determines her innovation effort incentive. Since the figure considers a uniform distribution, the manager's effort choice is $a = A/k$. The larger the region A, the larger the expected reward for developing a viable innovation and the higher the manager's incentive to expend innovation effort.

Given the manager's effort and investment choices, the firm's ex ante cash flow is:

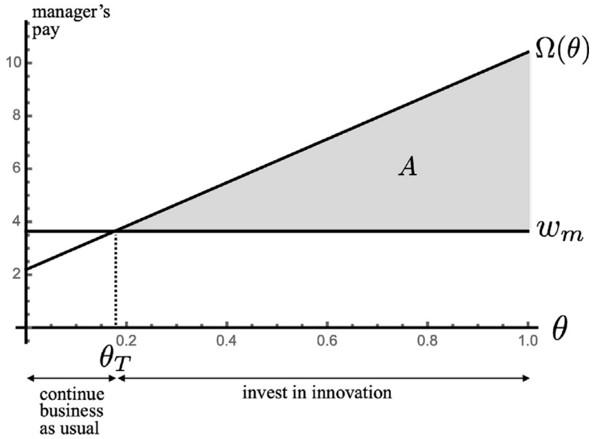

Fig. 3. A graphical illustration of the manager's investment threshold θ_T and her effort choice $a = A/k$.

$$CF = a\left(\int_{\theta_T}^{1}(\theta X_h + (1-\theta)X_l)f(\theta)d\theta + F(\theta_T)X_m\right) + (1-a)X_m. \tag{12}$$

The board's problem is now to maximize the expected firm value

$$\max_{(w_h, w_m, w_l, c)} \; V = CF - \Psi, \tag{13}$$

subject to the manager's incentive constraints (8) and (11), her participation constraint $U \geq \underline{U}$, and the limited liability constraints, $w_h, w_m, w_l \geq 0$. To ensure that the board's optimization problem is concave, we assume that the marginal cost of effort, k, is sufficiently high.[7]

As a reference, note that the first-best actions solve

$$\max_{(a,\theta_T)} CF - 0.5ka^2.$$

The first-best investment decision is to implement the innovation if and only if $\theta \geq \theta_{FB}$, where θ_{FB} is defined by

$$\theta_{FB}X_h + (1-\theta_{FB})X_l = X_m \tag{14}$$

and the first-best innovation effort is

$$a_{FB} = \frac{1}{k}\int_{\theta_{FB}}^{1}(\theta X_h + (1-\theta)X_l - X_m)f(\theta)d\theta. \tag{15}$$

5. Benchmark: Effects of conservatism when the pay plan is exogenous

We start the analysis by considering how changes in the accounting system affect the manager's actions and firm value, assuming the contract W is held constant (but satisfies (7)). In this benchmark, our model generates results that resemble the informal arguments made in the literature.

The next proposition establishes how an increase in conservative accounting affects the manager's innovation effort a, her investment threshold θ_T, and her expected compensation Ψ. All proofs are in Appendix D.

Proposition 1. *Holding the contract W fixed, an increase in conservatism c:*

(i) *increases the investment threshold* θ_T;
(ii) *reduces the manager's innovation effort* a;
(iii) *reduces the manager's expected compensation* Ψ.

[7] See the proof of Proposition 2 for details.

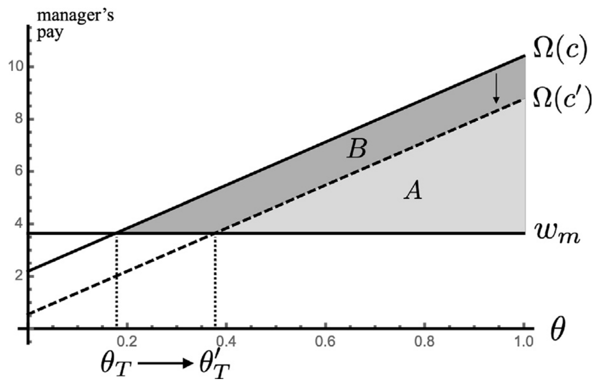

Fig. 4. An increase in conservatism from c to c' reduces the expected innovation compensation from $\Omega(c)$ to $\Omega(c')$, which increases the investment threshold from θ_T to θ_T', but reduces innovation effort by B/k.

When the accounting system is more conservative, investing in a risky innovation is less likely to result in a favorable earnings report. The manager's expected innovation compensation $\Omega(\theta)$ is therefore lower when the accounting system is more conservative for any given θ.[8] Fig. 4 depicts the decline in $\Omega(\theta)$ when conservatism increases from c to c'.[9]

The decline in the innovation compensation Ω associated with an increase in c renders the manager less eager to work hard on developing innovative ideas. The manager's innovation effort choice therefore declines from $a = (A+B)/k$ to $a' = A/k$ in Fig. 4. This result is consistent with the view put forth by Chang et al. (2015), who argue that conservative accounting stifles innovation in organizations.

Further, the degree of conservatism affects the manager's investment decision once she has made her effort choice. Specifically, the decline in Ω reduces the manager's incentive to invest in the innovation, and hence increases the investment threshold from θ_T to θ_T' in Fig. 4. Whether an increase in the threshold θ_T improves or worsens investment efficiency depends on whether the investment threshold initially lies below or above the first-best level θ_{FB}. If $\theta_T < \theta_{FB}$, the manager overinvests in the innovation for all $\theta \in [\theta_T, \theta_{FB})$ in the sense that she implements the new idea even though continuing the status quo is optimal for shareholders. More conservative accounting then reduces the manager's overinvestment incentive and pushes θ_T closer to θ_{FB}. The opposite is true when $\theta_{FB} < \theta_T$. In this case, the manager underinvests in the innovation for all $\theta \in (\theta_{FB}, \theta_T]$ and more conservative accounting aggravates the manager's underinvestment incentive and pushes θ_T further away from θ_{FB}. These findings are consistent with Roychowdhury (2010), who points out that conservatism is no panacea because it can alleviate as well as aggravate investment inefficiencies.

The level of c that maximizes firm value V balances the different effects on investment efficiency, innovation effort, and managerial compensation. Formally, the effect of a marginal increase in c on V is given by[10]

$$\frac{dV}{dc} = -a(\theta_T X_h + (1-\theta_T)X_l - X_m)f(\theta_T)\frac{d\theta_T}{dc} + \frac{da}{dc}\left[\frac{1}{k}\int_{\theta_T}^{1}(\theta X_h + (1-\theta)X_l - X_m)f(\theta)d\theta - 2a\right]k, \tag{16}$$

where θ_T and a satisfy (8) and (11), respectively. Conservative accounting influences firm value V via three channels. A higher degree of conservatism (i) leads to a higher investment threshold θ_T, (ii) weakens ex ante innovation effort incentives, and (iii) reduces the manager's expected compensation. Effect (i) is captured in the first line in (16) and effects (ii) and (iii) are captured in the second line in (16). These effects can lead to an interior optimal level of conservatism. For example, when $X_h = 200, X_m = 140, X_l = 100, w_h = 4, w_m = 2, w_l = 0, k = 1, g(e|X_h) = g(e|X_l) = 1/(2L), L = 100$, and $f(\theta) = 1$, firm value V is single peaked with respect to c and the optimal c is 111.3. For the optimal level of c the investment threshold and effort level are $\theta_T = 0.12$ and $a = 0.77$, respectively, which lie below the first-best levels of $\theta_{FB} = 0.4$ and $a_{FB} = 1$. In this example, the optimal value of c is relatively low, which has the benefit of inducing a high level of innovation effort but comes at the cost of overinvestment, $\theta_T < \theta_{FB}$, and a high expected managerial compensation. An increase in c would lead to more efficient investments and less managerial compensation, but the associated decline in innovation effort would more than offset these benefits.

[8] Formally, using (4) and (5) and recognizing that $p_{ll} = (1-p_{hl})$ and $p_{lh} = (1-p_{hh})$, the manager's innovation compensation can be written as $\Omega = (\theta p_{hh} + (1-\theta)p_{hl})(w_h - w_l) + w_l$, which decreases with c for all θ since $dp_{hh}/dc < 0$, $dp_{hl}/dc < 0$, and $w_h > w_l$.

[9] To ease exposition, Fig. 4 (and all figures that follow) assumes $dp_{hh}/dc = dp_{hl}/dc$, so that an increase in c reduces the intercept of the innovation compensation Ω but not its slope.

[10] Equation (16) is obtained by taking the first derivative on (13) and using (28).

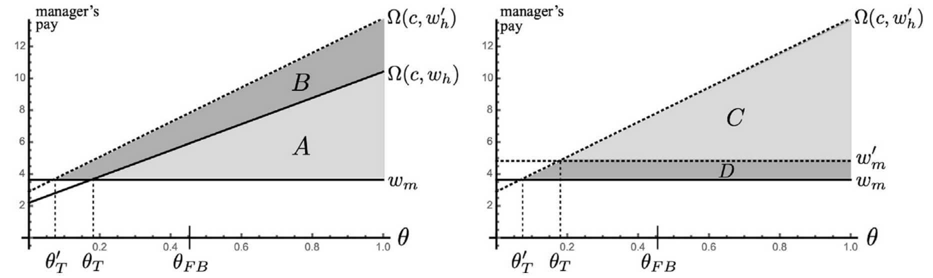

Fig. 5. The left panel shows that an increase in the pay w_h to w'_h increases the innovation compensation $\Omega(c, w_h)$ to $\Omega\left(c, w'_h\right)$, which increases effort incentives by B/k, but reduces the investment threshold θ_T to θ'_T. The right panel show that an increase in the pay w_m to w'_m increases the investment threshold back to θ_T, but reduces effort incentives by D/k.

6. Optimal contracting

We now take into account that incentive contracts are chosen endogenously and that they will be adjusted in response to changes in the accounting system. Allowing for optimal contracting leads to conclusions that differ significantly from those in the benchmark section. Specifically, we find that more conservative accounting practices do not result in weaker managerial incentives to work on innovative projects, but result in stronger innovation effort incentives. Further, conservatism always leads to more efficient investment and higher firm value.

Our analysis proceeds in two steps. In Subsection 6.1, we show that the optimal pay plan that motivates the manager to work on an innovation induces her to subsequently overinvest in innovation. Due to this tension, the optimal effort level and investment threshold lie below the first-best levels, $a^* < a_{FB}$ and $\theta_T^* < \theta_{FB}$. We then show in Subsection 6.2 that more conservative accounting alleviates the tension between inducing effort and inducing efficient investment, and thus results in less overinvestment, greater innovation effort, and higher firm value.

6.1. Tension between inducing effort and efficient investment

When designing the contract W the board has to address two incentive problems: motivating the manager to work on developing a viable innovation, and inducing her to make an efficient investment decision based on her private information about the innovation's profitability θ. These two incentive problems conflict with one another. To see why consider the left panel of Fig. 5 and suppose the pay plan (w_h, w_m, w_l) depicted there implements actions that are below first-best, $\theta_T < \theta_{FB}$ and $a < a_{FB}$.[11]

If the board wishes to boost the manager's incentive to work on an innovation, it can do so by increasing the manager's bonus w_h for a high accounting report, say to w'_h. The higher bonus increases the innovation compensation from $\Omega(c, w_h)$ to $\Omega\left(c, w'_h\right)$, and hence the manager's effort level from $a = A/k$ to $a' = (A+B)/k$, as depicted in the left panel of Fig. 5. The higher bonus, however, has two drawbacks. First, it increases the manager's expected compensation, and second, it boosts the manager's incentive to overinvest in a viable innovation, reducing the investment threshold from θ_T to θ'_T. The board's goal of inducing effort therefore conflicts with its goal of inducing efficient investment.

The board can counteract the manager's stronger overinvestment incentive by offering a greater reward for continuing business as usual, w_m. When w_m increases to w'_m, as depicted in the right panel of Fig. 5, the manager's investment threshold increases back to the initial level θ_T. But rewarding the manager for doing business as usual increases the manager's pay, and also weakens her incentive to innovate. The manager's innovation effort therefore declines by D/k. To preserve incentives for innovation effort, an increase in w_m must be combined with an increase in the bonus w_h, which further increases the cost of the incentive system, and so on.

Due to these interactions and costs, the optimal contract implements actions that lie below the first-best levels, $\theta_T^* < \theta_{FB}$ and $a^* < a_{FB}$, as stated in the next proposition. The optimal pay plan (w_h, w_l, w_m) that implements the optimal actions can be found in Appendix D.

Proposition 2. *For any level of conservatism c, the optimal contract induces the manager*

(i) *to exert too little innovation effort,* $a^* < a_{FB}$, *and*
(ii) *to overinvest in a viable innovation,* $\theta_T^* < \theta_{FB}$,

relative to the first-best levels.

[11] The contract (w_h, w_m, w_l) depicted in Fig. 5 is actually the optimal contact when $k = 5$, $X_h = 110$, $X_l = 0$, $X_m = 50$, and $p_{hh}(c) = 0.95$, $p_{hl}(c) = 0.2$.

6.2. The value of conservative accounting

We are now ready to study the benefits of conservative accounting practices. The analysis proceeds as follows. We first show that conservatism alleviates the contracting tensions that we discussed in the previous subsection. We then show that more conservative accounting leads to contracts that implement greater innovation effort and more efficient investment, and ultimately increases firm value.

We know from Section 6.1 that offering the manager a higher bonus w_h spurs her incentive to work on the innovation, but has the downside of creating stronger incentives for overinvestment. Proposition 3 shows that an increase in both w_h and c allows the board to boost the manager's innovation effort incentive without increasing her incentive for overinvestment.

Proposition 3. *For all $c \in [e_1, e_2)$, a higher level of conservatism alleviates the tension between inducing effort and inducing efficient investment. Specifically, as c increases, the board can offer a larger bonus w_h to:*

(i) *increase innovation effort a, without increasing incentives for overinvestment (θ_T stays constant), or*
(ii) *reduce overinvestment incentives (increase θ_T), without reducing innovation effort (a stays constant).*

The intuition behind the result in Proposition 3(i) is as follows. When the accounting system is more conservative, investing in a risky innovation is less likely to result in a favorable earnings report. As a result, an increase in c reduces the manager's expected innovation compensation Ω for any given θ and the innovation becomes relatively less attractive (as discussed in the benchmark setting in Section 5). To hold the investment behavior constant, the board increases the bonus w_h so that the marginal type that is indifferent between investing and business as usual, θ_T, continues to be indifferent. Increasing the bonus w_h increases the expected innovation compensation $\Omega(\theta)$, and, importantly, the increase is higher for higher values of θ. As a result, investment becomes more attractive in expectation for any $\theta > \theta_T$, which fosters the manager's incentive to exert innovation effort. The key assumption underlying this result is that a higher degree of conservatism renders the high report more informative of high performance. The left panel of Fig. 6 demonstrates these effects graphically. An increase in the level of conservatism and the bonus from (c, w_h) to $\left(c', w'_h\right)$ renders the innovation compensation Ω more sensitive to the innovation's success probability θ, that is, the slope of Ω increases. This shift in Ω increases the manager's incentive to work on the innovation from $a = A/k$ to $a' = (A+B)/k$, but leaves her investment threshold θ_T unchanged.

As long as more conservative accounting increases the informativeness of the high report (that is, $d\frac{p_{hh}}{p_{hl}}/dc > 0$), the board can exploit an increase in c to tie the manager's innovation pay closer to θ, and hence better address the dual problem of inducing effort and efficient investment. This is the case until conservatism reaches $c = e_2$. Increasing c above e_2 does not further increase the information content of the high report, and hence has no effect on contracting.

Alternatively, the board can respond to an increase in c by adjusting the bonus w_h so that the manager's overinvestment incentive declines but her incentive for innovation effort remains constant (as stated in part (ii) of Proposition 3). This case is depicted in the right panel of Fig. 6, where the shift from (c, w_h) to $\left(c'', w''_h\right)$ increases the investment threshold from θ_T to θ''_T but leaves effort incentives unchanged, since $C = D$. The steeper performance sensitivity of Ω implies that the manager's incentive for innovation effort now comes mainly from highly profitable innovations. Thus, the manager is less inclined to overinvest in an innovation while her incentive to spend innovation effort remains unchanged.

Both cases demonstrate that more conservative accounting permits the board to better tackle the twin problems of encouraging the manager to work on innovative ideas and make efficient investment decisions. Since conservatism reduces agency frictions, an increase in c results in more efficient actions and higher firm value, as stated in Proposition 4.

Proposition 4. *For all $c \in [e_1, e_2)$, a higher level of conservatism*

(i) *increases the investment threshold θ^*_T and, hence, reduces overinvestment,*
(ii) *increases innovation effort a^*, and*
(iii) *increases firm value V.*

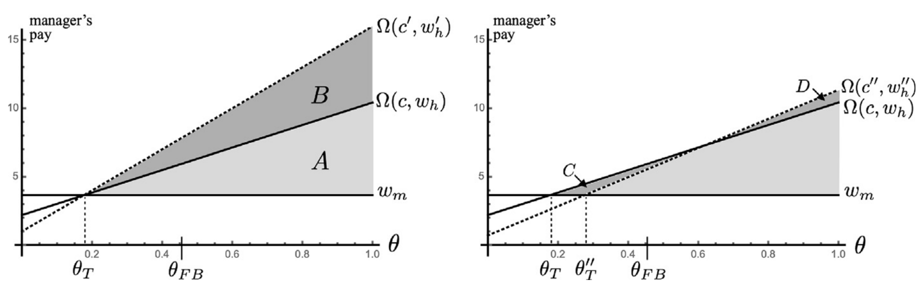

Fig. 6. The left panel demonstrates that an increase in conservatism and the bonus from (c, w_h) to $\left(c', w'_h\right)$ increases effort incentives by B/k, without changing the investment threshold θ_T. The right panel shows that a move to $\left(c'', w''_h\right)$ increases the investment threshold to θ''_T, without changing effort incentives, because $C = D$.

It is instructive to compare these results with the results from Section 5, where we treat the contract as exogenous. When $\theta_T < \theta_{FB}$, an isolated increase in the level of conservatism c has positive and negative effects on the manager's behavior: It reduces incentives for overinvestment but also weakens incentives for innovation effort. Due to this tension, an increase in c can increase or decrease firm value. The situation is different with endogenous contracts. The degree of conservatism is then no longer the only tool to influence the manager's behavior. Instead, the board relies on the manager's pay plan to address the incentive conflicts and the optimal contract balances incentives for innovation effort and incentives for efficient investment. A higher degree of conservatism allows the board to adjust the contract to better address these incentive problems, which renders an increase in c unambiguously valuable. Specifically, as discussed following Proposition 3, as long as a higher degree of conservatism increases the informativeness of the high report ($d\frac{p_{hh}}{p_{hl}}/dc > 0$), the board can exploit more conservative accounting to increase the sensitivity between the manager's innovation compensation Ω and the innovation's success probability θ. The higher pay-performance sensitivity, in turn, allows the board to better tackle the dual problems of inducing innovation effort and inducing efficient investment. As a result, whereas with exogenous contracts, conservatism stifles innovation, the opposite is true with endogenous contracts and an increase in c leads to more innovation effort. The discussion shows that optimal contracting critically changes the role of conservative accounting.

6.3. Optimal accounting system

From Proposition 4 we know that more conservative accounting reduces contracting frictions and yields a higher firm value until c reaches e_2. This result immediately leads to the next corollary.

Corollary 1. *The level of conservatism that maximizes firm value is* $c^* = e_2$

When the level of conservatism is chosen optimally, $c = e_2$, the requirements for issuing a high report R_h are so stringent that the firm can only report R_h if the evidence e clearly supports the good news (that is, $e \geq e_2$). Thus, if there is uncertainty about the output, the firm has to play it safe and understate, rather than overstate, financial performance.

We next determine the optimal pay plan and equilibrium actions when conservatism is chosen optimally. To do so, note that for $c = e_2 \equiv X_l + L$, the conditional probabilities in (1) and (2) change to

$$p_{hh} = \int_{X_l+L}^{X_h+L} g(e|X_h)de \text{ and } p_{hl} = 0, \tag{17}$$

$$p_{lh} = \int_{X_h-L}^{X_l+L} g(e|X_h)de \text{ and } p_{ll} = 1. \tag{18}$$

Substituting these probabilities into (29), (30), (40), (41), and (51) in Appendix D yields the optimal pay plan, managerial actions, and firm value.

Two observations are useful. First, when the level of conservatism is chosen optimally, $c = e_2$, the incentive problems discussed in Section 6.1 still prevail but are less severe relative to the case where $c < e_2$. Thus, the first-best solution cannot be achieved and the optimal contract implements an investment threshold and an innovation effort level below the first-best levels, $\theta_T^* < \theta_{FB}$ and $a^* < a_{FB}$.[12] Second, the fact that the contract can only be contingent on the earnings report R but not on the long-term output X does not negatively affect firm performance when the level of conservatism is chosen optimally (but does reduce firm value if c is suboptimal). Thus, for $c = e_2$, the optimal contract studied here leads to the same equilibrium actions and firm value that would result if the firm were able to write contracts that are directly contingent on long-term output. The reason is that the optimal earnings-based contract rewards the manager only for a high report, and the high report is a clear indicator of high firm performance when $c = e_2$.[13]

6.4. Stock-based compensation

In this subsection, we discuss the role of stock-based compensation. Stock-based compensation can be valuable when the stock price reflects information that cannot be captured in the accounting report R. For example, non-financial information about the long-term demand for the innovation is reflected in the stock price, but not in the accounting report.[14] Specifically, consider a modified setting, where the future output of the innovation X depends on two parameters: the project type, such as the implementability of the project, denoted T, with $T \in \{T_h, T_l\}$, and the long-term demand for the innovation, denoted δ,

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[12] Formally, this can be seen by substituting $c = e_2$ into the first-order conditions for θ_T^* and a^* given in (40) and (41) and comparing these first-order conditions with the first-best actions determined in (14) and (15).

[13] To obtain the optimal solution when X is contractible, we do not need to redo the analysis, but merely set $p_{hh} = 1$ and $p_{ll} = 1$, because the report R is then a one-to-one mapping of the outcome X. When the board contracts on R and chooses c, it can never achieve $p_{hh} = 1$ and $p_{ll} = 1$, as is apparent from (1) and (2). Instead, the optimal level of conservatism, $c = e_2$, leads to $p_{ll} = 1$ and $p_{hh} < 1$, which implies that only the high report, but not the low report, is a perfect indicator of output X. Inspection of (29), (30), (40), and (41) shows that the optimal contract and actions are determined by $\frac{p_{hl}}{p_{hh}-p_{hl}}$. Since $c = e_2$ achieves $p_{hl} = 0$, the optimal earnings-based contract replicates the optimal output-based contract.

[14] We thank the referee for suggesting this discussion.

with $\delta \in \{0, 1\}$. The innovation yields a high output, $X = X_h$, if the project's type and the demand are both high, $T = T_h$ and $\delta = 1$, and a low output, $X = X_l$, otherwise.

The manager's private information θ is now the probability that the project type is high, $T = T_h$. The distribution of θ and the effect of innovation effort a is as in the main setting. The interim accounting report R is informative of the project's type T only. Specifically, equivalent to the base setting, evidence e is given by $e = T + \varepsilon$, where ε is drawn from a distribution with density $g(\varepsilon)$ and positive support over $(-L, L)$. Any evidence e below $e_1 = T_h - L$ indicates a low project type; any evidence above $e_2 = T_l + L$ indicates a high type; and evidence in the range (e_1, e_2) is inconclusive about T. The likelihood ratio $g(e|T_h)/g(e|T_l)$ is non-decreasing in e for all $e \in [e_1, e_2]$, that is, the MLRP holds. As in the main setting, the degree of conservatism c partitions the evidence into a high and low report. When c increases, the high report R_h becomes a more accurate indicator that the project type is high, $T = T_h$, for all $c \in [e_1, e_2)$ and R_h is a perfect indicator of $T = T_h$ if $c = e_2$.

After choosing effort a but before making the investment decision, the manager learns the realizations of θ and δ. Given θ and δ, the new project generates the high output X_h with probability $\delta\theta$ and the low output X_l with probability $(1 - \delta\theta)$. The first-best investment decision is to invest if and only if $\delta = 1$ and $\theta \geq \theta_{FB}$. Assuming the ex ante probability of a high demand $(\delta = 1)$ is $\pi \in (0, 1)$, the first-best effort level is $a_{FB} = \frac{\pi}{k} \int_{\theta_{FB}}^{1} (\theta X_h + (1 - \theta) X_l - X_m) f(\theta) d\theta$.

If the manager's bonus just depends on the report R, the manager will ignore the long-term demand δ and invest even when $\delta = 0$ because the report does not capture this information. Suppose, however, the contract can be based on the interim stock price, denoted P, which is the price that arises after the report R is issued but before the long-term cash flow X is realized. Further, suppose the market is informed about the innovation's long-term demand δ, so that the stock price after investment not only reflects R but also δ and is given by $P(R, \delta)$.

The optimal contract awards the manager the high bonus w_h only when the stock price exceeds the performance target $\overline{P} = P(R_h, 1)$, which is the case when the report and the demand are both high, $R = R_h$ and $\delta = 1$.[15] As before, the manager's pay is w_m when the report is R_m, indicating business as usual (or, alternatively, when the stock price is $P(R_m)$). Linking the high bonus w_h to the stock price P (rather than just the report R) ensures that the manager does not invest in the innovation when there is no long-term demand for it $(\delta = 0)$. The pay plan also has to induce the manager to exert innovation effort and to make an appropriate investment decision based on her private information θ about the project's type. Similar to the base setting, a higher degree of conservatism c is valuable because it permits the board to better tackle these two incentive problems (until $c = e_2$). This follows because the stock price meets the target $\overline{P}$ (which yields the high bonus w_h) only when the accounting report is high and a high report is a more informative indicator of the high project type when the accounting system is more conservative.[16]

7. Discussion and empirical implications

Conservative accounting practices require companies to prepare financial reports with caution and to choose reporting methods that reduce the risk of exaggerated financial statements. In our model, the optimal accounting rule ensures that if there is uncertainty, firms have to play it safe and use methods that understate, rather than overstate, financial performance. However, our model should not be interpreted as predicting that firms will adopt accounting practices that eliminate the risk of overstatements. Rather, the goal of our model is to identify one benefit of conservative accounting that has been overlooked in the literature, namely that conservatism can help encourage innovation in organizations. In practice, other forces will also influence the firm's choice of conservatism, such as the legal liability environment, the manager's ability to engage in earnings manipulation, and the firm's desire to raise debt. For example, Gigler et al. (2009) show in a debt contracting setting in which the lender receives control rights when debt covenants are violated that the optimal accounting system can be aggressive. Bertomeu et al. (2017) and Caskey and Laux (2017) show that conservative accounting practices can increase managers' incentives to engage in costly manipulation of earnings reports, which renders conservative accounting less desirable. The ultimate level of conservatism that firms will choose will balance these competing forces.

The main predictions of our model are directional. Specifically, our model suggests that adopting more conservative accounting practices will lead to (i) stronger managerial incentives to develop innovative ideas, and (ii) weaker incentives to invest in new ideas that have a negative net present value. A large empirical literature studies the effects of conservative accounting on corporate investments and finds evidence of a negative relation between conservatism and overinvestment, consistent with our model.[17]

To the best of our knowledge, the working paper by Chang et al. (2015) is the only empirical study that examines the association between conservatism and innovation in organizations. Using the number of patents and patent citations as a proxy for the level of innovation, Chang et al. (2015) find a negative relation between conservatism and innovation. They argue that managers are under pressure to meet short-term performance targets, and conservative accounting adds to this

[15] Assuming the firm has N outstanding shares of stock, the stock price $P(R_h, 1)$ is given by $E[X|R_h, 1]/N = (\Pr(X_h|R_h, 1)X_h + \Pr(X_l|R_h, 1)X_l)/N$, with $\Pr\ (X_h|R_h,\ 1) = \frac{\frac{p_{hh}}{p_{hl}}}{\frac{p_{hh}}{p_{ll}} + \frac{\int_{\theta_T}^{1}(1-\theta)f(\theta)d\theta}{\int_{\theta_T}^{1}\theta f(\theta)d\theta}}$ and $\Pr(X_l|R_h,\ 1) = 1 - \Pr(X_h|R_h,\ 1)$.

[16] Note that the stock price $\overline{P} = P(R_h, 1)$ increases in conservatism c and equals $P(R_h, 1) = X_h/N$ when $c = e_2$, where N is the number of outstanding shares.

[17] See, e.g., Francis and Martin (2010), Bushman et al. (2011), Ball and Shivakumar (2005), and Garcia Lara et al. (2016).

pressure, which causes managers to forego investments in innovation (similar to the intuition behind real earnings management). The empirical findings in Chang et al. (2015) do not contradict our theory, as the number of patents and patent citations are unlikely to capture the type of innovation we have in mind. In our model, the manager either continues with business as usual or implements an innovation. For example, a consumer electronics company can venture out into new technologies, products, and markets that depart from their existing business model (think of Apple creating the iPhone). This type of innovation changes the direction of the firm and is highly risky and disruptive. Alternatively, the firm can continue with business as usual, which will likely lead to improvements of existing products and services (think of Apple's yearly update of the iPhone). Since both types of activities generate patents, the number of patents is not a useful proxy for the type of innovation our model addresses. Balsmeier et al. (2017) have developed new, more refined measures of innovation to distinguish between exploration of new technologies and exploitation of well-known technologies. For example, they argue that patents that cite other patents owned by the same company are based on existing knowledge, while patents that do not cite other patents are more explorative. These more refined measures of innovation could be used to test our theory, and we encourage empirical researchers to do so.

8. Conclusion

Innovation and conservatism seem to be conflicting concepts: Innovation involves risk taking and discovery, while conservatism embodies caution and risk avoidance. In this paper, we argue that conservatism can nevertheless foster innovation. Our model of innovation involves a manager who must first exert costly effort to develop a viable innovation and then decide whether to implement the innovation based on private information about its success probability. Due to the long-term nature of innovation, the manager is paid based on an interim accounting report that is informative about the economic performance of the firm.

We first discuss the effects of conservative accounting on managerial behavior, assuming that the manager's pay plan is exogenously fixed. More conservatism reduces the probability that risky investments yield high earnings reports, and therefore weakens the manager's incentive to spend effort working on new ideas ex ante. Further, conservatism increases the profitability threshold above which the manager invests in a new idea, which either increases or decreases investment efficiency, depending on whether the manager is initially tempted to overinvest or underinvest in the innovation. The effect of conservatism on firm value is therefore ambiguous. These findings are broadly consistent with informal arguments in the literature.

Corporate boards, however, design optimal incentive pay plans, and these plans change when the accounting system changes. When designing the optimal contract, the board faces the challenge of providing the manager with incentives to spend effort on innovative ideas without inducing her to subsequently overinvest in a new idea. We find that conservative accounting allows the board to link the manager's compensation more closely to the performance of the innovation, which alleviates the tension between inducing innovation effort and inducing efficient investment, and hence leads to more efficient actions. As a result, in equilibrium, more conservative accounting (i) increases the manager's incentive to work on innovative ideas, (ii) reduces her incentive to overinvest in an innovation, and (iii) increases firm value. These results stand in contrast to the standard arguments offered in the literature.

Our model highlights the dangers of evaluating changes in accounting practices in isolation from other governance instruments. Boards have multiple tools to control managerial behavior, and one important tool is incentive contracting. Although conservatism impedes innovation when all else is held constant, we find that this result flips when one takes into account that incentive contracts are optimally adjusted in response to changes in the reporting environment. This demonstrates that changes in accounting practices should not be evaluated in a vacuum, but in conjunction with other governance tools.

Appendix A. Verifiable Profitability

In this appendix, we consider the case in which the manager's information θ is observable and verifiable so that the report R can be based on θ. Consider the following reporting system. If the project is implemented, the report is high, $R = R_h$, if $\theta \geq c$, and low, $R = R_l$, if $\theta < c$. If the firm continues the status quo, the report is R_m. The optimal contract awards the manager a bonus $w_h > 0$ when the report is high, $R = R_h$, and pays her zero otherwise, that is, $w_l = w_m = 0$. The optimal value of c is any value that satisfies $c \geq \theta_{FB}$.

This pay plan induces the manager to spend innovation effort without encouraging her to overinvest in the innovation. That is, the goal of inducing effort does not interfere with the goal of inducing efficient investment (which stands in contrast to the main model where θ is not observable). To see why the manager makes the desired investment decision note that for all $\theta \geq c$, the manager prefers to invest in the project to obtain w_h, which is efficient since $c \geq \theta_{FB}$. For all $\theta < c$, the manager is indifferent between implementing the innovation and continuing the status quo (because in both cases she obtains zero). Assuming the manager behaves in the best interest of the firm when indifferent, she will implement the project if and only if $\theta \geq \theta_{FB}$.

The only remaining incentive problem is to provide the manager with incentives to work on the innovation. Given w_h, the manager's effort choice is

$$a = \int_c^1 w_h f(\theta)d\theta/k. \tag{19}$$

The board's goal is to maximize the expected cash flows minus the manager's expected pay

$$a\left(\int_{\theta_{FB}}^1 (\theta X_h + (1-\theta)X_l)f(\theta)d\theta + F(\theta_{FB})X_m\right) + (1-a)X_m - a\int_c^1 w_h f(\theta)d\theta. \tag{20}$$

Substituting (19) into (20) and taking the first-order condition with respect to a yields

$$\left(\int_{\theta_{FB}}^1 (\theta X_h + (1-\theta)X_l)f(\theta)d\theta + F(\theta_{FB})X_m\right) - X_m - 2ka = 0, \tag{21}$$

which determines the optimal innovation effort, denoted $a^{\#}$. Using (15), equation (21) simplifies to $a^{\#} = 0.5a_{FB}$. The optimal pay w_h is then $w_h = ka^{\#}/(\int_c^1 f(\theta)d\theta)$, the manager's expected pay is $a^{\#}\int_c^1 w_h f(\theta)d\theta = k(a^{\#})^2$, and the value of the firm is

$$a^{\#}\left(\int_{\theta_{FB}}^1 (\theta X_h + (1-\theta)X_l)f(\theta)d\theta + F(\theta_T)X_m - X_m\right) + X_m - k(a^{\#})^2.$$

Two observations are useful. First, the board implements the first-best investment decision but not first-best effort. When the board induces a certain effort level a, the manager receives an expected compensation of $V = ka^2$, but the actual effort cost is $0.5ka^2$, leaving the manager with a utility of $V - 0.5ka^2 = 0.5ka^2$. To economize on the manager's rents, the board induces an innovation effort level that lies below first-best, that is, $a^{\#} = 0.5a_{FB}$.

Second, the level of conservatism c plays no role as long as $c \geq \theta_{FB}$. Thus, any $c \geq \theta_{FB}$ constitutes an optimal reporting system. The intuition for this finding is as follows. When the degree of conservatism c increases, the manager is less likely to receive the bonus w_h, which reduces her effort incentive (as is apparent from (19)). To restore effort incentives, the board has to offer a higher bonus w_h. The increase in w_h perfectly offsets the effect of an increase in c such that the expected pay to the manager remains unchanged. As a result, the cost of inducing innovation effort a is independent from c.

Appendix B. Communication

In this appendix, we consider a direct revelation mechanism, in which the investment decision and payments to the manager are contingent on the manager's message $\widehat{\theta}$. After the manager exerts effort a, she learns $\theta \in [0,1]$. At the beginning of the game, the board commits to a menu of contracts $M = (I(\widehat{\theta}), w_h(\widehat{\theta}), w_l(\widehat{\theta}), w_m(\widehat{\theta}))$. By sending a message $\widehat{\theta}$, the manager selects a contract from the menu. The parameter $I(\widehat{\theta}) \in \{0,1\}$ is an indicator variable that denotes whether the new investment idea is pursued. If $I = 1$, the project is implemented and if $I = 0$, the project is rejected. $w_h(\widehat{\theta})$ or $w_l(\widehat{\theta})$ are the payments to the manager if the project is implemented and the accounting report is high R_h or low R_l, respectively. $w_m(\widehat{\theta})$ is the pay if the project is rejected. By the revelation principle, we can restrict attention to contracts that induce the manager to truthfully reveal her private information. In the optimal mechanism, for any two messages $\widehat{\theta}_i$ and $\widehat{\theta}_j$ for which the board rejects the project, $I(\widehat{\theta}_i) = I(\widehat{\theta}_j) = 0$, the manager must receive the same pay $w_m(\widehat{\theta}_i) = w_m(\widehat{\theta}_j) \geq 0$. Otherwise, if $w_m(\widehat{\theta}_i) > w_m(\widehat{\theta}_j)$ and $I(\widehat{\theta}_i) = I(\widehat{\theta}_j) = 0$, the manager would announce $\widehat{\theta}_i$ even when $\widehat{\theta}_j$ is true. Equivalently, since the optimal contract does not reward the manager for poor performance, $w_l = 0$, the manager must receive $w_h(\widehat{\theta}_i) = w_h(\widehat{\theta}_j)$ for all $\widehat{\theta}_i, \widehat{\theta}_j$ for which $I(\widehat{\theta}_i) = I(\widehat{\theta}_j) = 1$.

Further, the optimal mechanism involves a cutoff θ_T such that $I = 0$ if $\widehat{\theta} \in [0, \theta_T)$ and $I = 1$ if $\widehat{\theta} \in [\theta_T, 1]$. This follows because if $I(\widehat{\theta}_i) = 1$, then it must be that $I(\widehat{\theta}_j) = 1$ for all $\widehat{\theta}_j > \widehat{\theta}_i$. Suppose to the contrary that $I(\widehat{\theta}_i) = 1$, $I(\widehat{\theta}_j) = 0$, and $\widehat{\theta}_j > \widehat{\theta}_i$. The incentive compatibility for truthtelling requires that $(\theta_i p_{hh} + (1-\theta_i)p_{hl})w_h \geq w_m$ and $w_m \geq (\theta_j p_{hh} + (1-\theta_j)p_{hl})w_h$. If the first condition is satisfied, the second is violated and vice versa, since $\theta_j > \theta_i$ and $p_{hh} > p_{hl}$.

As a consequence, the mechanism M can be replicated by the simple contract (w_h, w_m, w_l), in which payments are independent of the manager's message $\widehat{\theta}$ and the manager makes the investment decision (rather than sending a message that determines the investment decision).

Appendix C. Properties of Conservatism

We prove that the conditional probabilities in (1) and (2) imply properties (A1) to (A3). Rewriting the conditional probability p_{hl} from (1) as $p_{hl} = \int_{c+X_h-X_l}^{X_h+L} g(e|X_h)de$ and the conditional probability p_{ll} from (2) as $p_{ll} = \int_{X_h-L}^{c+X_h-X_l} g(e|X_h)de$ shows that

$$p_{hh} = \int_c^{X_h+L} g(e|X_h)de > p_{hl}$$

and

$$p_{ll} > p_{lh} = \int_{X_h-L}^{c} g(e|X_h)de,$$

implying (A1).
Taking the first derivatives of the conditional probabilities in (1) and (2) yields $\frac{dp_{lh}}{dc} = g(e|X_h) > 0$ and $\frac{dp_{ll}}{dc} = g(e|X_l) > 0$, implying (A2).

Finally, using (1) and (2), we obtain

$$\frac{d\frac{p_{hh}}{p_{hl}}}{dc} = \frac{-g(c|X_h)}{\int_c^{X_l+L} g(e|X_l)de} + g(c|X_l)\frac{\int_c^{X_h+L} g(e|X_h)de}{\left(\int_c^{X_l+L} g(e|X_l)de\right)^2}$$

$$= \frac{\int_c^{X_l+L}\left(g(c|X_l)\left(\frac{g(e|X_h)}{g(e|X_l)} - \frac{g(c|X_h)}{g(c|X_l)}\right)g(e|X_l)\right)de + g(c|X_l)\int_{X_l+L}^{X_h+L} g(e|X_h)de}{\left(\int_c^{X_l+L} g(e|X_l)de\right)^2}.$$

Due to the MLRP ($d\frac{g(e|X_h)}{g(e|X_l)}/de \geq 0$ for $e \in [e_1, e_2]$) and due to $c < X_l + L$, the term $\int_c^{X_l+L} g(c|X_l)\left(\frac{g(e|X_h)}{g(e|X_l)} - \frac{g(c|X_h)}{g(c|X_l)}\right)g(e|X_l)de$ is nonnegative. Hence, $d\frac{p_{hh}}{p_{hl}}/dc > 0$. The Proof that $d\frac{p_{lh}}{p_{ll}}/dc > 0$ is equivalent and hence is omitted. This establishes (A3).

Appendix D. Proofs

Proof of Proposition 1. Combine (4) and (5) with (8) to get

$$\theta_T p_{hh} + (1-\theta_T)p_{hl} = \frac{w_m - w_l}{w_h - w_l}. \tag{22}$$

Using the implicit function theorem generates

$$\frac{d\theta_T}{dc} = -\frac{\theta_T\frac{dp_{hh}}{dc} + (1-\theta_T)\frac{dp_{hl}}{dc}}{p_{hh} - p_{hl}} > 0, \tag{23}$$

which is positive since $\frac{dp_{hh}}{dc} < 0$ and $\frac{dp_{hl}}{dc} < 0$ from condition (A2).

Using (11), we obtain

$$\frac{da}{dc} = -\frac{1}{k}(\theta_T E[w|X_h] + (1-\theta_T)E[w|X_l] - w_m)f(\theta_T)\frac{d\theta_T}{dc} + \frac{(w_h - w_l)}{k}\int_{\theta_T}^{1}\left(\theta\frac{dp_{hh}}{dc} - (1-\theta)\frac{dp_{ll}}{dc}\right)f(\theta)d\theta < 0. \tag{24}$$

The first line in (24) is zero since the manager's optimal choice of θ_T solves (8), and the second line in (24) is negative since $\frac{dp_{hh}}{dc} < 0$ and $\frac{dp_{ll}}{dc} > 0$ from (A2).

Using (4) and (5), we can write (10) as

$$\Psi = a\int_{\theta_T}^{1}(\theta(p_{hh}w_h + p_{lh}w_l) + (1-\theta)(p_{hl}w_h + p_{ll}w_l) - w_m)f(\theta)d\theta + w_m. \tag{25}$$

Taking the first derivative with respect to c yields

$$\begin{aligned}\frac{d\Psi}{dc} = & \frac{da}{dc}\int_{\theta_T}^{1}(\theta(p_{hh}w_h + p_{lh}w_l) + (1-\theta)(p_{hl}w_h + p_{ll}w_l) - w_m)f(\theta)d\theta \\ & - a(\theta_T(p_{hh}w_h + p_{lh}w_l) + (1-\theta_T)(p_{hl}w_h + p_{ll}w_l) - w_m)f(\theta_T)\frac{d\theta_T}{dc} \\ & + a(w_h - w_l)\int_{\theta_T}^{1}\left(\theta\frac{dp_{hh}}{dc} + (1-\theta)\frac{dp_{hl}}{dc}\right)f(\theta)d\theta.\end{aligned} \tag{26}$$

The second line in (26) is zero from equation (8). The first line is negative since we just established that $\frac{da}{dc} < 0$, and the third line is negative since $\frac{dp_{hh}}{dc} < 0$ and $\frac{dp_{hl}}{dc} < 0$ from (A2). Using (11), we can simplify (26) to

$$\frac{d\Psi}{dc} = \frac{da}{dc}ka + a(w_h - w_l)\int_{\theta_T}^{1}\left(\theta\frac{dp_{hh}}{dc} + (1-\theta)\frac{dp_{hl}}{dc}\right)f(\theta)d\theta, \tag{27}$$

and using (24), we obtain

$$\frac{d\Psi}{dc} = 2\frac{da}{dc}ka < 0. \tag{28}$$

Proof of Proposition 2. To determine the equilibrium actions, we proceed in two steps. In the first, we specify the least costly contract that implements a certain effort level and investment threshold combination (a, θ_T). In the second step, we solve for the optimal (a^*, θ_T^*) combination, given that the board will choose the least expensive contract for any (a, θ_T). The next lemma presents the results from the first step.

Lemma 1. *Let $\{w_i^*(\theta_T, a)\}_{i=h,m,l}$ denote the least costly contract that elicits innovation effort a and the investment threshold θ_T. Then,*

$$w_h^*(\theta_T, a) = \frac{ak}{(p_{hh} - p_{hl})\left(\int_{\theta_T}^{1}(\theta - \theta_T)f(\theta)d\theta\right)}, \tag{29}$$

$$w_m^*(\theta_T, a) = (\theta_T p_{hh} + (1-\theta_T)p_{hl})w_h^* \text{ and } w_l^*(\theta_T, a) = 0, \tag{30}$$

and the expected compensation $\Psi(\theta_T, a)$ and the manager's utility $U(\theta_T, a)$ are

$$\Psi(\theta_T, a) = ka^2 + w_m^*(\theta_T, a), \tag{31}$$

$$U(\theta_T, a) = 0.5ka^2 + w_m^*(\theta_T, a). \tag{32}$$

Proof: The pay w_m is determined by the investment condition (8), and is given by

$$w_m = \theta_T E[w|X_h] + (1-\theta_T)E[w|X_l]. \tag{33}$$

Substituting (33) into the effort constraint (11) yields

$$a = \frac{1}{k}\int_{\theta_T}^{1}(\theta - \theta_T)(E[w|X_h] - E[w|X_l])f(\theta)d\theta. \tag{34}$$

After inserting (4) and (5) into (34) and rearranging, we obtain

$$(w_h - w_l) = \frac{ak}{(p_{hh} - p_{hl})\int_{\theta_T}^{1}(\theta - \theta_T)f(\theta)d\theta}. \tag{35}$$

Substituting (35) into (33) yields

$$w_m = \frac{\theta_T + \frac{p_{hl}}{p_{hh} - p_{hl}}}{\left(\int_{\theta_T}^{1} (\theta - \theta_T) f(\theta) d\theta \right)} ak + w_l. \tag{36}$$

Substituting (11) and (36) into (10) yields the manager's expected compensation when the board implements (a, θ_T)

$$\Psi = a^2 k + \frac{\theta_T + \frac{p_{hl}}{p_{hh} - p_{hl}}}{\left(\int_{\theta_T}^{1} (\theta - \theta_T) f(\theta) d\theta \right)} ak + w_l. \tag{37}$$

From (37) it immediately follows that $w_l = 0$ is optimal (given the limited liability constraint $w_l \geq 0$). Using (36) and setting $w_l = 0$, we obtain (31).

Step 2: Substituting (31) into the board's utility function (13), we can write the board's problem as

$$\max_{a, \theta_T, w_l} V \equiv a \left(\int_{\theta_T}^{1} (\theta X_h + (1-\theta) X_l) f(\theta) d\theta + F(\theta_T) X_m \right) + (1-a) X_m \tag{38}$$

$$- \left(ka^2 + \frac{\theta_T + \frac{p_{hl}}{p_{hh} - p_{hl}}}{\int_{\theta_T}^{1} (\theta - \theta_T) f(\theta) d\theta} ka \right),$$

subject to the manager's participation constraint

$$U = 0.5ka^2 + \frac{\theta_T + \frac{p_{hl}}{p_{hh} - p_{hl}}}{\left(\int_{\theta_T}^{1} (\theta - \theta_T) f(\theta) d\theta \right)} ka \geq \underline{U}. \tag{39}$$

As discussed in Section 2, the limited liability constraints imply that the board has to rely on rewards to provide incentives (and cannot use punishments), which yields the manager a positive utility. If the manager's reservation utility is not larger than a certain threshold, denoted $\underline{U}_T$, she enjoys an economic rent, that is, the participation constraint is slack. In what follows, we assume that this is the case and determine $\underline{U}_T$ below.

Taking the first-order conditions for θ_T and a yields

$$\frac{\partial V}{\partial \theta_T} = -(\theta_T X_h + (1-\theta_T) X_l - X_m) f(\theta_T) \tag{40}$$

$$- \frac{k}{\int_{\theta_T}^{1} (\theta - \theta_T) f(\theta) d\theta} \left(1 + \int_{\theta_T}^{1} f(\theta) d\theta \frac{\theta_T + \frac{p_{hl}}{(p_{hh} - p_{hl})}}{\int_{\theta_T}^{1} (\theta - \theta_T) f(\theta) d\theta} \right) = 0,$$

and

$$\frac{\partial V}{\partial a} = \int_{\theta_T}^{1} (\theta X_h + (1-\theta) X_l - X_m) f(\theta) d\theta \tag{41}$$

$$- \left(2a + \frac{\theta_T + \frac{p_{hl}}{(p_{hh} - p_{hl})}}{\int_{\theta_T}^{1} (\theta - \theta_T) f(\theta) d\theta} \right) k = 0.$$

Since $\theta_{FB}X_h + (1-\theta_{FB})X_l = X_m$ by definition, equation (40) implies $\theta_T^* < \theta_{FB}$. Equation (41) implies

$$a^* = 0.5\left(\frac{1}{k}\int_{\theta_T^*}^{1}(\theta X_h + (1-\theta)X_l - X_m)f(\theta)d\theta - \frac{\theta_T^* + \frac{p_{hl}}{p_{hh}-p_{hl}}}{\int_{\theta_T^*}^{1}(\theta-\theta_T^*)f(\theta)d\theta}\right), \tag{42}$$

where (a^*, θ_T^*) are the optimal actions. Using

$$a_{FB} = \frac{1}{k}\int_{\theta_{FB}}^{1}(\theta X_h + (1-\theta)X_l - X_m)f(\theta)d\theta,$$

we obtain

$$a^* = 0.5\left(a_{FB} + \frac{1}{k}\int_{\theta_T^*}^{\theta_{FB}}(\theta X_h + (1-\theta)X_l - X_m)f(\theta)d\theta - \frac{\theta_T + \frac{p_{hl}}{p_{hh}-p_{hl}}}{\int_{\theta_T^*}^{1}(\theta-\theta_T^*)f(\theta)d\theta}\right). \tag{43}$$

Since $(\int_{\theta_T^*}^{\theta_{FB}}(\theta X_h + (1-\theta)X_l - X_m)f(\theta)d\theta) < 0$, it follows that $a^* < 0.5a_{FB}$. The result that $a^* < 0.5a_{FB}$ is an artifact of the quadratic effort cost function, the limited liability assumption, and the fact that the board has to deal with the dual problems of inducing effort and inducing efficient investment.

The second-order conditions for a maximum are satisfied if

$$\frac{\partial^2 V}{\partial\theta_T^2}\frac{\partial^2 V}{\partial a^2} - \left(\frac{\partial^2 V}{\partial\theta_T\partial a}\right)^2 > 0, \tag{44}$$

$$\frac{\partial^2 V}{\partial a^2} < 0, \tag{45}$$

where $\frac{\partial^2 V}{\partial\theta_T\partial a} = 0$, $\frac{\partial^2 V}{\partial a^2} = -2k$ and

$$\begin{aligned}\frac{\partial^2 V}{\partial\theta_T^2} = &-(X_h - X_l)f(\theta_T) - (\theta_T X_h + (1-\theta_T)X_l - X_M)\frac{df(\theta_T)}{d\theta_T}\\ &-\frac{k\left(\theta_T + \frac{p_{hl}}{p_{hh}-p_{hl}}\right)}{\left(\int_{\theta_T}^{1}(\theta-\theta_T)f(\theta)d\theta\right)^2}\left[\frac{2\left(\int_{\theta_T}^{1}f(\theta)d\theta\right)^2 - f(\theta_T)\int_{\theta_T}^{1}(\theta-\theta_T)f(\theta)d\theta}{\int_{\theta_T}^{1}(\theta-\theta_T)f(\theta)d\theta}\right]\\ &-\frac{2k\int_{\theta_T}^{1}f(\theta)d\theta}{\left(\int_{\theta_T}^{1}(\theta-\theta_T)f(\theta)d\theta\right)^2}.\end{aligned} \tag{46}$$

Conditions (44) and (45) are therefore satisfied when $\frac{\partial^2 V}{\partial\theta_T^2} < 0$. We obtain $\frac{\partial^2 V}{\partial\theta_T^2} < 0$, for example, when the marginal cost of effort, k, is sufficiently high, because the term in square brackets in (46) is positive.

Using (39), the manager's participation constraint is indeed slack (as initially assumed) when her reservation utility $\underline{U}$ is not larger than

$$\underline{U}_T \equiv 0.5ka^{*2} + \frac{\theta_T^* + \frac{p_{hl}}{p_{hh}-p_{hl}}}{\int_{\theta_T^*}^{1}(\theta-\theta_T^*)f(\theta)d\theta}ka^*,$$

where θ_T^* and a^* are determined by the first-order conditions (40) and (41). Substituting (41) into $\underline{U}_T$ yields

$$\underline{U}_T = \left(a^* \int_{\theta_T^*}^{1} (\theta X_h + (1-\theta)X_l - X_m) f(\theta) d\theta - 0.5ka^{*2} \right) - ka^{*2}. \tag{47}$$

The term in parentheses in (47) is the total surplus associated with innovation effort, that is, the increase in expected cash flows from the manager's innovation effort a^* minus her personal cost of effort.

Proof of Proposition 3. We first show that an increase in c and w_h allows the board to increase the manager's incentive to work on the innovation without increasing her incentive to overinvest in the innovation; that is, a increases but θ_T remains unchanged. Solving the investment constraint (8) for w_h and setting $w_l = 0$ yields

$$w_h(\theta_T) = \frac{w_m}{(\theta_T p_{hh} + (1-\theta_T) p_{hl})}.$$

As c increases, the bonus $w_h(\theta_T)$ must increase to maintain the investment threshold θ_T. Inserting $w_h(\theta_T)$ into the effort constraint (11) and setting $w_l = 0$ yields, after some rearranging,

$$a = \frac{1}{k} \int_{\theta_T}^{1} \left(\frac{\theta \frac{p_{hh}}{p_{hl}} + (1-\theta)}{\theta_T \frac{p_{hh}}{p_{hl}} + (1-\theta_T)} - 1 \right) w_m f(\theta) d\theta.$$

Taking the first derivative shows that an increase in c increases the effort level a:

$$\frac{da}{dc} = \frac{d\frac{p_{hh}}{p_{hl}}}{dc} \frac{\int_{\theta_T}^{1} (\theta - \theta_T) f(\theta) d\theta}{k\left(\theta_T \frac{p_{hh}}{p_{hl}} + (1-\theta_T)\right)^2} w_m > 0,$$

since $\frac{d\frac{p_{hh}}{p_{hl}}}{dc} > 0$. Thus, an increase in c (and the subsequent increase in w_h that is required to keep the investment threshold θ_T unchanged) increases the manager's incentive to work on the innovation.

Alternatively, the board can increase c and w_h to reduce the manager's incentive to overinvest in the innovation without reducing her effort incentive; that is, θ_T increases but a remains unchanged. Solving effort constraint (11) for w_h and setting $w_l = 0$ yields

$$w_h(a) = \frac{ka + w_m \int_{\theta_T}^{1} f(\theta) d\theta}{\int_{\theta_T}^{1} (\theta p_{hh} + (1-\theta) p_{hl}) f(\theta) d\theta}. \tag{48}$$

Note that as c increases, the bonus $w_h(a)$ must increase to maintain the effort level a. Substituting (48) into the investment constraint (8) with $\Pr(X_h|R_h, 1) = \frac{\frac{p_{hh}}{p_{hl}}}{\frac{p_{hh}}{p_{hl}} + \frac{\int_{\theta_T^*}^{1} (1-\theta) f(\theta) d\theta}{\int_{\theta_T^*}^{1} \theta f(\theta) d\theta}}$ and rearranging yields

$$Q \equiv \left(\theta_T \frac{p_{hh}}{p_{hl}} + (1-\theta_T) \right) \frac{ka + w_m \int_{\theta_T}^{1} f(\theta) d\theta}{\int_{\theta_T}^{1} \left(\theta \frac{p_{hh}}{p_{hl}} + (1-\theta) \right) f(\theta) d\theta} - w_m = 0. \tag{49}$$

Using the implicit function theorem, we obtain

$$\frac{d\theta_T}{dc} = -\frac{dQ/dc}{dQ/d\theta_T},$$

where

$$\frac{dQ}{dc} = -\frac{\left(ka + w_m\int_{\theta_T}^{1} f(\theta)d\theta\right)\left(\int_{\theta_T}^{1}(\theta-\theta_T)f(\theta)d\theta\right)}{\left(\int_{\theta_T}^{1}\left(\theta\frac{p_{hh}}{p_{hl}} + (1-\theta)\right)f(\theta)d\theta\right)^2}\frac{d\frac{p_{hh}}{p_{hl}}}{dc} < 0,$$

and

$$\frac{dQ}{d\theta_T} = \left(\frac{p_{hh}}{p_{hl}} - 1\right)\frac{ka + w_m\int_{\theta_T}^{1} f(\theta)d\theta}{\int_{\theta_T}^{1}\left(\theta\frac{p_{hh}}{p_{hl}} + (1-\theta)\right)f(\theta)d\theta}$$

$$+\left(\theta_T\frac{p_{hh}}{p_{hl}} + (1-\theta_T)\right)f(\theta_T)\frac{\left(\theta_T\frac{p_{hh}}{p_{hl}} + (1-\theta_T)\right)\left(ka + w_m\int_{\theta_T}^{1} f(\theta)d\theta\right)}{\left(\int_{\theta_T}^{1}\left(\theta\frac{p_{hh}}{p_{hl}} + (1-\theta)\right)f(\theta)d\theta\right)^2}$$

$$+\left(\theta_T\frac{p_{hh}}{p_{hl}} + (1-\theta_T)\right)\frac{-w_m f(\theta_T)}{\int_{\theta_T}^{1}\left(\theta\frac{p_{hh}}{p_{hl}} + (1-\theta)\right)f(\theta)d\theta},$$

which using (49) simplifies to

$$\frac{dQ}{d\theta_T} = \left(\frac{p_{hh}}{p_{hl}} - 1\right)\frac{ka + w_m\int_{\theta_T}^{1} f(\theta)d\theta}{\int_{\theta_T}^{1}\left(\theta\frac{p_{hh}}{p_{hl}} + (1-\theta)\right)f(\theta)d\theta} > 0.$$

These calculations show that $\frac{d\theta_T}{dc} > 0$, implying that an increase in c (and the subsequent increase in w_h required to preserve effort incentives) increases the manager's investment threshold θ_T.

Proof of Proposition 4. Differentiating the first-order condition (40) with respect to c yields

$$\frac{\partial^2 V}{\partial\theta_T^2}\frac{\partial\theta_T^*}{\partial c} + \frac{\partial^2 V}{\partial\theta_T\partial a}\frac{\partial a^*}{\partial c} + \frac{\partial^2 V}{\partial\theta_T\partial c} = 0,$$

where $\frac{\partial^2 V}{\partial\theta_T\partial a} = 0$ and

$$\frac{\partial^2 V}{\partial\theta_T\partial c} = \frac{\frac{d\frac{p_{hh}}{p_{hl}}}{dc}\int_{\theta_T}^{1} f(\theta)d\theta}{\left(\frac{p_{hh}}{p_{hl}} - 1\right)^2\left(\int_{\theta_T}^{1}(\theta-\theta_T)f(\theta)d\theta\right)^2}k > 0, \tag{50}$$

which is positive because $d\frac{p_{hh}}{p_{hl}}/dc > 0$ from (A3) and $\frac{p_{hh}}{p_{hl}} > 1$ from (A1). Further, $\frac{\partial^2 V}{\partial\theta_T^2} < 0$ by the second-order condition for a maximum.

Differentiating the first-order condition (41) with respect to c yields:

$$\frac{\partial^2 V}{\partial a^2}\frac{\partial a^*}{\partial c} + \frac{\partial^2 V}{\partial a\partial\theta_T}\frac{\partial\theta_T^*}{\partial c} + \frac{\partial^2 V}{\partial a\partial c} = 0,$$

where

$$\frac{\partial^2 V}{\partial a^2} = -2k, \quad \frac{\partial^2 V}{\partial a \partial c} = \frac{\frac{d\frac{p_{hh}}{p_{hl}}}{dc}k}{\left(\frac{p_{hh}}{p_{hl}} - 1\right)^2 \int_{\theta_T}^1 (\theta - \theta_T) f(\theta) d\theta} > 0, \text{ and } \frac{\partial^2 V}{\partial a \partial \theta_T} = 0.$$

Since $d\frac{p_{hh}}{p_{hl}}/dc > 0$ from (A3) and $\frac{p_{hh}}{p_{hl}} > 1$ from (A1), $\frac{\partial^2 V}{\partial a \partial c} > 0$. We therefore obtain

$$\frac{\partial \theta_T^*}{\partial c} = -\frac{\frac{\partial^2 V}{\partial \theta_T \partial c}}{\frac{\partial^2 V}{\partial \theta_T^2}} > 0 \text{ and } \frac{\partial a^*}{\partial c} = -\frac{\frac{\partial^2 V}{\partial a \partial c}}{\frac{\partial^2 V}{\partial a^2}} > 0.$$

In the optimal solution, firm value is

$$V(a, \theta_T, c) = CF(a, \theta_T) - \Psi(a, \theta_T, c), \tag{51}$$

where the levels of a and θ_T satisfy the first-order conditions (40) and (41). The expected cash flow CF is given in (12). From Proposition 1, the expected compensation is

$$\Psi(\theta_T, a, c) = ka^2 + \frac{\left(\theta_T + \frac{p_{hl}}{p_{hh} - p_{hl}}\right) ak}{\int_{\theta_T}^1 (\theta - \theta_T) f(\theta) d\theta}.$$

By the envelope theorem,

$$\frac{dV(c)}{dc} = \left.\frac{\partial V(\theta_T, a, c)}{\partial c}\right|_{\substack{\theta_T = \theta_T^*(c) \\ a = a^*(c)}} \tag{52}$$

where $\theta_T^*(c)$ and $a^*(c)$ are the optimal solutions for any given c. We now obtain

$$\frac{dV(c)}{dc} = -\left.\frac{\partial \Psi(\theta_T, a, c)}{\partial c}\right|_{\substack{\theta_T = \theta_T^*(c) \\ a = a^*(c)}} > 0, \tag{53}$$

where

$$\frac{\partial \Psi(\theta_T, a, c)}{\partial c} = -\frac{d\frac{p_{hh}}{p_{hl}}}{dc} \frac{ak}{\left(\frac{p_{hh}}{p_{hl}} - 1\right)^2 \int_{\theta_T}^1 (\theta - \theta_T) f(\theta) d\theta}$$

is negative since $d\frac{p_{hh}}{p_{hl}}/dc > 0$ from (A3).

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The mediating role of board size, philanthropy and working capital management between basic corporate governance factors and firm's performance

Muhammad Naeem Shahid and Aamir Abbas
Government College University, Chiniot Campus, Faisalabad, Pakistan
Khalid Latif
College of Commerce, Government College University, Faisalabad, Pakistan
Ayesha Attique
Government College University, Faisalabad, Pakistan, and
Safwan Khalid
Government College University, Chiniot Campus, Faisalabad, Pakistan

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Abstract

Purpose – This study aims to identify the impact of corporate governance on performance of sugar mills. In order to study this relation, a model is constructed in which ownership structure and independent directors are taken as independent variables. Whereas firm performance is analyzed by using proxy variables such as return on asset (ROA), return on equity (ROE) and sales growth. Moreover, size of board, working capital management (WCM) and philanthropy are taken as mediating variables between governance variables and firm performance.

Design/methodology/approach – The data of 32 sugar mills listed at Pakistan Stock Exchange for the period of four years (i.e. 2014–2017) is used for this research. Moreover, to investigate the model, generalized least squares statistical method is used to measure the relationship between variables.

Findings – The results revealed that there is significant but positive relationship between independent directors and ROA while ownership structure and ROE have significant but negative relationship. Thus, the board of directors should make it sure that all stakeholders and organizations should increase the nonfamily ownership in firms for better corporate performance. Moreover, philanthropy and WCM mediate the relationship between corporate governance and firms' performance.

Practical/implications – This research work will be helpful in the corporate governance, and further researchers can conduct their study by considering executive/nonexecutive director and institutional owners as governance variables.

Originality/value – This paper fulfills an identified need to study how Corporate Governance effect the performance of firm.

Keywords Corporate governance, Firm's performance, ROA, ROE, Stakeholder, Ownership, Philanthropy

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1. Introduction

The corporate sector and Institute of Chartered Accountant of Pakistan (ICAP) [1] are the main controlling bodies of capital market secretarial profession of Pakistan. Securities and Exchange Commission of Pakistan (SECP) [2] is responsible for the monitoring of the profession. International Financial Reporting Standards (IFRS) [3] foundation declares statements, which are used to take help in case of other requirements related to the economic reportage. In 2002, there were major frauds in WorldCom and Enron after that Sarbanes–Oxley act was issued; therefore, a code of conduct regarding the corporate governance (CG) system in Pakistan was introduced by SECP and that code was mentioned compulsory to be adopted within the same year 2002. Later on review of code was taken and revision of the code took place during 2012.

Shareholders/investors always try to get information that can be helpful for them to earn as much return as they can. For that purpose an effective CG system has a vital importance and current issue of discussion in business management. Many studies gained fame in the recent years by studying impact of CG on firms' performance (Sami *et al.*, 2011; Ammanna *et al.*, 2011; Stefanescu, 2011; Garcia-Meca and Ballesta, 2011; Lam and Lee, 2012; Sheikh and Wang, 2012; Ujaunwa, 2012; Rashid and Islam, 2013; Kumar and Singh, 2013). CG can be counted among the most effecting aspects of firm' governance; this area is studied at a large scale to get best firm performance. A common mind-set is that the better the CG, better will be the firm performance. CG consists of different areas such as ownership structure, board size, Chief Executive Officer (CEO) compensation, CEO duality, audit committee and ratio of board conferences and so on. These areas are studied by (Bhagat and Black, 1999; Ali and Mohtasham, 2011; Yasser *et al.*, 2011), but they do not find similar results. There are some researchers (Maury, 2006; Rashid *et al.*, 2010; Ali and Mohtasham, 2011) who conducted their studies and found a positive impact of independent board upon the firm performance, whereas others such as Bhagat and Black (1999) concluded that there is no relationship between both variables. We can define the concept of CG with several definitions. CG is defined by Gompers *et al.* (2003) with respect to investor's perspective as "both the guarantee to reimburse a reasonable profit for capital investment and the dedication to run a firm". Corporate governance directly affects the firm performance and ability of firm to access the capital market. Furthermore, the researcher advocated that level of CG of a firm could be helpful in emerging market with minor organizations as it supports to differentiate among firms. CG is a proper set of processes applied in favor of economic agents and urging them to take part in productive process within the social entity (Maati, 1999).

CG is the mechanism approved by the members of the board and its associated committees. The corporations in CG are administrated to ensure that manager runs the organization for the advantages of its stakeholders such as shareholders, creditors, suppliers and employees (Martynova and Renneboog, 2006). The basic principle of CG is the distribution of authority within a corporate, among its stockholders and the members of the board (Brown and Casey, 2012). Cadbury (2000) concluded that the aim and purpose of CG are promoting contest and permitting options to the customers for making a choice and satisfying interest of individuals, corporations and securities, respectively. Shleifer and Vishny (1997) studied that the CG is administered by board members and is implemented and evaluated through various processes within the organizations. The inside directors residing in the corporation are managers of the organization, they are well aware of the company than outside directors and they make improved decisions. The outside independent directors have less value as compared to the inside directors. The outsiders are part-timers and they do not have inside information. Most of the public and private decision-makers prefer the system of independent board (Gordon, 2006). Independent directors are assumed to be custodians of the investors' interests. Moreover, they are effective in the composition of board. Hermalin and Weisbach (1991) explained that the Board of Directors (BODs) have basic responsibility of monitoring the firms and success of board depends on the majority of independent outside directors. According to the Wall Street Journal, independent outsiders made up of 66% of all boards and 72% percent of Standard & Poor's board. The larger number of directors on the board raises the difficulty of decision-making and coordination (Cheng, 2008) but leads to its benefit to better monitoring capability, improvement in organization's capacity to perform better exterior associations (Coles *et al.*, 2008). A lot of researchers discover an insignificant association between board size and organizational performance (Ghosh, 2007). Erickson (2005) describes that there are two things that are greatly affected by board size; one is difficulty of decision-making and second is effectiveness. The board has chief tasks such as planning and execution of strategy and promoting relationships between the organization and its outer environment (Ruigrok *et al.*, 2006). According to Brennan (2006), board of corporations is essential component of CG because it acts as mediator between the investors and the administrators (Brown, 2007). CG has a great deal of interest to the ownership structure of corporations. Shareholders' compensation and board are mostly focused on two things; one is organizational performance and other is CG. Thus, the board members act as mediator between owners and their agents (Leech and Leahy, 1991).

The administrative ownership position relates the management interest with the interest of investors, but it is not as much important because of its uncertain effect on organizational performance (Stulz, 1988). Thomsen and Pedersen (2000) study the relationship between organizational performance and ownership concentration. They find that this relationship depends upon uniqueness of the controlling investors. Owner-controlled organizations are more profitable than administrator-controlled organizations. Ownership provides improved monitoring, which leads to enhanced performance (Agrawal and Knoeber, 1996). The family-controlled organization or family ownership is the ordinary form of business firms on the globe, and it accounts for over 80% of all organizations in the United States (Anderson and Reeb, 2003). Family organizations have better performance compared to nonfamily organizations.

In order to judge the ability of company regarding fulfilling its obligation, cash is the foremost important among items of working capital (WC). Moreover, cash holding is crucial for fulfilling the obligations while the idle cash does not help to increase value of the company. Therefore, it's essential for companies to maintain appropriate cash reserves. The company can enhance their business by optimal level of held reserves, which are also considered as the most important element in analyzing responsibilities of company toward its obligations (Gill and Shah, 2012). CG not only helps in regulating policies, but it also plays active role in controlling WCM, which is abbreviated as WCM (Gill and Biger, 2013).

Similarly, philanthropy is supposed to absolutely impact firm monetary-related efficacy since it supports organizations in sociopolitical welfare, which enables them to rouse consenting results (Dabor *et al.*, 2015). Therefore, the study aims to investigate the impact of basic governance factors on performance of firm via mediating role of board size, philanthropy and WCM. The foremost important and first objective of this study is to identify the impact of ownership structure (OS) and independent directors on board size, WCM and philanthropy of firms (sugar industry) in Pakistan. Second objective of this study is to determine the impact of OS and independent directors on return on equity (ROE), return on asset (ROA) and sales growth of firms. Third objective is to explore the impact of board size, WCM and philanthropy on ROA, ROE and sales growth of firms (sugar industry) in Pakistan.

The study contributes to the existing knowledge in following ways: first, it bridges a gap via providing the evidence of mediating role of board size, philanthropy and WCM between the governance factors and performance. Secondly, it links the WCM with CG to improve the quality of work and better management. Finally, it enhances the need to spend more on philanthropy to highlight the corporate image and hence, better performance. Furthermore, this research will be contribution to corporate sector of Asian countries for analyzing different roles of CG.

1.1 Overview of sugar industry
First major contribution was made for sugar by Arabs in 642 and then followed by crusaders until the first sugar cane plant was recorded in 1,099 in England. In 1,493, Columbus took sugar cane plants to Caribbean, and Portuguese brought sugar cane to Brazil. From 1,625 to 1,750 with American colonization of Europe, Caribbean became largest producer of sugar. Sugar production was mechanized by the end of 18th century.

Modern form of sugar industry established in the subcontinent in early 1930s. At the time of partition, there were seven sugar mills in Pakistani territory. With brisk economic activities and rapid urbanization, demand increased day by day. There were 35 sugar mills by the end of 1980 in Pakistan, and later this figure rose to 45 in 1990. By 2009, total sugar mills were 86 with an annual capacity of 7 million tons. Present sugar consumption has crossed 4 million tons with a value of US$1.8 billion. It is the second largest agro-based industry in Pakistan, which generates Rs. 22 billion revenue to government. It provides direct and indirect jobs to 1.2 million people.

Sugar cane industry is facing many challenges. The price of sugar is based on weight instead of quality, and this fact is hurdle toward quality production. Moreover, government policies on price fixing for sugar cane are another major issue. Further expansion of the industry merely depends on how these issues will be tackled by government. Sugar purity is mainly determined by its sucrose contents. Sugar was bleached by sulphitation process, which is now replaced by carbon process. Production estimate for current year is 5 million tons where the expected consumption will be around 4.337 million tons (based at 24 kg per capita for 180.71 million population).

2. Literature review

OS of the company, size of board and CEO's duality are considered as foremost important components of CG (Arora and Sharma, 2016; Butt and Hasan, 2009). Significant consideration has been given to board size of the companies and their performance in current literature of CG. CG mechanisms like the size of the board and independent director for family and nonfamily ownership have an important influence on organizational performance (Ibrahim, 2011). According to prediction of agency theory, there must be difference of opinion between the owners of corporations (Jensen and Meckling, 1976). If there is widespread ownership and control, there might be conflicts between shareholders and company management. However, in a saturated ownership, the conflicts among major shareholders and minority shareholders got importance. According to the study of (Claessens *et al.*, 2000; Lemmon and Lins, 2003), instead of having direct relationships, divergence of ownership and performance of firm are inversely proportional to each other.

It is evident from various Asian countries that ownership divergence and firm's profitability are in nonlinear relationship with each other (Lin and Lin, 2013; Wiwattanakantang, 2001; Utama *et al.*, 2017). The study of Hanafi *et al.* (2018) also shows significant relationship between ownership and firm performance, especially the saturated ownership increases the performance. Therefore, the policymakers and other stakeholders should pay great attention toward ownership. Outcome showed the reality of a statistically significant nonlinear relationship between ownership and performance. Many organizations analyzed that there is significant and positive relation between foreign holding and organizational performance (Imam and Malik, 2007).

Mudambi and Nicosia (2009) studied the relation between corporate performance and OS. They found that managerial ownership and family ownership of corporate can improve financial performance of company. Lauterbach and Vaninsky (2011) analyzed the data collected from 280 Israeli firms for exploring the relationship between OS and firm's performance. Their study revealed that if managers are owners, then firm's performance will decrease, and in case of family ownership, the firm's performance is worst. Therefore, managerial ownership is more important than family ownership. The study of Itturalde *et al.* (2011) has given new evidence regarding influence of the insider ownership on performance of nonlisted organizations. They distinguished the performance of family and nonfamily organizations by collecting data from 586 Spanish nonlisted organizations, and results of their study highlighted that in family-owned firms, the relationship between insider ownership and organizational performance depends on age group of managers.

Ongore and Owoko (2011) investigated the interrelations among ownership, board and administrator personality by collecting data of firm's performance from 52 organizations listed at the Nairobi Stock Exchange. They measured ROA, ROE and dividend yield and found that the relationships among ownership concentration, government and organizational performance are negative. Zakaria *et al.* (2014) studied the effect of different types of OS on firm's performance. They took four types under consideration including concentrated, foreign, governmental and managerial ownership. The results suggested that managerial or concentrated ownership directly and positively affects firm performance, but government and foreign ownership have less effect on it. There is no specific standard to measure or observe the exact relation between firm performance and OS because for every country and economy, there is sustainable OS. Scholten (2014) examined the data of 80 Dutch companies from 2011 to 2012 and concluded that firms perform better when ownership concentration increases and decrease in ownership concentration will lead to poor firm performance. There is great effect of foreign ownership on inside ownership in decision-making. Foreign ownership has negative and state ownership has positive effect on leverage, whereas managerial ownership also positively affects leverage and OS (Le, 2015). The data of nonfinancial public firms listed in Busra Malaysia taken for five years (2010–2014) highlighted that OS positively affects financial performance (Elvin and Hamid, 2016). Therefore, ownership concentration is directly proportional to firm performance. In order to find the impact of OS on firm performance, (Ahmed and Hadi, 2017) took data of firms located in MENA region (comprising nine countries including Jordan, Bahrain, Oman, Qatar, Tunisia, UAE, Morocco, Kuwait and Egypt). They preferred ROE, ROA and Tobin Q as a standard to measure performance, and results revealed that governmental ownership and insider ownership both positively affect the financial performance of firms in MENA region.

Shahid *et al.* (2018) explored the relationship between elements of CG and performance of cement industry in Pakistan. They found insignificant but positive relationship between size of board and ROE. Moreover, they found that there is significant but negative relationship between financial leverage and ROE. Latif *et al.* (2013) took the data from sugar industry of Pakistan and investigated the relationship between CG mechanism and firm performance. They involved size of board, CEO duality and board composition to check CG mechanism. Whereas ROE was used by them to check the firm performance. The result of their study highlighted that CG and firm performance are in significant relationship.

Like many other researchers, Peng (2004) found the positive relation between size of board and firm performance. Whereas some studies have explained this relationship as negative. Kumar and Singh (2013) investigated the relationship of size of the board with organization worth and found positive relationship between board size and the corporate performance. Malik *et al.* (2014) used Pareto approach in order to investigate the connection between board size and performance of organization, and for this purpose sample of 14 commercial banks was taken from 2008 to 2012. The relationship between bank board size and CG was measured by econometric techniques, and study revealed that there is positive relationship between performance and board size. According to (Jensen, 1993), the financial performance of firm is positively affected by board size. Small board size is more efficient than the big one, and there is strong negative relationship between board size and firm performance (Yermack, 1996). Furthermore, Lehn *et al.* (2004)

found that performance of firms with smaller board size is better than the firms having large board size. According to Hermalin (2005), due to coordination and communication problems, there is possibility that small boards are more effective than large ones. (Lehn *et al.*, 2004; Guest, 2008) explained that the board size is the specific feature of firm and has profound effect on the performance. Similarly, Connelly *et al.* (2012) explained that small boards are more valuable and better for firm performance. Klein (1998); Eisenberg *et al.* (1998); Jell-Ojobor and Windsperger (2014) also found strong negative relationship between board size and profitability of the firm, and large board size leads to miscommunication and poor decision-making. The board size and financial performance of firm have negative relationship (Bennedsen *et al.*, 2010; Adams and Mehran, 2012). Htay (2012) explained that smaller size board is positively associated to financial performance of bank, which is measured by ROE and ROA. In context of Pakistan, the study of Karim and Faiz (2017) investigated positive association between board size and firm performance.

In all types of CG, executive and nonexecutive directors constitute the board comprising nonindependent or independent directors. The nonexecutive directors monitor CEO and other company executive directors' actions to ensure the safety of shareholder's interests. Nonexecutive directors have diverse knowledge and skills as compared to other directors (Weir and Laing, 2001; Abdullah, 2004).

Rhoades *et al.* (2000) measured the impact of outsider or independent directors on financial performance. They found that performance is not dependent on the independency of the directors. Dehaene *et al.* (2001) highlighted the significant relationship among ROE and independent directors, and this relation actually supported the perception that due to monitoring function of independent directors, the interests of shareholders are well guarded (Johl *et al.*, 2015). The existences of independent directors are important because independent directors have access to source of external environment and information, which is inaccessible by dependent directors (Hermalin, 2005). The proportion of the independent director has positive affect on performance of the firm as well as it also increases the bank debt financing and credit rating (Ashbaugh-Skaife *et al.*, 2006).

In recent times toward corporate board, there is a trend with additional independent director to monitor independently and raise the problem of agency faced by the organization. On the board of banks, the existence of independent directors is supposed to increase the compatible compensation reward to managers and earning management (Cornett *et al.*, 2009). Independent directors can independently monitor the management for the best interest of shareholders (i.e. to protect and maximize owner's wealth). The effectiveness of independent directors on firm performance is empirically supported but has diverse findings. Literature revealed that independent directors protect shareholder's interest and mitigate the agency problem (Adams and Mehran, 2012; Hermalin and Weisbach, 1991; Xie *et al.*, 2003). In Pakistan, the study of Khan and Awan (2012) revealed positive association between independent directors and firm's financial performance by measuring ROA and ROE. There is positive relationship among independent directors and firm performance. If this relationship is negative, then it will jeopardize the performance of independent directors (Sharifah *et al.*, 2016). Opposite to these findings, Adams and Mehran (2012) found a negative correlation between abnormal returns and independent directors.

2.1 Relationship among corporate governance, philanthropy, working capital and firms' performance

There are only few studies that have explored the relationship between CG mechanisms and the management efficiency of WC. Uchenna *et al.* (2012) took five top beer manufacturing companies to evaluate the relationship between changes in WC level and its effect on the earning of the firm.

According to Kim *et al.* (1998), the companies having surplus cash are often considered as weak in CG and this cash has no role in generating profit. Gul *et al.* (2013) explored the relationship between WCM and operating profit of the firms listed in Pakistan Stock Exchange. They measured the WC efficiency of the companies through C-R, cash turnover ratio and current-asset-to-sales ratio. Average collection period (ACP), Inventory turnover period (ITOP) and average payment period (APP) and ROA were used as dependent variables. They concluded that there exists a significant relationship between measures of WCM and ROA.

Gill and Mathur (2011) collected the data of Canadian companies in order to explore the relation between board size, board duality and net WC. They found that size of board and duality of board reversely affect net WC. Vahid *et al.* (2012) investigated the impact of WCM (cash holdings) on the performance of firms listed in Tehran Stock Exchange (TSE). They used the data of 83 Iranian companies for the period of 2001–2010. With the application of multiple regression model, they found negative and significant relationship between board size, board duality and net WC. The weakness of CG can lead to inefficient policies of WCM. Moreover, this weakness negatively affects stockholder value. Whereas the influential or strong CG acts as a tool in reserve management system of company (Gill and Biger, 2013). Madishetti and Kibona (2013) determined the impact ACP and APP on the earning before interest and tax (EBIT) or SMEs. They showed that ACP and EBIT are significantly but negatively associated with each other. They found a positive relationship between APP and EBIT.

Jamalinesaria and Soheilib (2015) explained that efficiency of WC is judged by CG mechanisms. "The time taken by a company to pay for the inventory purchased on credit is referred to the average payment period" (Ngwenya, 2012). It is calculated as:

"APP = (Average accounts payable/Cost of purchases) x 365"

Philanthropy is a Greek word that describes social and financial welfare. Traditionally philanthropy is known as general public welfare that focuses on human prosperity (Masulis and Reza, 2014). The idea of philanthropy opens the activities for welfare of general public by concentrating on their prosperity. It comprises several dimensions, for example, monetary gifts, improvement of framework, regular affliction and support in administrative activities (Seifert *et al.*, 2004). According to Saiia *et al.* (2003), philanthropy is proclivity by the organizations working for human welfare.

Executives of companies must possess the ability to show the company's profitability to patrons, which is result of charitable works. Many studies have discussed that firm-specific variables have great influence on firm's performance, and these variables include age, firm size and leverage. Dabor *et al.* (2015) examined that there is significant effect of philanthropy on financial efficacy of firm because organizations are interested in sociopolitical welfare, which leads to favorable results. Mahmood *et al.* (2018) used the data of firms listed in Pakistan Stock Exchange for the period of 15 years (i.e from 2004 to 2018) and investigated the moderating effect of strategic philanthropy between relation of CG and firm's performance. Their study revealed that with moderating role of philanthropy, CG significantly affects firm performance.

3. Data and methodology

In this study, independent directors and OS are taken as independent variables while ROA/investment, ROE and sales growth are used as proxy variables for firms' performance. However, size of the board, philanthropy and WCM (APP = average payment period) mediate the relationship between independent and dependent variables. The data is collected from Balance sheet analysis issued by State Bank of Pakistan and annual reports of 32 food companies and sugar mills listed at Pakistan Stock Exchange of Pakistan for the period of four years, 2014–2017. Generalized least squares statistical method is used to measure the relationship. The study has the following theoretical framework and hypotheses.

H1. There is no relationship between board size and ROA.

H2. There is no relationship between board size and ROE.

H3. There is no relationship between board size and sales growth.

H4. There is no relationship between ownership structure and ROA.

H5. There is no relationship between ownership structure and ROE.

H6. There is no relationship between ownership structure and sales growth.

H7. There is no relationship between independent directors and ROA.

H8. There is no relationship between independent directors and ROE.

H9. There is no relationship between independent directors and sales growth.

H10. There is no relationship between ownership structure and board size.

H11. There is no relationship between independent directors and board size.

H12. There is no relationship between ownership structure and WCM.

H13. There is no relationship between independent directors and WCM.

H14. There is no relationship between ownership structure and philanthropy.

H15. There is no relationship between independent directors and philanthropy.

H16. There is no relationship between WCM and ROA.

H17. There is no relationship between WCM and ROE.

H18. There is no relationship between WCM and sales growth.

H19. There is no relationship between philanthropy and ROA.

H20. There is no relationship between philanthropy and ROE.

H21. There is no relationship between philanthropy and sales growth.

Regression models

$$\mathrm{ROA}_{it} = \beta_{1i} + \beta_2\,\mathrm{OWN}_{it} + \beta_3\,\mathrm{ID}_{it} + \mu_{it}$$

$$\mathrm{ROE}_{it} = \beta_{1i} + \beta_2\,\mathrm{OWN}_{it} + \beta_3\,\mathrm{ID}_{it} + \mu_{it}$$

$$\mathrm{Sales\,Growth}_{it} = \beta_{1i} + +\beta_2\,\mathrm{OWN}_{it} + \beta_3\,\mathrm{ID}_{it} + \mu_{it}$$

$$\mathrm{ROA}_{it} = \beta_{1i} + \beta_2\,\mathrm{BSize}_{it} + \beta_3\,\mathrm{WCM}_{it} + \beta_4\,\mathrm{PhT}_{it} + \mu_{it}$$

$$\mathrm{ROE}_{it} = \beta_{1i} + \beta_2\,\mathrm{BSize}_{it} + \beta_3\,\mathrm{WCM}_{it} + \beta_4\,\mathrm{PhT}_{it} + \mu_{it}$$

$$\mathrm{Sales\,Growth}_{it} = \beta_{1i} + \beta_2\,\mathrm{BSize}_{it} + \beta_3\,\mathrm{WCM}_{it} + \beta_4\,\mathrm{PhT}_{it} + \mu_{it}$$

$$\mathrm{BSize}_{it} = \beta_{1i} + \beta_2\,\mathrm{OWN}_{it} + \beta_3\,\mathrm{ID}_{it} + \mu_{it}$$

$$\mathrm{WCM}_{it} = \beta_{1i} + \beta_2\,\mathrm{OWN}_{it} + \beta_3\,\mathrm{ID}_{it} + \mu_{it}$$

$$\mathrm{PhT}_{it} = \beta_{1i} + \beta_2\,\mathrm{OWN}_{it} + \beta_3\,\mathrm{ID}_{it} + \mu_{it}$$

where ROA = Return on Assets, ROE = Return on Equity, Board Size = Board Size, OWN = Ownership structure, ID = Independent Directors, PhT = Philanthropy, WCM = Working Capital Management.

4. Results

Table 1 shows that there is significant (p-value = 0.0443) and positive (7.63324) relationship between independent directors and ROA (firms' performance) showing as the independent directors increase in board of firms, the ROA also increases, thus rejecting H7. It is also found that both board size and OS have negative but insignificant relationship with ROA, thus H1 and H4 can be partially rejected. It is clear from the table that there exists significant and positive relationship between philanthropy and ROA; therefore, H19 is rejected. On the other hand, WCM has significant and negative relationship with ROA, which means as the APP decreases, the ROA of sugar firms increases; thus, Ho16 is also rejected.

Table 2 shows that there is significant (p-value = 0.0013) and negative (−30.647) relationship exists between OS and ROE, which means as more firms are family-owned, the ROE decreases in food industry of Pakistan, thus rejecting H5. On the other hand, H2 and H8 can be partially rejected as both board size and independent directors have positive but insignificant relationship with ROE. It is clear from the table that there exists significant and positive relationship between philanthropy and ROE, which means as the amount of donations increases, ROE also increases; therefore, H20 is rejected. On the other hand, WCM has significant and negative relationship with ROE, which means as the APP decreases, the ROE of sugar firms increases; thus, H17 is also rejected.

Table 3 shows that there is significant (p-value = 0.041) and negative (−10.7912) relationship between board size and sales growth, which means as the board size increases,

Variable	Coefficient	t-Statistic	p-values
C	11.8287	0.847	0.3986
Board size	−1.7053	−0.8867	0.377
Ownership structure	−6.0766	−1.6555	0.1004
Independent directors	7.63324	2.03223	0.0443
Philanthropy	0.736536	2.604548	0.0098
WCM (APP)	−0.03830	−3.827876	0.0002

Table 1. The impact of board size, independent directors, ownership structure, philanthropy and WCM on ROA (return on assets)

Variable	Coefficient	t-Statistic	p-values
C	−57.277	−1.6136	0.1092
Board size	7.6953	1.57415	0.118
Ownership structure	−30.647	−3.2849	0.0013
Independent directors	10.4101	1.0904	0.2776
Philanthropy	2.160684	5.557809	0.0000
WCM (APP)	−0.0529	−0.039096	0.9689

Table 2. The impact of board size, independent directors, ownership structure, philanthropy and WCM on ROE (return on equity)

the sales growth decreases in food industry, thus rejecting H3. On the other hand, H6 and H9 can be partially rejected as both OS and independent directors have positive but insignificant relationship with sales growth. It is clear from the table that there exists significant and positive relationship between philanthropy and sales growth, which means as the amount of donations increases, sales growth also increases; therefore, H21 is rejected. On the other hand, WCM has significant and negative relationship with sales growth, which means as the APP decreases, the sales growth of sugar firms increases; thus, H18 is also rejected (see Figure 1).

Table 4 presents that OS has positive and insignificant relationship with the board size; thus, board size does not mediate the relationship between OS and dependent variables (ROA, ROE and sales growth). But independent directors have a significant relationship with the board size; thus, board size mediates the relationship between OS and sales growth; however, it does not mediates the relationship between independent directors and other dependent variables (ROA and ROE) because board size has insignificant relationship with ROA and ROE. Table 4 shows that both OS and independent directors have significant relationship with philanthropy and WCM; thus, philanthropy and WCM mediate the relationship between independent variables (OS and independent directors) and dependent variables (ROA, ROE and sales growth) (see Figure 2).

Table 4 presents that OS has positive and insignificant relationship with the board size; thus, board size does not mediate the relationship between ownership structure and dependent variables (ROA, ROE and sales growth). But independent directors have a

Table 3. The impact of board size, ownership structure and independent directors on sales growth

Variable	Coefficient	*t*-Statistic	*p*-values
C	49.3654	1.9995	0.0477
Board size	−10.7912	−1.9932	0.041
Ownership structure	1.72954	0.26653	0.7903
Independent directors	6.89124	1.0378	0.3014
Philanthropy	0.648599	1.995335	0.0476
WCM (APP)	−0.06164	−3.382651	0.0011

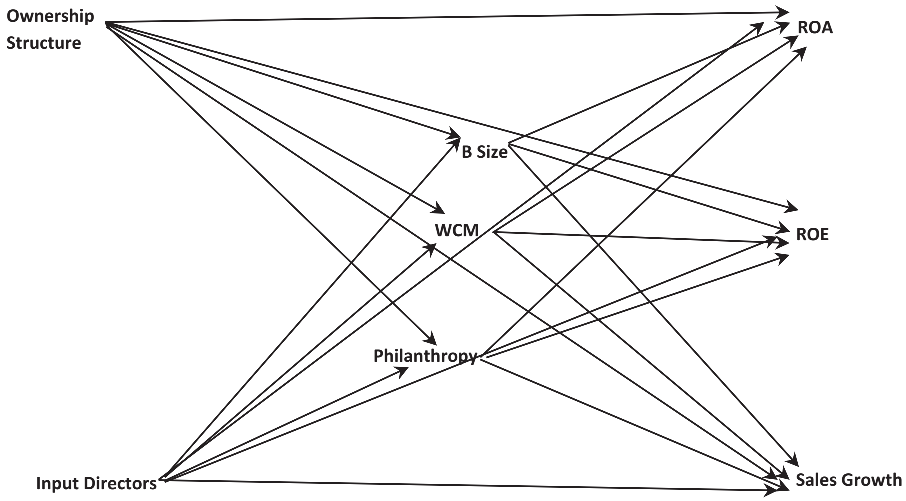

Figure 1. Theoretical framework: relationship between corporate governance and firms' performance

significant relationship with the board size; thus, board size mediates the relationship between OS and sales growth; however, it does not mediate the relationship between independent directors and other dependent variables (ROA and ROE) because board size has insignificant relationship with ROA and ROE. Table 4 shows that both OS and independent directors have significant relationship with philanthropy and WCM; thus, philanthropy and WCM mediate the relationship between independent variables (OS and independent directors) and dependent variables (ROA, ROE and sales growth).

Variable	Coefficient	*t*-Statistic	*p*-values
The impact of ownership structure and independent directors on board size			
Ownership structure	6.3467	1.41341	0.118
Independent directors	−11.2279	−1.9989	0.042
The impact of ownership structure and independent directors on philanthropy			
Ownership structure	0.25	−2.232	0.026
Independent directors	0.004	*−2.275 0.023*	−0.036
The impact of ownership structure and independent directors on WCM			
Ownership structure	0.106	5.491	0.000
Independent directors	0.088	5.273	0.000

Table 4.
The impact of ownership structure and independent directors on board size, philanthropy and WCM

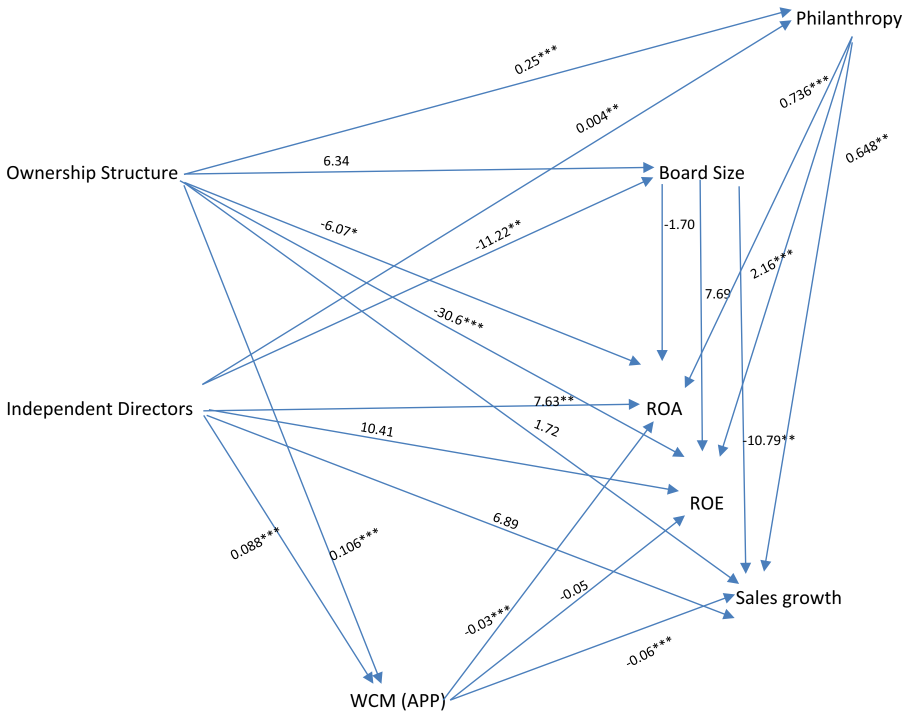

Figure 2.
Results of SEM

5. Conclusion

The results are concluded in the framework of sugar mills. The study finds significant and positive relationship between independent directors and ROA (firms' performance) showing that the increase in independent directors in board of firm will also increase the ROA. Similarly, there exists a significant and negative relationship between OS and ROE, which means that as more firms are family-owned, the ROE will decrease. There is significant and negative relationship between board size and sales growth as the increase in board size will decrease the sales growth, thus rejecting H3, H5 and H7. The OS has positive and insignificant relationship with the board size; thus, board size does not mediate the relationship between OS and outcome variables (ROA, ROE and sales growth). Independent directors have a significant relationship with the board size; thus, board size mediates the relationship between OS and sales growth. However, it does not mediate the relationship between independent directors and other dependent variables (ROA and ROE) because board size has insignificant relationship with ROA and ROE. On the other hand, it is clear from the results that philanthropy has significant and positive relationship with ROA, ROE and sales growth; therefore, H19, H20 and H21 are rejected. WCM has significant and negative relationship with ROA, ROE and sales growth; thus, H16, H17 and H18 are also rejected. It is also clear that both OS and independent directors have significant relationship with philanthropy and WCM; thus, philanthropy and WCM mediate the relationship between independent variables (OS and independent directors) and dependent variables (ROA, ROE and sales growth). The rest of constructed hypotheses can be partially rejected. CG maintains a basic role in the performance of the organization. The results suggest that the board of directors should make sure that the decisions are made for benefit of all stakeholders and the role of independent director should be increased in the sugar sector firms of Pakistan. Finally, the ownership is very important in the organizations. Organizations should increase the nonfamily ownership in firms for better corporate performance.

6. Limitations and future recommendations

This study has several limitations among which first limitation is that this research only focused on sugar industry and in future the researchers can conduct similar research on any other manufacturing industry. Secondly, this research is limited to CG of Pakistani companies. Therefore, this study can be replicated in context of any other Asian country. Moreover, this study can be extended by adding variable of responsible leadership or green financing.

Notes

1. Institute of Chartered Accountant of Pakistan (ICAP) is responsible to regulate the profession of accounting in Pakistan and was established on July 1, 1961 https://www.icap.org.pk/about-icap/.
2. "Securities and Exchange Commission of Pakistan is governmental entity that has the legal authority to enforce financial reporting requirements and exert other controls over entities that participate in the capital markets within their jurisdiction".
3. International Financial Reporting Standards: Framework for the Preparation and Presentation of Financial Statements, which sets forth the concepts that underlie the preparation and presentation of financial statements for external uses.

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Corresponding author

Muhammad Naeem Shahid can be contacted at: naeemtuf@yahoo.com

CORPORATE RISK DISCLOSURE AND COST OF EQUITY CAPITAL: MODERATING ROLE OF FIRM PERFORMANCE

Nia Yuniarsih[1*], Triyonowati[2]

[1] Indonesia School of Economic (STIESIA), Surabaya and Faculty of Economics, Darma Cendika Catholic University, Surabaya, Indonesia
[2] Indonesia School of Economic (STIESIA) Surabaya, Indonesia

*Corresponding Author: nia.yuniarsih@ukdc.ac.id

Abstract: Investors can use Corporate Risk Disclosure to guide them in assessing a company. Indicators of Corporate Risk Disclosure, based on IFRS 7, include 45 items with the following requirements: (a) General Risk Information; (b) Accounting Policies; (c) Financial Instrument; (d) Derivative hedging; (e) Reserve; and (f) Financial and Other Risks. The current study aims to assess and analyze the impact of Corporate Risk Disclosure on Cost of Equity Capital and to determine whether Firm Performance moderates the relationship between Corporate Risk Disclosure and Cost of Equity Capital. It uses a sample of 86 manufacturing companies listed in Indonesia Stock Exchange in the period 2017-2019. The results indicated that Corporate Risk Disclosure negatively affects Cost of Equity Capital. More risk items disclosed means higher market liquidity as demand for securities is increasing and thereby lowering the cost of equity capital. Firm performance has been shown to strengthen the impact of Corporate Risk Disclosure on Cost of Equity. Underperforming companies tend to disclose more risk information than their well-performing counterparts and the latter, thereby, will have lower cost of equity capital.

Keywords: Corporate Risk Disclosure, Firm performance, Cost of Equity Capital

1. Introduction

Corporate risk disclosure has gained special attention in the global stakeholder communities (Aebi et al., 2012; Beltratti dan Stulz, 2012; Erkens et al., 2012). Studies by Botosan (1997), Lajili (2009) and Linsley and Shrives (2006) elucidated the costs and benefits of disclosure and maintain that higher level of disclosure leads to more transparency, lower cost of capital, and decreased information asymmetry. An example of this is the mining case of PT. Newmont that produced a large amount of mine tailings, caused pollution, and disturbed the ecological balance of West Nusa Tenggara, Indonesia in 2016. Another example that represents the case of negative externalities as the impact of industrialization is the destruction of natural ecosystem caused by PT. Riau Andalan Pulp and Paper in 2015. High production capacity of PT. Riau Andalan Pulp and Paper requires it to cut down trees in a large scale, which makes the forest condition even worse. Companies lacking real care for environmental issues in their operation will end up causing environmental damages and degrading their business performance.
From a business perspective, disclosing company risk can reduce the cost of capital, because investors believe that business operations run well when uncertainty diminishes (Abraham

and Cox, 2007; Linsley and Shrives, 2006). Disclosure of financial information is mandatory for companies seeking to go public. Positive company information regarding expected returns will influence shareholders and potential investors. Unexpected negative information, on the contrary, will have a negative impact on the market. In a contractual relationship, management has a choice to use a combination of debt and equity financing.

Considering the importance of risk disclosure, standard-setters seek to further reform the existing regulations in recent years, including the issuance of IFRS 7 to regulate and guide accounting disclosure practices—depending on the mandate extended. IFRS 7 comes with the objective that entities shall provide information regarding company's financial position, performance, cash flow, and risks associated with financial instruments and management policies. IFRS 7 includes disclosure about financial instruments applicable to all enterprises as it combines the requirements for disclosure of financial instruments, which formerly regulated under International Accounting Standards (IAS). IFRS 7 requires qualitative and quantitative disclosures for three main risks: credit risk, liquidity risk and market risk.

Qualitative disclosure is intended to describe how the company is exposed to the risks, how the risks arise and how it manages these risks. Quantitative disclosure, on the other hand, is designed to provide information concerning the extent to which an entity discloses the risks based on information provided internally for the management. Capital market regulations serve as regulatory tools to effectively provide the required information. Disclosure may benefit firms through lower cost of capital for the following reasons: (1) Disclosure reduces transaction cost figure. Increase in disclosure helps investors reduce adverse selection component of their bid-ask spreads and cost of equity capital (Botosan, 1997). Disclosure reduces the adverse price impact associated with large-scale trade; reduces information asymmetry between investors, which leads to a higher demand for securities in the market; and reduces cost of transaction and increases liquidity, which in turn reduces cost of equity capital (Amihud and Mendelson, 1986; Botosan, 1997; Verrecchia, 1991). Increased disclosure also lowers uncertainty or estimation risk (Clarkson et al., 1996). Botosan (1997) suggests that firm enhancing disclosure is an attempt to reduce the cost of equity capital by lowering non-diversifiable estimation risk.

Prior research has examined the relationship between disclosure level (financial and social) and cost of equity capital, and the results have been varied because of the disclosure validity and certain measures used to measure the cost of equity capital (Al-Tuwaijri et al. , 2004). Negative relation exists between financial disclosure and cost of equity capital (Botosan, 2004; Healy and Palepu, 1999; Richardson and Welker, 2001). However, there is a significant positive relation between social disclosures and the cost of equity capital because some biases in social disclosure might benefit companies through its impact on organizational stakeholders rather than on other investors (Richardson and Welker, 2001). Lambert et al. (2007) examined the direct and indirect effects of disclosure quality on the cost of capital. Higher quality disclosures affect the firm's assessed covariances with other firms' cash flows and also indirectly affect the company's investment decisions in the future. The results of study showed that disclosures have a direct negative impact and an indirect positive impact on cost of capital.

Information disclosure is an attempt to bring a harmony of interests between stakeholders and managers by lowering agency cost and, thus, improve company's performance (Solomon et al., 2000). Healy and Palepu (1999) maintained that disclosure communicates corporate governance and firm performance to stakeholders. Previous studies provide evidence that voluntary disclosure provides an important mechanism that improves firm performance (Healy and Palepu, 1999; Miller and Noulas, 1996). Agency theory suggests that the relationship between business principals and their agents requires efficient use of information to minimize information asymmetry (Eisenhardt, 1989). Agency theory explores two potential problems (adverse selection and moral hazard) that may arise in the manager-shareholder relationship for low corporate disclosure. Foerster et al. (2014) found that corporate management disclosures in Canada have been positively related to firm value in two aspects: reducing business risk and changes in investors' perceptions of future cash flows. Callahan and Smith (2004) found that financial disclosure is positively related to future performance of corporate industries.

Results of study related to corporate risk disclosure and those that moderate risk disclosure, cost of capital and performance remain limited (Aebi et al., 2012). The current study analyzes the relationship among three variables—risk disclosure, cost of capital and performance—in developing country settings where disclosing risk information is a matter of options rather than obligations. Based on the above mentioned phenomenon, we formulate the research problem as follows:

a) Does corporate risk disclosure affect cost of equity capital?
b) Does firm performance strengthen the impact of corporate risk disclosure on the cost of equity capital?

2. Literature Review

Literature Review

Corporate Risk Disclosure

Cabedo and Tirado (2004, 184) define risks as a series of internal and external factors that condition a corporation's wealth, challenges, opportunities and threats. By the term risk they mean the possible loss or potential enhancement in corporations' wealth that arise from the interaction of these factors. Linsley and Shrives (2006) add that risk is a characteristic of every opportunity, prospect, danger, threat, which impacts the company in the future. While there are relevant concerns over potential losses, it is clear that risk must consist of two-sided volatility concerns about both potential gains and losses. Corporate risk disclosure is defined as the reporting of conditions that may cause the company's value to increase or decrease as well as the steps to be taken to minimize these risks (Hassan, 2009).

Firm Performance

Performance is the output or accomplishment of company's operational activities in utilizing the available resources. The company's strategy from a financial perspective will affect shareholder value in the long run. Return on Assets (ROA) serves to indicate how profitable a company is relative to its assets or the resources it owns. According to Lestari and Sugiharto (2007) ROA is a financial ratio that indicates the net profit that a company earns in relation to its assets. To put it another way, the higher the ratio the better the asset productivity is in obtaining net profits. The higher the ROA figures, the better the firm performance is, because its rate of return on investment of will be higher.

Cost of Equity Capital

Cost of equity capital (COC) is the cost to pay for the spending resources (source of financing). Cost of equity capital can be identified as the minimum return required to pay for the equity capital invested (Modigliani and Miller, 1958). Cost of equity correlates with the risk of investing in company shares. Things assumed in estimating the cost of capital are business and financial risks that remain constant (or relatively stable). Companies can raise equity capital in two ways: (1) retained earnings, and (2) issuing new shares. This is done to raise new funds required for the company's operation (Brigham and Houston, 2006: 105).

Companies have an obligation to disclose financial information which certainly has an impact on the incurred costs. Therefore, the cost of equity capital referred to in this study is the cost incurred by the company for providing information to the public; shareholders, investors, government, creditors, and the general public (Tarjo, 2008).
The cost of capital is calculated on the basis of the long-term sources of funds available to the company. There are four long-term sources of funds: (1) long-term debt, (2) preferred stock, (3) common stock, and (4) retained earnings. Long-term cost of debt is the current after-tax cost of debt to borrow long-term funds through loans. The cost of preferred stock is the annual dividend of preferred stock divided by the proceeds from selling the preferred stock. The cost of common stock capital is the rate used by investors to discount dividends that are expected to be paid out in the future. The measurement of cost of common stock capital (cost of equity capital) is affected by the company valuation model used. The following are valuation models for cost of equity capital (Utami, 2005):

1) Constant Growth Valuation Model or Gordon Growth Model. The rationale for this model is that the stock value equals the cash value (present value) of all dividends to be received in the future at a constant growth rate indefinitely.
2) Capital Asset Pricing Model (CAPM). Based on this model, the cost of ordinary share capital is the rate of return expected by investors as compensation for undiversifiable risk as measured by beta coefficient.
3) Ohlson Model. The model is used to estimate firm value based on book values and cash value of abnormal earnings.

The present study used Cost of Equity Capital measured using Capital Asset Pricing Model (CAPM). The latter is the rate of return expected by investors as compensation for undiversifiable risk as measured by beta coefficient. In this study, we employed CAPM to measure cost of equity capital because it generates accurate and correct estimation.

Research Model

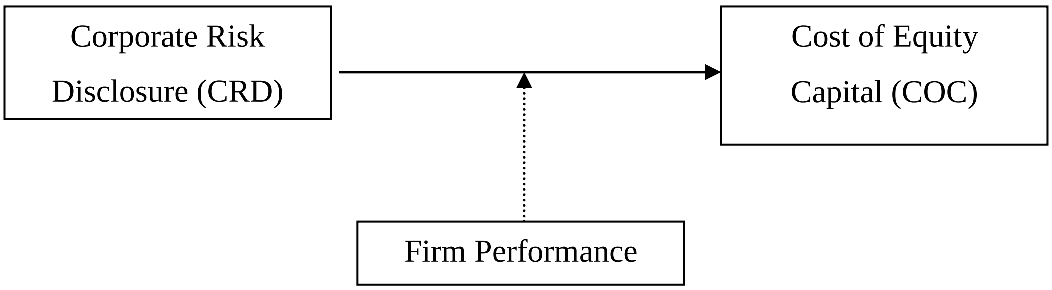

Figure 1 : Research Framework

3. Method

Population and Sample

The population in this study consisted of all manufacturing companies listed on Indonesia Stock Exchange for the period 2017-2019. We use purposive sampling techniques to collect samples that meet the following criteria: (1) companies publishing annual report; (2) companies using rupiah; (3) companies reporting their earnings during study; and (4) companies not getting delisted. The study uses a sample of 86 companies per year. The table below details the sampling criteria:

Tabel 1. Population and sample

Sampling Criteria	Number
Total number of manufacturing companies.	145
Companies not publishing annual report	(15)
Companies using currency other than Rupiah.	(17)
Companies reporting net loss.	(18)
Companies not getting delisted.	(9)
Total	**86**

Sources: Indonesia Stock Exchange

Variables and Measurments

1) Corporate Risk Disclosure

As adopted in Hassan (2009), Corporate Risk Disclosure is the number of financial risks that firms present in their annual reports that consist of 45 items. Risk disclosure can be divided into: (a) General Risk Information; (b) Accounting Policies; (c) Financial Instrument; (d) Derivative hedging; (e) Reserve; and (f) Financial and other risks. The extent of financial risk disclosure in this study is indicated by scores: 1 is assigned when the items are presented in the annual report; and 0 is assigned when the items are not presented in the annual report. Financial risk disclosure can be measured by summing up the total score of disclosure for each annual report. The equation used to quantitatively measure the extent of financial risk disclosure in this study is presented below:

$$CRD = \frac{1}{MAX} \sum SCORE$$

Where, CRD = Disclosure score
MAX = Maximum value a company can achieve
SCORE = Score for each item of corporate risk disclosure
(1 and 0 for available and not available, respectively).

2) Firm Performance

To identify firm performance, we use Return on Assets (ROA) as indicated by the following formula:

$$ROA = \text{Net Incone} / \text{Total Asset}$$

3) Cost of Equity Capital

By cost of equity capital we mean the cost that the firm has to bear for providing information to the public and, thus, anticipating the risks by increasing the required rate of return on shares. Furthermore, Cost of Capital (COC) in this study is calculated by Capital Asset Pricing Model (CAPM). The method calculating COC using CAPM has been adopted by Mardiyah (2002) and Heriyanthi (2013). COC approximation using Capital Asset Pricing Model (CAPM) is represented in the following formula:

$$COC = Rft + \beta i\ (RMt - Rft)$$

Where,
Rft : Free-risk return as proxied by the 1-month Bank Indonesia's interest rate.

RMt : Market return of the Composite Stock Price Index (CSPI) on day t plus CSPI on day t-1 divided by CSPI on day t-1.
βi : Unsystematic risk for each company share i

4) Control Variable : Leverage dan Size
The control variables used in this study includes:
(a) LEV (Leverage) as measured using debt-to-asset ratio. Debt-to-asset ratio has been widely used as leverage proxies in previous studies (Amran et al., 2009; Oliviera et al., 2011). Debt-to-asset ratio is, by definition, the total amount of a company's liabilities divided by the total amount of the company's assets.
(b) SIZE, is the firm size as measured by Ln Total Asset over the period of the study.

4. Result and Discussion

Corporate Risk Disclosure affects Cost of Equity Capital

Based on the multiple linear regression analysis of Model 1 regression equation, the formula is written as follows:

$$COC = 0.560 - 0.306\ CDR + 0.038\ LEV + 0.008\ SIZE + e$$

Table 2. Determination Test

R	R Square	Adj R Square	Std Error of the Estimate
0.409	0.167	0.157	0.24667

Sources: processed

Table 3. ANOVA and T-test

ANOVA		
F		**Sig.**
17.010		0.000
Uji t		
Unstandardized Coefficients		**Sig.**
Constant	0.560	
CRD	-0.306	0.000
LEV	0.038	0.777
SIZE	0.008	0.860

Sources: processed

The adjusted r-squared value, as we can see in Table 1, is 0.157, which means that 15.7% variation in cost of equity capital can be explained by Corporate Risk Disclosure, while the remaining 84.3% can be explained by other variables not included in the model. The results of ANOVA indicate Sig. 000 at $\alpha = 5\%$, which means that the regression model is adequate to estimate the effect of Corporate Risk Disclosure on Cost of Equity Capital. Regression testing for Model 1 in Table 2 indicates the t-test value of 0.306 with Sig. 0.000 at $\alpha = 5\%$. This confirms that the result of this study is consistent with those of Botosan (1997) and Dhaliwal et al (2001). As suggested above, Corporate Risk Disclosure has a negative effect on Cost of Equity Capital. The more extensive the financial risks disclosure is, the lower the cost of equity capital will be. The more items disclosed, the higher the market liquidity is; for the reason that increased demand for securities will decrease the cost of equity capital.
Extensive disclosure lowers unanticipated risks and therefore reduces compensation costs for investors. According to Hassan (2009), risk disclosure that requires (a) General Risk Information (b) Accounting Policies (c) Financial Instrument (d) Derivative hedging (e) Reserve (f) Financial and Other Risks provides crucial information for investors to asses firm capability to survive and to meet its short-term and long-term obligations as well as to

estimate return on their investments. The regression analysis for Leverage as the control variable indicates no effect on cost of equity capital with Sig. 0.777 which is greater than α = 5%. Companies with funding structure that adopts Leverage technique need to maintain their liquidity to enable them to pay short-term and long-term debts. The regression analysis for Size as the control variable indicates Sig. 0.860, which is greater than α = 5%. This indicates that firm size has no effect on cost of equity capital. Both large and small companies incur costs to provide information to stakeholders.

Corporate Risk Disclosure and Firm Performance affect Cost Of Equity Capital

Based on the multiple linear regression analysis of Model 2 regression equation, the formula is written as follows

$$COC = 0.471 – 0.278\ CDR + 0.132\ FP - 0.171\ CDR*FP + 0.102\ LEV – 0.02\ SIZE + e$$

Model 2 adds up Firm Performance to determine the effect of Corporate Risk Disclosure on Cost of Equity Capital.

Table 4. Determination Test

R	R Square	Adj R Square	Std Error of the Estimate
0.488	0.238	0.223	0.23683

Sources: processed

Table 5. ANOVA and T-Test

ANOVA		
F		**Sig.**
15.780		0.000
t-test		
Unstandardized Coefficients		**Sig.**
Constant	0.471	
CRD	-0.278	0.014
FP	0.132	0.000
LEV	0.102	0.434
SIZE	-0.02	0.969
MODERATE	-0.171	0.000

Sources: processed

The adjusted r-squared value, as can seen in Table 3, is 0.223, which means that 22.3% variation in Cost of Equity Capital can be explained by Corporate Risk Disclosure and Firm Performance, while the remaining 77.7% can be explained by other variables not included in the model. The results of ANOVA indicate Sig. 0.000 at α = 5%, which means that the regression model is adequate to estimate the effect of Corporate Risk Disclosure and Firm Performance on Cost of Equity Capital. Regression testing for Model 2 in Table 4 indicates that Corporate Risk Disclosure affects Cost of Equity Capital with Sig. 0.014 at α = 5%. In addition, Firm Performance affects Cost of Equity Capital with Sig. 0.000 at α = 5%. Leverage and Size have no effect on Cost of Equity Capital. This confirms that the Model 2 regression analysis is consistent with Nahar and Azim (2017) stating that Firm Performance as the moderating variable is indicated with Sig. MODERATE of 0.000 at α = 5%. Firm Performance strengthen the effect of Corporate Risk Disclosure on Cost of Equity Capital as indicated by negative coefficient of -0.171 and increased Adjusted R-Squared Value of 0.157 (Table 1) to 0.223 (Table 2).

Corporate Risk Disclosure items are more commonly presented by poor-performing firms, because more extensive risk disclosure may avoid surprising information that leads to a negative market reaction. Investors' assessment of the company profile can be indicated by the level of transparency. Sophisticated and knowledgeable investors can assess firm performance more accurately (Deumes and Knechel, 2008) and risk disclosure helps companies improve their performance. Corporate Risk Disclosure is not mandatory for companies in developing countries. Based on agency theory, management needs shareholders' supervision to ensure that the business process runs effectively and efficiently (Jensen and Meckling, 1976). Contractual relationships require transparency with regard to positive and negative information about the expected returns. Corporate management can determine the best combination of financial structures through debt or equity. Debt and equity are important components in decision making concerning the financial structure of a business (Dhaliwa et al., 2011). Shareholders will react positively if the return on investment is greater than the cost of capital, which in turn improves the company's performance. The cost of capital is an important factor in determining the best company's financial structure (Dhaliwal et al., 2011).

5. Conclusions

The above analysis and discussion have led us to the conclusion that:

Corporrate Risk Disclosure affects Cost of Equity Capital

Higher levels of Corporate Risk Disclosure can lead to lower Cost of Equity Capital. Extensive disclosure reduces unpredictable risks and therefore lowers the cost of compensation for investors. Risk disclosure practices require disclosing of: (a) General Risk Information; (b) Accounting Policies; (c) Financial Instrument; (d) Derivative hedging; (e) Reserve; and (f) Financial and Other Risk. This provides investors with crucial information to assess firms' capability to survive and to meet their short-term and long-term obligations, as well as to estimate their return on investments.

Firm Performance strengthens the impact of Corporate Risk Disclosure on Cost of Equity Capital.

Corporate Risk Disclosure items are more commonly presented by poor-performing firms, because more extensive risk disclosure may avoid surprising information that leads to negative market reactions. Investors' assessment of the company profile can be indicated by the level of transparency. Corporate Risk Disclosure is not mandatory for companies in developing countries.

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Investigating the Interaction of Earning Quality and Information Asymmetry in the Banking Industry Using Simultaneous Equation System

Leila Vasegh Abadshapoori[*]
Amin Nazemi[**]
Navid Reza Namazi[***]

Abstract

Objective: Accounting information in financial markets is as a basis for deciding on the optimal allocation of limited financial resources. Also it is performance appraisal and the perspective of cash flows of investments or loans granted by the organization. Economic decisions of depositors and borrowers in the banking industry are made based on the quantity and quality of their information. The information of these banks, including earnings, must have the necessary quality characteristics in order to distribute financial resources among the members of the society in the best way along the decisions of information users. This can lead to an improvement in the economy and the growth of the banking system. Therefore, the purpose of this study is to investigate the interaction between earning quality and information asymmetry in the banking industry.

Method: To achieve the purpose of the research, data of 11 banks listed on the Tehran Stock Exchange (TSE) and Iran of OTC during a period of 11 years for the years 2007-2018 using the Rah Avard Novin, financial statements and the official site of the Tehran Stock Exchange was collected and analyzed using the structural equation method (SEM) and the two-way Granger causality test.

Results: The findings showed that information asymmetry in the banking industry is high and their earning quality is low. Information asymmetry has a negative effect on earning quality. On the other hand, if the quality of earning is low, it will increase information asymmetry. As a result, earnings quality also has a negative effect on information asymmetry. Finally, bilaterally, these two variables are the cause and effect of each other and have interaction.
The most important risk of the banking industry is their credit risk, which is due to the increase in debt to banks' capital. Another point is that most of the assets of banks are receivables from the provision of facilities, but depending on the steps through which the repayment of receivables, policies and regulatory tools can be repaid can lead to instability of banks.

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[*] M.A. of Accounting, Shiraz University, Shiraz, Iran. (**Email:** leilavasegh@gmail.com).
[**] **Corresponding Author**, Assistant Professor of Accounting, Shiraz University, Shiraz, Iran.
(**Email:** anazemi@rose.shirazu.ac.ir).
[***] Assistant Professor of Accounting, Shiraz University, Shiraz, Iran. (**Email:** nnamazi@rose.shirazu.ac.ir).
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Abstract

Conclusion: In the banking industry, the information gap is high, so the manager can present the amount of declared earning in the financial statements differently from the actual earning. In this case, the quality of earning decreases and leads depositors and borrowers to incorrect financial decisions. Wrong economic decisions lead to incorrect distribution of financial resources among members of society. In order not to reflect the instability of banks, managers may manage their profits, which implies low profit quality, and as a result, other people active in the capital market will be deprived of complete and transparent information within the organization. These conditions increase the information asymmetry surrounding the banking industry.

Keywords: *Earnings Quality, Information Asymmetry, Banking Industry, Simultaneous Equation.*

Paper Type: *Research Paper*.

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انجمن حسابداری ایران — دانشگاه شهید باهنر کرمان

بررسی تأثیر متقابل کیفیت سود و عدم تقارن اطلاعاتی در صنعت بانکداری با استفاده از سیستم معادلات هم‌زمان

لیلا واثق‌آباد شاپوری*

امین ناظمی**

نویدرضا نمازی***

چکیده

هدف: تصمیمات اقتصادی سپرده‌گذاران و گیرندگان تسهیلات در صنعت بانکداری، بر مبنای کمیت و کیفیت اطلاعات آن‌ها اتخاذ می‌شود. اطلاعات این بانک‌ها از جمله سود باید ویژگی‌های کیفی لازم را داشته باشد تا در امتداد تصمیمات استفاده‌کنندگان اطلاعات، توزیع منابع مالی بین افراد جامعه به بهترین شکل صورت گیرد تا منجر به بهبود اقتصاد و رشد نظام بانکداری شود. بنابراین، هدف این پژوهش بررسی تأثیر متقابل کیفیت سود و عدم تقارن اطلاعاتی در صنعت بانکداری است.

روش: در راستای هدف پژوهش، داده‌های ۱۱ بانک پذیرفته شده در بورس اوراق بهادار تهران و فرابورس ایران طی بازه زمانی ۱۱ ساله برای سال‌های ۱۳۹۷-۱۳۸۷ با استفاده از نرم‌افزار ره‌آورد نوین، صورت‌های مالی و سایت رسمی بورس اوراق بهادار تهران جمع‌آوری و به کمک روش معادلات ساختاری و آزمون علیت دوطرفه گرنجری، تحلیل شد.

یافته‌ها: یافته‌ها نشان داد که عدم تقارن اطلاعاتی در صنعت بانکداری سطح بالایی دارد و سطح کیفیت سود آن‌ها پایین است. عدم تقارن اطلاعاتی بر کیفیت سود تأثیر منفی دارد. از طرفی اگر کیفیت سود پایین باشد باعث افزایش عدم تقارن اطلاعاتی می‌شود. در نتیجه کیفیت سود بر عدم تقارن اطلاعاتی نیز تأثیر منفی دارد. در نهایت به شکل دوطرفه این دو متغیر علت و معلول یکدیگرند و تأثیر متقابل هم دارند.

نتیجه‌گیری: در صنعت بانکداری شکاف اطلاعاتی بالا است، در نتیجه مدیر می‌تواند مبلغ سود اظهاری در صورت‌های مالی را متفاوت از سود واقعی ارائه دهد. در این صورت کیفیت سود پایین آمده و منجر به تصمیمات مالی ناصحیح سپرده‌گذاران و گیرندگان تسهیلات می‌شود. تصمیمات نادرست اقتصادی موجب توزیع نادرست منابع مالی بین افراد جامعه می‌گردد.

واژه‌های کلیدی: *صنعت بانکداری، عدم تقارن اطلاعاتی، کیفیت سود، معادلات هم‌زمان.*

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* کارشناسی ارشد گروه حسابداری، دانشگاه شیراز، شیراز، ایران. (**رایانامه:** leilavasegh@gmail.com).

** **نویسنده مسئول**، استادیار گروه حسابداری، دانشگاه شیراز، شیراز، ایران. (**رایانامه:** anazemi@rose.shirazu.ac.ir).

*** استادیار گروه حسابداری، دانشگاه شیراز، شیراز، ایران. (**رایانامه:** nnamazi@rose.shirazu.ac.ir).

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مقدمه

اطلاعات حسابداری در بازارهای مالی به عنوان مبنایی برای تصمیم‌گیری درمورد تخصیص بهینه منابع محدود مالی و ارزیابی عملکرد، دور نمای جریان‌های نقدی سرمایه‌گذاری‌ها یا وام‌های اعطایی سازمان است (فرانسیس و همکاران[1]، ۲۰۰۴). در نتیجه، آثار و پیامدهای کیفیت اطلاعات حسابداری، مورد توجه سرمایه‌گذاران، مدیران، قانون‌گذاران و تدوین‌کنندگان استانداردها است (باتاچاریا و همکاران[2]، ۲۰۱۲). فلاوردی و وون سلمز[3] (۲۰۰۷) اطلاعات را داده‌های خام پردازش شده تعریف می‌کند که با تفسیر این اطلاعات آگاهی به وجود می‌آید و بر مبنای همین آگاهی، تصمیمات اتخاذ و نتایج اقتصادی آن مشخص می‌شود. بخشی از اطلاعات حسابداری در قالب مفهوم سود به ذینفعان صورت‌های مالی گزارش می‌شود. طبق تعریف باربریس و هوانگ[4] (۲۰۰۱)، کیفت سود حدی از صداقت تعریف شده است که عایدات گزارش شده را نشان می‌دهد. در شرایطی که اطلاعات از جمله سود به شکلی شفاف تهیه و به ذینفعان ارائه نشود، بین رقم واقعی سود و مبلغی که در صورت‌های مالی گزارش می‌شود شکافی ایجاد شده و از آن‌جایی که امکان دارد سود توسط مدیر دستکاری شود، می‌تواند با سود واقعی متفاوت باشد. بنابراین، سود ابرازی همیشه نمی‌تواند معیار خوبی برای تصمیم‌گیری باشد. از این رو، علاوه بر کمیت سود باید به کیفیت آن نیز توجه کرد (نمازی و رضایی، ۱۳۹۱).

یک سفارش خرید یا فروش خاص ناشی از وجود یک سرمایه‌گذار با اطلاعات خصوصی، تعریفی از حدود عدم تقارن اطلاعاتی است (باتاچاریا و همکاران، ۲۰۱۲). در بازارهای سرمایه‌ای که توزیع اطلاعات نامتقارن است، فروشنده به دلیل داشتن برتری اطلاعاتی نسبت به خریدار، قیمت بالاتری را برای سهام پیشنهاد می‌دهد که این فاصله قیمت پیشنهادی خریدار و فروشنده نمایانگر سطح عدم تقارن اطلاعاتی است (فرانسیس و همکاران، ۲۰۰۴). بنابراین، جهت اتخاذ تصمیم صحیح به‌وسیله سرمایه‌گذاران، اطلاعات حسابداری باید تضاد منافع و عدم تقارن اطلاعاتی را کاهش دهد. در این صورت کارایی بازار افزایش می‌یابد و اطمینان تصمیم‌گیران اقتصادی نیز محقق می‌گردد. حال این پرسش مطرح می‌شود که اگر فاصله بین سود واقعی و سود گزارش شده کمتر باشد و کیفیت سود بالا باشد، شکاف اطلاعاتی بین مدیر و مالک یا عدم تقارن اطلاعاتی نیز کاهش می‌یابد؟

کیفیت بالای اطلاعات افشا شده، عدم تقارن اطلاعاتی را در بازار سرمایه کاهش می‌دهد. میزان و نحوه جمع‌آوری و افشای اطلاعات توسط مدیریت در عدم تقارن اطلاعاتی بین مالک و مدیر نقش دارد، به این صورت که مدیر به دلیل وجود فرصت‌های رشد و سرمایه‌گذاری امکان دستکاری بیشتر صورت‌های مالی را دارد و در جهت انتقال منابع و مزایا به خود در تلاش است. این فعالیت‌های مدیریت از ارزش شرکت کاسته و هزینه‌های نمایندگی را در بر دارد (قربانی و همکاران، ۱۳۹۲). از دیگر پرسش‌های پژوهش که مطرح می‌شود این است که آیا عدم تقارن اطلاعاتی بر کیفیت سود گزارش شده توسط مدیریت تأثیر دارد؟ با توجه به دو پرسش مهمی مطرح شده، به نظر می‌رسد رابطه دو طرفه بین

کیفیت سود و عدم تقارن اطلاعاتی وجود داشته باشد. بنابراین، پژوهش حاضر به دنبال بررسی این رابطه به صورت متقابل و هم‌زمان است.

بانک‌ها به عنوان یک واسط وجوه مالی میان سپرده‌گذاران و متقاضیان دریافت تسهیلات، با پدیده عدم تقارن اطلاعاتی روبرو هستند، زیرا اغلب آن‌ها شناخت کافی و اصولی از متقاضیان تسهیلات خود ندارند. بنابراین، بانک‌ها در انجام فعالیت خود که ارائه تسهیلات از محل سپرده های عمومی است، دچار مشکل می شوند، به این معنی که اعتبارات به شکل ناکارا تخصیص و در نتیجه ریسک اعتباری بانک افزایش می یابد (مکیان و محبی، ۱۳۹۲، ۷۶). شبکه بانکی با جمع آوری منابع پراکنده و قرار دادن آن در اختیار سرمایه گذاران، باعث رشد سرمایه گذاری و در نهایت رشد درآمد ملی و بهبود رفاه جامعه می شود. در کشورهای درحال توسعه از جمله ایران میزان درآمد سرانه پایین و میل به مصرف بالا است. در نتیجه میزان پس انداز و منابع مالی برای سرمایه‌گذاری‌ها اندک و پراکنده است. لذا، بانک‌ها و مؤسسات پولی نقش مهم‌تری را برای تجهیز منابع و تخصیص مطلوب آن ایفا می کنند (مجتهد و حسن‌زاده، ۲۰۰۳).

مسئله‌ای که وجود دارد این است که در صنعت بانکداری تأثیر کیفیت سود و عدم تقارن اطلاعاتی با وجود رابطه علی بین آن‌ها، مورد بررسی قرار نگرفته است و در نتیجه چگونگی تأثیر متقابل آن‌ها و هم‌زمانی آن به صورت دقیق مشخص نیست. همچنین، ابعاد درون‌زا برای هر بعد تاکنون تعیین نشده است. افزون بر این، تأثیر متقابل متغیرهای برون‌زا با لحاظ تأثیر متغیرهای درون‌زا مورد بررسی قرار نگرفته است. بنابراین، این مطالعه به دنبال رفع نیاز ذینفعان و تصمیم‌گیران این حوزه جهت اخذ اطلاعات حسابداری باکیفیت است. با توجه به اهمیت بانک‌ها در اقتصاد کشور و سنجه‌های کیفیت سود و عدم تقارن اطلاعاتی در این صنعت خاص، هدف پژوهش بررسی تأثیر متقابل کیفیت سود و عدم تقارن اطلاعاتی در صنعت بانکداری است. به منظور بررسی دقیق‌تر از سیستم معادلات هم‌زمان استفاده می‌شود.

در مطالعات پیشین، رابطه یک‌طرفه بین کیفیت سود و عدم تقارن اطلاعاتی، در نظر گرفته شده است در حالی که با توجه به مطالب ذکر شده در بالا، این رابطه دو طرفه است و باید به شیوه هم‌زمان این رابطه دو طرفه مورد آزمون قرار گیرد. این پژوهش متغیرهای مناسب درون‌زا را برای هر سنجه برون‌زا مشخص می‌سازد، به طوری که تأثیر متغیرهای درون‌زا بر برون‌زا را نمایان سازد. دیگر موردی که این مطالعه را به طور کامل از مطالعات پیشین متمایز می‌سازد، نحوه بررسی تأثیر متغیرهای کیفیت سود و عدم تقارن اطلاعاتی است که تأثیر متغیرهای درون‌زا را هم‌زمان بر این رابطه مورد سنجش قرار می‌دهد. بنابراین، این پژوهش در صدد بررسی تأثیر متقابل و هم‌زمان عدم تقارن اطلاعاتی و کیفیت سود با استفاده از معادلات هم‌زمان در صنعت بانکداری است تا شکافی که در مطالعات پیشین است را برطرف نماید و تأثیر این دو عامل به گونه دقیق‌تر مورد واکاوی قرار گیرد. افزون بر این، این پژوهش تاکنون در صنعت بانکداری انجام نشده است. بنابراین، این پژوهش بدیع است و به دنبال بسط دانش حسابداری در خصوص صنعت بانکداری است. این پژوهش به دنبال پاسخ به این پرسش‌هاست که آیا در شرایطی که عدم تقارن اطلاعاتی بر کیفیت سود تأثیر می‌گذارد به شکل متقابل و کیفیت سود نیز بر عدم تقارن اطلاعاتی تأثیر دارد؟ جهت تأثیر دوطرفه چگونه است؟ هدف این پژوهش پاسخ به پرسش‌های مطرح شده است.

به منظور نیل به اهداف پژوهش، در ابتدا مبانی نظری مربوط به عدم تقارن اطلاعاتی و کیفیت سود مطرح می‌شود. پس از بیان پیشینه مطالعه، الگو، روش‌شناسی، جامعه و نمونه آماری پژوهش ارائه می‌شود. پس از تشریح متغیرها، آمار توصیفی، نتایج آزمون فرضیه‌ها، بحث و نتیجه‌گیری و پیشنهادهای پژوهش بیان می‌شود.

مبانی نظری

عدم تقارن اطلاعاتی

گردآوری، تأمین و توزیع متناسب و عادلانه منابع مالی محدود بین افراد جامعه معیاری برای توسعه و پیشرفت اقتصاد هر کشوری است. مؤسسات مالی همچون بانک‌ها در این امور جایگاه مهم و نقش پررنگ واسطه‌گری مالی را عهده‌دار هستند. از این رو نقش شفافیت اطلاعات این صنعت در جامعه بسیار حائز اهمیت است. در این راستا، عدم تقارن اطلاعاتی یکی از مباحث مهم است. باتاچاریا و همکاران، (۲۰۱۲) حدود عدم تقارن اطلاعاتی را یک سفارش خرید یا فروش خاص ناشی از وجود یک سرمایه‌گذار با اطلاعات خصوصی تعریف کردند.

عدم تقارن اطلاعاتی را می‌توان متأثر از تئوری بازارگردانی دانست. طبق این تئوری، که این افراد بین دو گروه معامله‌گر در بازار سرمایه قرار می‌گیرند. گروه اول شامل سرمایه‌گذارانی است که اطلاعات بیشتری نسبت به بازارگردان دارد و اگر معامله‌ای بین آنان رخ دهد، بازارگردان متضرر می‌شود چرا که سرمایه‌گذار آگاه تنها در مواردی با او وارد معامله می‌شود که قیمت‌های اعلام شده نسبت به اطلاعات آنان مطلوب باشد. گروه دوم سرمایه‌گذاران به اصطلاح کم اطلاع هستند که نقدینگی بالا یا نیاز شدید به نقدینگی دارند. بازارگردان در معامله با اینگونه افراد، زیان ناشی از معامله با گروه اول را به وسیله کسب سود ناشی از داشتن اطلاعات بیشتر جبران می کند. درنهایت توازن بین سود و زیان ذکر شده، بازار خرید و فروش را ایجاد می کند.

طبق مطالعه اسکات و اوبریان[5] (۲۰۰۳) که از تئوری نمایندگی نشأت می‌گیرد، یکی از پیامدهای ناشی از تضاد منافع میان سهامداران و مدیران، عدم تقارن اطلاعاتی است. عدم تقارن اطلاعاتی ناشی از تضاد منافع بین مدیر و مالک در بستر نظریه نمایندگی ایجاد می‌شود (حساس‌یگانه و خیرالهی، ۱۳۸۷). بر اساس الگوی جنسن و مکلینگ[6]، (۱۹۷۶)، یکی از مشکلات نمایندگی، ناتوانی سهامدار در پیگیری روزانه اقدامات مدیر است. بنابراین، سهامدار اطلاعات لازم درمورد عملیات مدیر را ندارد و این حالت عدم تقارن اطلاعات نامگذاری شده است، به این معنی که اطلاعات اضافی مدیر که اطلاعات خصوصی تعریف می‌شود، در اختیار مالک نیست (نمازی، ۱۳۸۴).

طبق نظریه نمایندگی زمانی که فعالیت بنگاه‌های اقتصادی گسترده‌تر می‌شود، برای اداره بهتر امور، طی قراردادی بین مدیر و مالک، اختیارات از مالک به مدیر تفویض می‌شود (جنسن و مکلینگ، ۱۹۷۶). طبق این نظریه، اگر در این قرارداد، به تمام جوانب و منافع دو طرف توجه نشود، مدیران می‌توانند با اطلاعات خود و با استفاده از اطلاعات درون سازمانی که در دسترس سرمایه‌گذاران و اعتباردهندگان نیست، با دستکاری صورت‌های مالی و سایر گزارش‌های غیرمالی، استفاده‌کنندگان را گمراه کنند. پس می‌توان در نظر داشت که در شرایط عدم تقارن اطلاعاتی دستکاری‌های گزارش‌های مالی توسط مدیر، کیفیت سود نیز از این شرایط متأثر شود. با توجه به مطالب بیان شده، فرضیه اول به شرح زیر ارائه می‌شود:

فرضیه اول: عدم تقارن اطلاعاتی بر کیفیت سود تأثیر منفی معنادار دارد.

کیفیت سود

سود در زمره مهمترین اطلاعات حسابداری است که همواره مورد توجه گروه های مختلف استفاده کننده قرار گرفته است. به واسطه سود واحد تجاری، ارزیابی دورنمای جریان‌های نقدی سرمایه‌گذاری‌ها یا وام‌های اعطایی انجام می‌شود (فرانسیس و همکاران، ۲۰۰۴). عبارت کیفیت سود به توانایی مدیران در استفاده از اقلام اختیاری از جمله، اصول یا استانداردهای حسابداری، روش‌های برآورد و زمان‌بندی معاملات در اندازه‌گیری و گزارشگری سود اشاره دارد (سلیمانی‌امیری و همکاران، ۱۳۹۷).

عدم تقارن اطلاعات میان مدیریت و افراد برون سازمانی نظیر سرمایه‌گذاران و اعتباردهندگان فرصتی را برای مدیر فراهم می‌کند که با ابزارهایی مانند اقلام تعهدی اختیاری، رقم سود دستکاری شود و کیفیت سود متأثر از این رویداد باشد (باتاچاریا و همکاران، ۲۰۱۲). سود گزارش شده از شرایط مالی واقعی واحد اقتصادی فاصله گرفته و کیفیت محتوای سود تحت تأثیر قرار می‌گیرد در نتیجه سرمایه‌گذاران، اعتباردهندگان، قانون‌گذاران، مشتریان و رقبا طبق سود گزارش شده با کیفیت پایین، ممکن است تصمیمات نادرستی اتخاذ نمایند (رضازاده و آزاد، ۱۳۸۷). با توجه به مطالب بیان شده، فرضیه دوم به شرح زیر ارائه می‌شود:

فرضیه دوم: کیفیت سود بر عدم تقارن اطلاعاتی تأثیر منفی معنادار دارد.

با توجه به مبانی نظری ارائه شده، در بانک‌های پذیرفته شده در بورس اوراق بهادار تهران و فرابورس ایران، کیفیت سود بر عدم تقارن اطلاعاتی تأثیر دارد. همچنین، عدم تقارن اطلاعاتی نیز، بر کیفیت سود تأثیر دارد. بنابراین، با توجه به تأثیر متقابل این دو متغیر بر یکدیگر، این پژوهش به دنبال بررسی تأثیر هم‌زمان و متقابل کیفیت سود و عدم تقارن اطلاعاتی با استفاده از سیستم معادلات همزمان است تا شکافی که در مطالعات پیشین است را برطرف نماید و تأثیر این دو عامل به گونه دقیق‌تر مورد واکاوی قرار گیرد. افزون بر این، این پژوهش تاکنون در صنعت بانکداری انجام نشده است. بنابراین، مطالعه این تأثیر با توجه به اهمیت سیستم بانکی در هر کشور، حائز اهمیت است. با توجه به مطالب بیان شده، فرضیه سوم به شرح زیر ارائه می‌شود:

فرضیه سوم: کیفیت سود و عدم تقارن اطلاعاتی برهم تأثیر متقابل و هم‌زمان دارند.

پیشینه پژوهش

پیشینه مطالعاتی درمورد رابطه دو متغیر عدم تقارن اطلاعاتی و کیفیت سود در صنعت بانکداری اندک است، سایر پیشینه‌های مرتبط با ارزیابی متغیرهای پژوهش در شرکت‌های پذیرفته شده در بورس اوراق بهادار تهران در ادامه مطرح می‌شود. باتاچاریا و همکاران[۷] (۲۰۱۰) رابطه کیفیت سود و عدم تقارن اطلاعاتی را بررسی کردند. نتایج پژوهش آنان نشان داد که کیفیت پایین سود موجب افزایش عدم تقارن اطلاعاتی در بازارهای مالی می‌شود. کورمیر و همکاران[۸] (۲۰۱۳) درپژوهشی به بررسی تأثیر افشای اختیاری بر رابطه بین کیفیت سود و عدم تقارن اطلاعاتی پرداختند. یافته‌های آن‌ها نشان داد که کیفیت بالای سود و افشای اختیاری هردو باعث کاهش عدم تقارن اطلاعاتی می‌شود.

دی[9] (۲۰۱۷) به صورت تحلیلی نشان داد که وجود عدم تقارن اطلاعاتی بین مدیریت سود و سهامداران یک شرط اساسی برای مدیریت سود است. وی فرض کرد که بین گروههای سهامداران همپوشانی وجود دارد. سهامداران فروشنده به مدیریت اجازه می دهند که به منظور القای یک تصویر مناسب به گروه خریداران از یک سیاست مشخص مدیریت سود پیروی نماید. در این الگو، مدیر از یک مزیت اطلاعاتی نسبت به سهامداران برخوردار است. در نتیجه عدم تقارن اطلاعاتی شرط ضروری برای مدیریت سود در این وضعیت است. ترن و همکاران[10] (۲۰۱۹) به بررسی رابطه بین مدیریت سود و تنوع عملکرد بانکی در بازه زمانی ۲۰۱۵-۲۰۰۱ پرداختند. نتیجه پژوهش آنان بیانگر وجود رابطه مثبت و معنادار بین مدیریت سود و تنوع عملکرد بانکها بود. همچنین متفاوت بودن عملکرد بانک‌ها، عدم تقارن اطلاعاتی را افزایش می‌دهد و تأثیر تنوع عملکرد بانکی در دوران بحرانی بر مدیریت سود کمتر است. هوساین و هوساین[11] (۲۰۲۰) تأثیر کیفیت سود را بر هزینه بدهی در شرکت‌های فرانسوی طی بازه زمانی ۲۰۱۵-۲۰۰۵ مورد بررسی قرار دادند. آنان دریافتند که کیفیت سود تأثیر منفی معنادار بر هزینه بدهی دارد.

باباجانی و همکاران (۱۳۹۳) رابطه بین عدم تقارن اطلاعاتی و مدیریت سود را بررسی کردند. نتایج پژوهش نشان داد که شاخص عدم تقارن اطلاعاتی بر میزان مدیریت سود تأثیر مثبت و معناداری دارد. ثقفی و همکاران (۱۳۹۵) به بررسی رابطه کیفیت سود و عدم تقارن اطلاعاتی در شرکت‌های پذیرفته شده در بورس اوراق بهادار تهران پرداختند. آنان دریافتند که سطح عدم تقارن اطلاعاتی با افزایش یا کاهش کیفیت سود رابطه ندارد، ولی عدم تقارن اطلاعاتی در دوره زمانی پس از اعلام سود نسبت به قبل از آن افزایش می‌یابد. مشکی و همکاران (۱۳۹۷) با مطالعه استراتژی مدیریت، رقابت بازار و کیفیت سود را در بازه ۱۳۹۴-۱۳۸۹ به این نتیجه رسیدند که استراتژی مدیریت بر کیفیت سود تأثیر دارد. میزان این گرایش نیز بسیار بااهمیت است.

قوسی (۱۳۹۸) در پژوهشی مدیریت سود واقعی بر محتوای اطلاعاتی سود با تأکید بر عدم تقارن اطلاعاتی در شرکت‌های پذیرفته شده در بورس اوراق بهادار تهران را بررسی کردند. طبق نتایج پژوهش محتوای اطلاعاتی سود بر مدیریت سود واقعی تأثیر منفی و معنی دار دارد. همچنین عدم تقارن اطلاعاتی بر محتوای اطلاعاتی سود تأثیر معنی دار دارد ولی مدیریت سود واقعی با عدم تقارن اطلاعاتی بر محتوای اطلاعاتی سود تاثیری ندارد. داداشی و نوروزی (۱۳۹۹) رابطه بین کیفیت سود و هزینه سرمایه را مورد بررسی قرار دادند. نتایج پژوهش آن‌ها نشان داد که بین این دو متغیر رابطه معنادار وجود دارد.

روش‌شناسی و الگوی مفهومی پژوهش

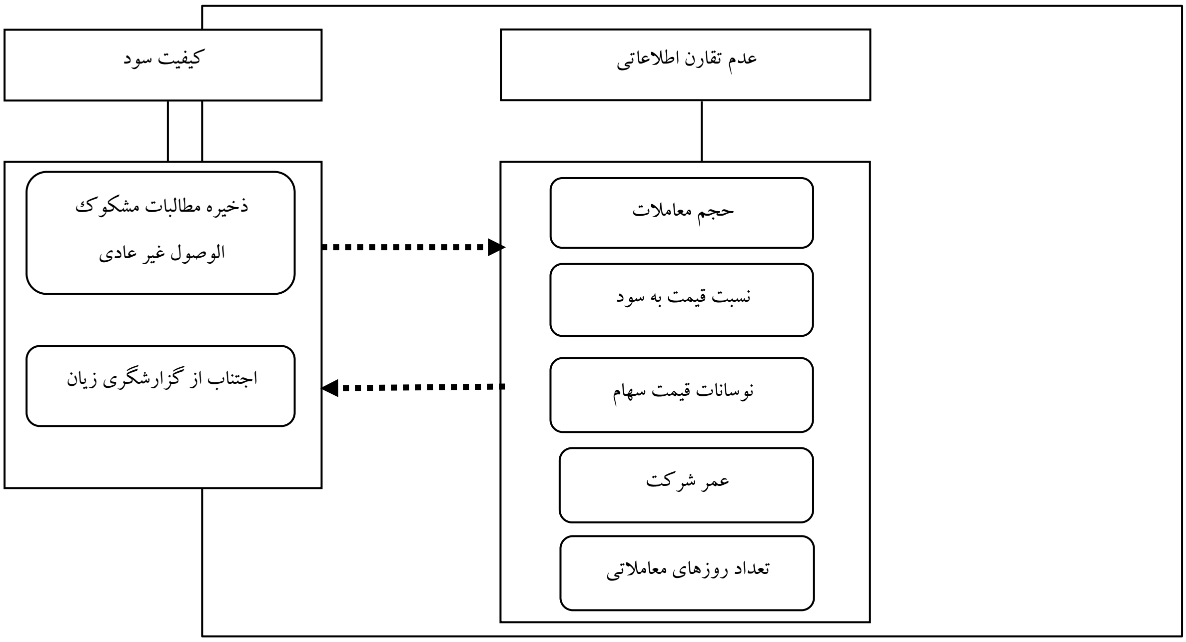
این پژوهش از حیث هدف یک پژوهش کاربردی است. هم‌چنین، پژوهش حاضر از دسته پژوهش‌های توصیفی، کمّی و پس‌رویدادی است که از روش علمی ساخت و اثبات تجربی استفاده می‌کند و بر اساس فرضیه‌ها و طرح‌های پژوهش از قبل تعیین شده انجام می‌شود. از این دسته پژوهش‌ها زمانی استفاده می‌شود که معیار اندازه‌گیری داده‌ها کمّی است و برای استخراج نتیجه‌ها از فن‌های آماری استفاده می‌شود (نمازی، ۱۳۸۲). برای تدوین متون و ادبیات پژوهش از مطالعات کتابخانه‌ای استفاده می‌شود که در برگیرنده کتب، پایان‌نامه‌ها، و نشریات تخصصی فارسی و انگلیسی و هم‌چنین پایگاه‌های الکترونیکی است. برای گردآوری داده‌های موردنیاز برای انجام این پژوهش از صورت‌های مالی

بانک‌های پذیرفته شده در بورس اوراق بهادار تهران و فرابورس ایران، موجود در سایت کدال، نرم‌افزار ره‌آورد نوین و همچنین از ترازنامه بانک‌ها، و همچنین از اطلاعات بازار سهام آنها استفاده شد.

در پژوهش حاضر برای آزمون فرضیه پژوهش براساس داده‌های بدست آمده از آمار توصیفی، بررسی پایایی متغیرهای پژوهش، بررسی اثرات متغیرهای مورد مطالعه، آزمون‌های استنباطی و آزمون‌های تأیید کننده با استفاده از نرم‌افزارهای ایویوز برای آمار توصیفی و آزمون نرمال بودن و علیت دوطرفه گرنجری و Smart PLS نسخه ۲ برای مدل یابی معادلات ساختاری و تحلیل مسیر و برازش مدل انجام شده است.

الگوی مفهومی پژوهش

با توجه به مبانی نظری پژوهش، الگوی مفهومی پژوهش تدوین شده است. شکل ۱، الگوی مفهومی پژوهش را نشان می‌دهد. در این الگو چگونگی تأثیر متقابل متغیرهای درون‌زا و همچنین برون‌زای پژوهش نشان داده شده است.



شکل ۱. نحوه رابطه و تأثیر متغیرهای پژوهش

طبق شکل ۱، با استفاده از تئوری بازارگردانی، طبق پژوهش باباجانی و همکاران (۱۳۹۳)، با استفاده از ترکیب پنج سنجه حجم معاملات، نوسان قیمت سهام، نسبت قیمت به سود (P/E)، تعداد روزهای معاملاتی و عمر شرکت شاخصی برای اندازه‌گیری عدم تقارن اطلاعاتی در نظر گرفته می‌شود. کیفیت سود نیز مطابق با شاخص دستکاری ذخیره مطالبات مشکوک‌الوصول تسهیلات (LLP[12]) و الگوی زین‌الدین و لئو[13] (۲۰۱۸)، با استفاده از دو شاخص اجتناب از گزارشگری زیان و ذخیره مطالبات مشکوک‌الوصول غیرعادی ارزیابی می‌شود.

شایان ذکر است که در این الگو، با فرض وجود رابطه و تأثیر متقابل متغیرهای کیفیت سود و عدم تقارن اطلاعاتی، متغیرهای کنترلی که اندازه بانک‌ها و سپرده بانکی است، به طور هم‌زمان بر متغیرهای مستقل و وابسته (که نقش آن‌ها به دلیل علیت متقابل جا به جا می‌شوند، یعنی در حالت اول عدم تقارن اطلاعاتی متغیر وابسته و کیفیت سود متغیر مستقل و در حالت دوم عدم تقارن اطلاعاتی متغیر مستقل و کیفیت سود متغیر وابسته است) تأثیر می‌گذارند.

اندازه‌گیری متغیرهای پژوهش

این پژوهش به بررسی تأثیر متقابل کیفیت سود بر عدم تقارن اطلاعاتی در صنعت بانکداری با استفاده از معادلات هم‌زمان می‌پردازد. در معادلات هم‌زمان، کیفیت سود به عنوان متغیر مستقل و عدم تقارن اطلاعاتی به عنوان متغیر وابسته و بار دیگر کیفیت سود متغیر وابسته و عدم تقارن اطلاعاتی متغیر مستقل درنظرگرفته می‌شود. هر کدام از این دو متغیر با کمک متغیرهای برون‌زا ارزیابی می‌شوند. در ادامه نحوه اندازه‌گیری هر کدام از متغیرهای درون‌زا (کیفیت سود و عدم تقارن اطلاعاتی) و متغیرهای برون‌زا در پژوهش حاضر بیان می‌شود.

عدم تقارن اطلاعاتی

در این پژوهش طبق مطالعه باباجانی و همکاران (۱۳۹۳) از پنج سنجه حجم معاملات، نوسان قیمت سهام، نسبت قیمت به سود (P/E)، تعداد روزهای معاملاتی و عمر شرکت برای اندازه‌گیری عدم تقارن اطلاعاتی استفاده می‌شود. سپس با ترکیب این پنج سنجه یک شاخص کلی[۱۴] محاسبه می‌شود.

به‌منظور ساخت شاخص ترکیبی، ابتدا رتبه چارکی بانک‌ها برای تمام سنجه‌های پنج‌گانه محاسبه می‌شود، به‌طوری که رتبه بالاتر در هر سنجه، به معنی درجه بالاتر عدم تقارن اطلاعاتی باشد. سپس رتبه‌های مربوط به هریک از آن‌ها در مورد هر یک با یکدیگر جمع می‌شود. بنابراین، میزان ارزش هر شاخص می‌تواند از ۵ تا ۲۵ باشد که هر چه این عدد بزرگ‌تر باشد، میزان عدم تقارن اطلاعاتی بیشتر خواهد بود.

حجم معاملات: به مجموع کل سهام مبادله شده بانک در یک دوره زمانی معین اطلاق می‌شود. طبق الگوی زین‌الدین و لئو (۲۰۱۸)، بانک‌های دارای حجم معاملات بالاتر، نوسان بیشتری در بازدهی سهام خود دارند که این امر در نهایت منجر به عدم تقارن اطلاعاتی بیشتر می‌شود.

نوسان قیمت سهام: به پراکندگی در بازدهی روزانه سهام طی سال مورد بررسی، اطلاق می‌شود. طبق مطالعات کورمیر و همکاران (۲۰۱۳) نوسانات قیمت سهام و عدم تقارن اطلاعاتی رابطه معکوس دارند، بنابراین، انتظار می‌رود هرچقدر سرمایه‌گذاران با سطح بالاتری از عدم تقارن اطلاعاتی مواجه باشند، احتمال پیش‌بینی غیردقیق بازده سهام توسط آن‌ها بیشتر باشد.

نسبت قیمت به سود (P/E): حاصل تقسیم قیمت سهام به سود هر سهم و بیانگر فرصت‌های رشد بانک است. انتظار می‌رود بانک‌ها با فرصت رشد بیشتر، سطح عدم تقارن اطلاعاتی بالاتری داشته باشند.

تعداد روزهای معاملاتی: تعداد روزهایی که در سال، سهام بانک‌ها معامله شده است. انتظار می‌رود سطح عدم تقارن اطلاعاتی بانک‌ها با کاهش تعداد روزهای توقف نماد بانک‌ها و افزایش حجم معاملات آن‌ها، کاهش یابد.

عمر شرکت: به زمان پذیرش در بورس اطلاق می‌شود. انتظار می‌رود هرچه سال‌های بیشتری از زمان حضور در بازار سرمایه گذشته باشد، اطلاعات بیشتری از بانک وجود داشته باشد، از این رو می‌توان گفت عمر بانک با عدم تقارن اطلاعاتی رابطه معکوس دارد (و لئو، ۲۰۱۸).

کیفیت سود

از آنجا که کیفیت سود به طور مستقیم قابل اندازه‌گیری نیست، روش‌های برآورد آن در صنعت بانکداری طبق مطالعه ترن و همکاران (۲۰۱۹) با تمرکز بر مفهوم دستکاری ذخیره مطالبات مشکوک‌الوصول تسهیلات است. مفهوم مطالبات مشکوک الوصول از مهم‌ترین مفاهیم اقلام تعهدی در بانک‌ها است و نشان دهنده عدم تقارن اطلاعاتی است، زیرا به قضاوت ذهنی مدیران بستگی دارد (بیتی و لیائو[15]، ۲۰۱۴). از بین الگوهای ارزیابی کیفیت سود در صنعت بانکداری، الگوی استفاده شده توسط زین‌الدین و لئو (۲۰۱۸) در این پژوهش استفاده می‌شود. در این الگو علاوه بر تمرکز بر مفهوم ذخیره مطالبات مشکوک‌الوصول از مفهوم اجتناب از گزارشگری زیان نیز استفاده می‌شود و با استفاده از این دو شاخص کیفیت سود ارزیابی می‌شود.

در این الگو، برای سنجش کیفیت سود، اقلام تعهدی به دو دسته تقسیم می‌شوند؛ دسته اول شامل اقلام تعهدی است که مدیریت نسبت به آن‌ها دارای اختیار عمل است و می‌توان از آن‌ها برای کیفیت سود استفاده نمود. دسته دوم شامل اقلام تعهدی است که مدیریت فاقد اختیار دخل و تصرف در وضعیت آن‌ها است. در صنعت بانکداری، در اکثر مواقع تحلیل دو مرحله‌ای با توجه به مطالبات مشکوک الوصول ناشی از تسهیلات بانکی برای موشکافی کیفیت سود انجام می‌شود. در این روش، در مرحله نخست، بخش تحت کنترل (احتیاطی) حساب‌های تعهدی از بخش خارج از کنترل جدا می‌شود. در حقیقت در مرحله نخست، بخش ذخیره مطالبات مشکوک‌الوصول الگوسازی می‌شود و ارزش‌های باقیمانده ایجاد شده در این مرحله که معادل با بخش احتیاطی یا تحت کنترل تلقی می‌شوند، در مرحله دوم به عنوان متغیر وابسته در نظر گرفته می‌شوند. در این مطالعه دو معیار برای سنجش کیفیت سود وجود دارد، زیرا پدیده کیفیت سود یک سنجه چند بعدی است و استفاده از یک معیار به طور مناسب و جامع تمام ابعاد احتمالی آن را در برنمی‌گیرد. این دو سنجه در مطالعات گذشته به‌عنوان معیارهای مطمئن و معتبر نشان داده شده‌اند (زین الدین و لئو، ۲۰۱۸). در ادامه این دو سنجه تشریح می‌شوند.

ذخیره مطالبات مشکوک‌الوصول غیرعادی: به دلیل قابل توجه بودن مطالبات مشکوک الوصول در صنعت بانکداری و اختیار عمل مدیران در اندازه‌گیری آن به‌عنوان یکی از معیارهای کیفیت سود استفاده می‌شود. در رابطه (۱) نحوه اندازه‌گیری این متغیر نشان داده می‌شود.

$$ALLP_{it} = \alpha_0 + \alpha_1 LCO_{it} + \alpha_2 LLA_{it} + \alpha_3 \Delta NPL_{it} + \alpha_4 EBITP_{it} + \varepsilon_{it} \qquad (۱)$$

$ALLP_{it}$: ذخیره مطالبات مشکوک الوصول غیر عادی بانک‌ها برای سال **t**،

LCO_{it}: خالص وام‌های سوخت شده در سال **t**،

LLA_{it}: مقدار مجاز یا ذخیره مطالبات مشکوک الوصول بانک‌ها در پایان سال **t-۱**،

ΔNPL_{it}: تغییرات در وام‌های سررسید گذشته بانک‌ها در سال **t** نسبت به سال **t-۱**،

$EBITP_{it}$: سود قبل از مالیات و ذخیره مطالبات مشکوک الوصول بانک‌ها برای سال **t**.

تمامی متغیرها در این رابطه برحسب دارایی‌های ابتدای دوره هم مقیاس می‌شوند. همچنین، در این رابطه جزء باقی‌مانده رگرسیون به‌عنوان معیار سنجش کیفیت سود در نظر گرفته می‌شود.

اجتناب از گزارشگری زیان: در این متغیر ابتدا نموداری از سود هم‌مقیاس شده (سود قبل از مالیات تقسیم بر کل دارایی‌ها) تهیه و میزان دامنه نوسان آن بررسی می‌شود. در شرایط عدم مدیریت سود، انتظار می‌رود که این نمودار ویژگی نرمال بودن و تقارن بیشتری داشته باشد و به بیان دیگر کیفیت سود بالاتری داشته باشند. طبق پژوهش زین‌الدین و لئو (۲۰۱۸) در صورتی که رقم سود هم‌مقیاس شده بین صفر و ۰/۱۵ در هر دوره باشد، عدد یک و در غیر این صورت عدد صفر برای هر بانک به عنوان شاخصی از کیفیت سود در نظر گرفته می‌شود. عدد یک به معنی کیفیت سود کمتر و عدد صفر به معنی کیفیت سود بیشتر است.

متغیرهای کنترلی

پژوهش حاضر براساس مطالعه ثقفی و همکاران (۱۳۹۵) اندازه و سپرده بانکی به‌عنوان متغیرهای کنترلی در نظر گرفته شده و نحوه محاسبات آنها به صورت زیر است:

اندازه بانک: لگاریتم طبیعی مجموع درآمدها،

سپرده بانکی: حاصل تقسیم جمع کل سپرده‌ها به کل دارایی‌های اول دوره.

جدول ۱، تعریف و اندازه‌گیری متغیرهای پژوهش را نشان می‌دهد.

جدول ۱. تعریف و اندازه‌گیری متغیرهای پژوهش

نام متغیر	نماد انگلیسی	تعریف عملیاتی
پنج شاخص برای اندازه‌گیری عدم تقارن اطلاعاتی (ASSEMETRY)		
حجم معاملات	Turnover	جمع کل سهام مبادله شده بانک در یک دوره زمانی معین
نوسان قیمت سهام	Stock price fluctuations	پراکندگی در بازدهی روزانه سهام طی سال مورد بررسی
نسبت قیمت به سود	P/E	حاصل تقسیم قیمت سهام به سود هر سهم
تعداد روزهای معاملاتی	Trading day	کل روزهای فعالیت در بورس و فرابورس منهای تعداد روزهای توقف نماد بانک‌ها
عمر بانک	Bank life	مدت زمان پذیرش بانک در فرابورس و بورس
دو شاخص برای اندازه‌گیری کیفیت سود (EQUALITY)		
ذخیره مطالبات مشکوک الوصول غیر عادی بانک‌ها برای سال **t**	ALLP	به شرح رابطه شماره ۱
اجتناب از گزارشگری زیان	ARL	در صورتی که رقم سود هم‌مقیاس شده بین صفر و ۰/۱۵ در هر دوره باشد، عدد یک و در غیر این صورت عدد صفر قرار داده می‌شود.
متغیرهای مربوط به محاسبه ALLP		
خالص وام‌های سوخت شده در سال **t**	LCO	میزان وام سوخت شده در هر سال
مقدار مجاز یا ذخیره مطالبات مشکوک الوصول بانک‌ها در پایان سال **t-1**	LLA	ذخیره مطالبات مشکوک‌الوصول برای تسهیلاتی است که بیش از ۱۸ ماه از سررسید آن‌ها گذشته است.
تغییرات در وام‌های سررسید گذشته بانک‌ها در سال **t** نسبت به سال **t-1**	NPL	تسهیلاتی است که از سررسید آن بین ۲ تا ۶ ماه گذشته است.
سود قبل از مالیات و ذخیره مطالبات مشکوک‌الوصول بانک‌ها برای سال **t**.	EBITP	سود خالص به علاوه مالیات و ذخیره مطالبات مشکوک‌الوصول
متغیرهای کنترلی		
اندازه بانک	Size	لگاریتم طبیعی مجموع درآمدها
سپرده بانکی	Depo	حاصل تقسیم جمع کل سپرده‌ها به کل دارایی‌های اول دوره

جامعه و نمونه آماری پژوهش

جامعه آماری این پژوهش شامل ۲۳ بانک پذیرفته شده در بورس اوراق بهادار تهران و فرابورس ایران در دوره زمانی ۱۱ ساله شامل سال‌های ۱۳۹۷-۱۳۸۷ است. باتوجه به شرایط زیر، تعداد ۱۱ بانک برای آزمون فرضیه‌های پژوهش انتخاب شدند:

۱. بانک‌ها باید قبل از سال ۱۳۸۷ در بورس و فرابورس پذیرفته شده باشند و از ابتدای سال ۱۳۸۷ سهام آن‌ها در بورس و فرابورس معامله شود.

۲. به لحاظ افزایش قابلیت مقایسه، بانک‌ها باید پایان سال مالی آن‌ها منتهی به پایان اسفند ماه باشد.

۳. باید در فاصله زمانی ۱۳۸۷ تا ۱۳۹۷ تغییر سال مالی یا تغییر فعالیت نداده باشند.

۴. در دوره مورد بررسی توقف معامله قابل توجه نداشته باشند.

۵. دسترسی لازم به صورتهای مالی وجود داشته باشند.

معادله‌های رگرسیونی فرضیه‌های پژوهش

با توجه به پژوهش‌های اسکات و اوبریان (۲۰۰۳) و حساس‌یگانه و خیرالهی، (۱۳۸۷)، معادله رگرسیونی فرضیه اول به شرح رابطه (۲) است:

$$ASSYMETRY_{jt} = \beta_0 + \beta_1 EQUALITY_{jt} + \beta_2 Size_{jt} + \beta_3 DEPO_{jt} + \varepsilon_{jt} \qquad \text{(۲) رابطه}$$

طبق پژوهش فرانسیس و همکاران (۲۰۰۴)، معادله رگرسیونی فرضیه دوم پژوهش، به شرح رابطه (۳) است:

$$EQUALITY_{jt} = \beta_0 + \beta_1 ASSYMETRY_{jt} + \beta_2 Size_{jt} + \beta_3 DEPO_{jt} + \varepsilon_{jt} \qquad \text{(۳) رابطه}$$

با توجه به مبانی نظری و پیشینه پژوهش، پس از عدم‌رد فرضیه‌های اول و دوم پژوهش، فرضیه سوم مطالعه مبنی بر تبیین رابطه و تأثیر متقابل متغیرهای کیفیت سود و عدم تقارن اطلاعاتی، به گونه هم‌زمان انجام می‌شود. جهت آزمون فرضیه سوم، از آزمون علیت دوطرفه گرنجری استفاده شده است.

آمار توصیفی و ماتریس کوواریانس

به‌منظور شناخت بهتر ماهیت جامعه‌ای که در پژوهش، مطالعه قرار می‌شود و آشنایی بیش‌تر با متغیرهای پژوهش، قبل از تجزیه و تحلیل داده‌های آماری، لازم است این داده‌ها از نظر آمار توصیفی بررسی شود. جدول ۲ آمار توصیفی برای همه متغیرهای پژوهش را نشان می‌دهد.

جدول ۲. آماره‌های توصیفی متغیرهای پژوهش

آماره/ متغیر	میانگین	میانه	انحراف معیار	بیشینه	کمینه
شاخص عدم تقارن اطلاعاتی	۱۳/۷۳۶	۱۴/۰۰۰	۳/۷۰۸	۲۲/۰۰۰	۵/۰۰۰
شاخص ذخیره مطالبات مشکوک الوصول غیرعادی	-۰/۰۸۱	-۰/۰۲۶	۰/۲۶۹	۰/۳۳۲	-۱/۹۷۵
اجتناب از گزارشگری زیان	۰/۷۹۳	۱/۰۰۰	۰/۴۱۱	۱/۰۰۰	۰/۰۰۰
اندازه شرکت	۷/۰۰۸	۷/۰۰۶	۰/۵۶۹	۸/۰۱۲	۶/۰۲۱
نسبت سپرده بانکی	۰/۶۸۲	۰/۷۵۴	۰/۲۰۵	۰/۸۹۳	۰/۱۲۸

طبق این جدول با مقایسه اعداد آمار توصیفی مربوط به شاخص عدم تقارن اطلاعاتی، مشاهده می‌شود که میانگین شاخص مذکور ۱۳/۷۳۶ است که این امر بازگوکننده عدم تقارن اطلاعاتی به نسبت بالا در میان بانک‌ها است. در این

راستا، اعداد مرتبط با شاخص ذخیره مطالبات مشکوک الوصول غیرعادی و اجتناب از گزارشگری زیان با شاخص عدم تقارن اطلاعاتی همخوانی دارد. از سویی دیگر، میانگین نسبت سپرده بانکی با نمایش عدد ۰/۶۸۲ توضیح دهنده آن است که به طور میانگین مجموع سپرده‌های بانکی در حدود ۶۸/۲ درصد از مجموع کل دارایی‌های بانک‌ها است.

عامل تورم واریانس (VIF) برای ارزیابی شدت هم‌خطی چندگانه در تحلیل رگرسیون استفاده شده است. جدول ۳ این نتایج را نشان می‌دهد.

جدول ۳. عامل تورم واریانس VIF

متغیر	آماره VIF
شاخص عدم تقارن اطلاعاتی	۱/۰۰۷
شاخص ذخیره مطالبات مشکوک الوصول غیرعادی	۱/۰۴۷
اجتناب از گزارشگری زیان	۱/۰۲۹
اندازه شرکت	۱/۰۳۷
نسبت سپرده بانکی	۱/۰۳۳

اگر آماره آزمونVIF به یک نزدیک باشد نشان دهنده عدم وجود هم‌خطی است. در این بین، آماره VIF در جدول ۳ نشان‌دهنده عدم وجود هم‌خطی در بین الگوی مورد آزمون است.

یکی از مفروضات الگوهای رگرسیونی، نبود همبستگی بین متغیرهای توضیحی (مستقل و کنترلی) است. به منظور اطمینان از رعایت چنین فرضی، در پژوهش حاضر از مفهوم کوواریانس استفاده شده است. در صورت نبود رابطه، مقدار کوواریانس برابر با صفر(یا نزدیک به صفر) است و به اصطلاح به آن دو متغیر مستقل گفته می‌شود (لازم به ذکر است که کوواریانس یک متغیر با خودش، همان واریانس متغیر است).

جدول ۴. ماتریس کوواریانس متغیرهای پژوهش

متغیر	شاخص عدم تقارن اطلاعاتی	شاخص کیفیت سود	اندازه شرکت	نسبت سپرده بانکی
شاخص عدم تقارن اطلاعاتی	۱۳/۶۳۳	–	–	–
شاخص کیفیت سود	-۰/۰۱۰	۰/۱۶۸	–	–
اندازه شرکت	۰/۰۰۵	۰/۰۱۸	۰/۳۲۲	–
نسبت سپرده بانکی	۰/۰۰۶	۰/۰۰۳	۰/۰۱۹	۰/۰۴۲

جدول ۴ ماتریس کواریانس متغیرهای پژوهش را ارائه می‌دهد. با توجه به این جدول، همبستگی قابل ملاحظه‌ای که بتواند نتایج اجرای الگوها را دستخوش تغییراتی کند، مشاهده نشد.

آمار استنباطی

پایایی یا ایستایی متغیرهای پژوهش

قبل از برآورد الگو باید پایایی (ایستایی) متغیرهای مورد استفاده در الگو بررسی شود. مطابق با جدول شماره ۵ و با استفاده از آزمون لوین، لین و چو [16](LLC) در کلیه متغیرهای مستقل، وابسته، تعدیلی و کنترلی سطح معناداری در آزمون ریشه واحد (که باید کوچک‌تر از ۰/۰۵ باشد) نشان‌دهنده این است که تمامی متغیرهای پژوهش پایایی هستند.

جدول ۵. بررسی پایایی متغیرهای پژوهش

متغیر	آزمون لوین، لین و چو		نتیجه آزمون LLC
	آماره آزمون	سطح معناداری	پایایی متغیرهای پژوهش
شاخص عدم تقارن اطلاعاتی	۵/۴۰۷-	۰/۰۰۰	پایا
شاخص کیفیت سود	۱۷/۰۷۸-	۰/۰۰۰	پایا
اندازه شرکت	۴/۷۰۵-	۰/۰۰۰	پایا
نسبت سپرده بانکی	۳/۸۳۰-	۰/۰۰۰	پایا

اثبات درون‌زایی متغیرهای عدم تقارن اطلاعاتی و کیفیت سود

شرط لازم برای برآورد سیستم معادلات هم‌زمان اثبات درون‌زا بودن متغیرهای درون‌زای سیستم است. هر کدام از متغیرهای عدم تقارن اطلاعاتی و کیفیت سود به عنوان متغیر درون‌زای سیستم با استفاده از همه متغیرهای برون‌زای مربوطه با نرم‌افزار ایویوز برآورد و مقادیر باقی مانده به عنوان متغیر جداگانه (RES) درنظر گرفته می‌شود. سپس معادله مربوط به هرکدام از متغیرهای درون‌زای سیستم را با کمک تمام متغیرهای برون‌زا و متغیر جدید RES برآورد می‌شود.

طبق جدول ۶-الف و ۶-ب، به دلیل معنادار بودن ضرایب متغیر جدید RES، متغیر کیفیت سود در معادله عدم تقارن اطلاعاتی و برعکس متغیر عدم تقارن اطلاعاتی در معادله کیفیت سود درون‌زا است. پس رابطه متقابل این دو متغیر تأیید می‌شود.

جدول ۶-الف. آزمون درون‌زا بودن متغیر کیفیت سود

نام متغیر	ضریب	سطح معناداری
RES	۴۲/۳۰۲۱۴	۰/۰۰۰۰

جدول ۶-ب. آزمون درون‌زا بودن متغیر عدم تقارن اطلاعاتی

نام متغیر	ضریب	سطح معناداری
RES	۴۱/۰۸۱۴۱	۰/۰۰۰۰

آزمون علیت دوطرفه گرنجری

برای به‌دست آوردن شواهد بیشتر مبنی بر تأثیر دوطرفه بین دو متغیر کیفیت سود و عدم تقارن اطلاعاتی، ابتدا آزمون علیت گرنجر[۱۷] به‌کار می‌رود و چنانچه وجود رابطه علّی بین دو متغیر به روش تجربی نیز تأیید شد، آنگاه از سیستم معادلات هم‌زمان استفاده می‌شود. در این راستا، نتایج آزمون مندرج در جدول ۷ برای تأیید استفاده از معادلات هم‌زمان، لزوم استفاده از روش مذکور را تأیید کرده است. به عبارتی، با توجه به فرضیه‌های صفر این آزمون و مقادیر به دست آمده سطح معناداری، نتیجه بیانگر این است که فرضیه صفر رد می‌شوند و بنابراین، رابطه علّی دوطرفه بین دو متغیر یاد شده برقرار است.

جدول ۷. نتایج آزمون علیت دو طرفه گرنجری

آزمون علیت دو طرفه گرنجری			نتیجه آزمون علیت دو طرفه گرنجری
P-value	آماره F	فرضیه صفر	رد فرضیه صفر
۰/۰۰۷	۵/۲۵۹	کیفیت سود، علیت دو طرفه گرنجری عدم تقارن اطلاعاتی نیست.	کیفیت سود، علیت دو طرفه گرنجری عدم تقارن اطلاعاتی است.
۰/۰۰۰	۹/۱۹۸	عدم تقارن اطلاعاتی، علیت دو طرفه گرنجری کیفیت سود نیست.	عدم تقارن اطلاعاتی، علیت دو طرفه گرنجری کیفیت سود است.

تحلیل مسیر متغیرهای برون‌زای پژوهش

نتایج آزمون رابطه بین متغیرهای پنهان و آشکار مرتبط با الگوی ۱، در جدول ۸ نشان داده شده است.

جدول ۸. خلاصه نتایج آزمون رابطه بین متغیرهای پنهان و آشکار (الگوی ۱)

متغیر	ضریب	آماره t	نتیجه
حجم معاملات و عدم تقارن اطلاعاتی	۰/۳۳۷	۲/۶۸۲	عدم رد
نسبت قیمت به سود و عدم تقارن اطلاعاتی	۰/۲۲۴	۰/۳۵۸	رد
نوسانات قیمت سهام و عدم تقارن اطلاعاتی	۰/۰۵۲	۲/۳۲۰	عدم رد
عمر شرکت و عدم تقارن اطلاعاتی	۰/۳۳۹	۱/۹۸۸	عدم رد
تعداد روزهای معاملاتی و عدم تقارن اطلاعاتی	۰/۳۳۱	۳/۵۷۶	عدم رد
ذخیره مطالبات مشکوک الوصول غیرعادی و کیفیت سود	۰/۲۷۸	۲/۸۲۰	عدم رد
اجتناب از گزارشگری زیان و کیفیت سود	۰/۳۹۷	۳/۰۵۹	عدم رد

همان‌طور که در این جدول ملاحظه می‌شود، بر اساس نتایج به‌دست آمده متغیرهای حجم معاملات، نوسانات قیمت، عمر شرکت و تعداد روزهای معاملاتی با عدم تقارن اطلاعاتی به عنوان شاخص‌های توضیح‌دهنده رابطه مستقیم و معناداری دارند. از سویی، مشاهده می‌شود که متغیرهای ذخیره مطالبات مشکوک الوصول غیرعادی و اجتناب از گزارشگری زیان با کیفیت سود به عنوان شاخص‌های توضیح‌دهنده رابطه مستقیم و معناداری دارند.

همچنین، نتایج آزمون رابطه بین متغیرهای پنهان و آشکار مرتبط به الگوی ۲، در جدول ۹ (خلاصه نتایج آزمون رابطه بین متغیرهای پنهان و آشکار) نشان داده شده است. همان‌طور که در جدول ۹ ملاحظه می‌شود بر اساس نتایج به‌دست آمده متغیرهای حجم معاملات، نوسانات قیمت سهام، عمر شرکت و تعداد روزهای معاملاتی با عدم تقارن اطلاعاتی به عنوان شاخص‌های توضیح‌دهنده رابطه مستقیم و معناداری دارند. از سویی، مشاهده می‌شود که متغیرهای ذخیره مطالبات مشکوک الوصول غیرعادی و اجتناب از گزارشگری زیان با کیفیت سود به عنوان شاخص‌های توضیح‌دهنده رابطه مستقیم و معناداری دارند.

جدول ۹. خلاصه نتایج آزمون رابطه بین متغیرهای پنهان و آشکار (الگوی ۲)

متغیر	ضرائب	آماره t	نتیجه
حجم معاملات و عدم تقارن اطلاعاتی	۰/۳۰۴	۲/۷۰۶	عدم رد
نسبت قیمت به سود و عدم تقارن اطلاعاتی	۰/۲۶۷	۰/۴۰۸	رد
نوسانات قیمت سهام و عدم تقارن اطلاعاتی	۰/۱۱۷	۲/۳۱۱	عدم رد
عمر شرکت و عدم تقارن اطلاعاتی	۰/۳۹۱	۱/۹۷۳	عدم رد
تعداد روزهای معاملاتی و عدم تقارن اطلاعاتی	۰/۳۱۸	۳/۰۳۶	عدم رد
ذخیره مطالبات مشکوک الوصول غیرعادی و کیفیت سود	۰/۲۱۵	۲/۷۹۳	عدم رد
اجتناب از گزارشگری زیان و کیفیت سود	۰/۳۵۶	۳/۰۵۴	عدم رد

تحلیل مسیر متغیرهای درون‌زای پژوهش

در این راستا، با توجه به جدول ۸ و جدول ۹ (الگوی نهایی پژوهش) و جدول ۱۰- الف، مشاهده می‌شود که آماره t برای هر دو مسیر مد نظر (رابطه بین کیفیت سود و عدم تقارن اطلاعاتی و همچنین رابطه بین عدم تقارن اطلاعاتی و کیفیت سود)، به‌ترتیب ۲/۶۳۳- و ۲/۸۵۲- است. این آماره‌ها در سطح اطمینان ۹۹ درصد کلیه ضرایب رگرسیونی

مسیرها مطابق جدول ۱۰ معنادار است. از این رو، معیار GOF[۱۸] مربوط به بخش کلی معادلات ساختاری است. این معیار که با GOF نشان داده می‌شود، عددی بین صفر تا یک است و هرچقدر به یک نزدیک‌تر باشد، حکایت از برازش کلی بالاتر الگو دارد. آماره GOF برای الگوی مورد استفاده در الگوی ۱ و الگوی ۲ به ترتیب با مقدار ۰/۲۰۵ و ۰/۲۰۷ گویای برازش قابل قبول الگوی کلی پژوهش است.

جدول ۱۰-الف. برازش الگوهای مربوط به فرضیه‌های اول و دوم پژوهش

متغیر	ضرائب	آماره t	GOF	نتیجه
کیفیت سود و عدم تقارن اطلاعاتی	-۰/۳۳۸	-۲/۶۳۳	۰/۲۰۵	پذیرش
عدم تقارن اطلاعاتی و کیفیت سود	-۰/۳۴۲	-۲/۸۵۲	۰/۲۰۷	پذیرش

جدول ۱۰-ب. خلاصه آماره‌های مرتبط با الگوی پژوهش

متغیر	Q2	CR	AVE
شاخص عدم تقارن اطلاعاتی	۰/۲۹۲	۰/۷۰۴	۰/۵۸۶
شاخص کیفیت سود	۰/۵۶۲	۰/۷۲۶	۰/۵۰۷
اندازه شرکت	۱/۰۰۰	۱/۰۰۰	۱/۰۰۰
نسبت سپرده بانکی	۱/۰۰۰	۱/۰۰۰	۱/۰۰۰

سرانجام، با مشاهده جدول ۱۰- ب، مقدار شاخص واریانس استخراج شده (AVE) نیز، بیانگر اعتبار مناسب ابزارهای اندازه‌گیری است (این شاخص باید مقداری بیش از ۰/۵ داشته باشد). از سویی، شاخص قابلیت اعتبار مرکب[۱۹] سازه‌های اندازه‌گیری متغیرهای پژوهش، نشان‌دهنده اعتبار ترکیبی مناسب این متغیرها است (این شاخص باید مقداری بیش از ۰/۷ داشته باشد). همچنین، شاخص Q2 با نمایش اعداد مثبت برای تمامی رابطه‌ها، نشانگر کیفیت مناسب الگوی ساختاری برای تمامی مسیرهای پژوهش نیز است.

آزمون فرضیه‌های پژوهش

جدول ۱۱ نتایج حاصل از آزمون فرضیه پژوهش را با استفاده از معادلات ساختاری نشان می‌دهد. جدول‌های ۱۱-الف و ۱۱-ب این نتایج را برای هر فرضیه ارائه می‌نماید.

با توجه به جدول‌های بالا، مقدار آماره F در سطح کلیه بانک‌ها، که به ترتیب برابر با **۴/۸۹۴** و **۳/۳۳۳** است، الگو در سطح ۹۵ درصد معنادار است. افزون‌براین، با توجه به مقدار آماره دوربین واتسون که به ترتیب برابر با **۱/۸۶۳** و **۱/۸۰۵** است، وجود خود همبستگی پی‌درپی در اجزای اخلال رگرسیون رد می‌شود. مقدار R2adj به ترتیب برابر با **۰/۲۹۷** و **۰/۲۰۲** است. بنابراین، با توجه به این مقدار می‌توان در الگوی اول، ۲۹/۷ درصد از تغییرات متغیر وابسته (عدم تقارن اطلاعاتی) را به‌وسیله متغیرهای مستقل (کیفیت سود) و کنترلی (اندازه شرکت و نسبت سپرده بانکی) پیش‌بینی کرد. از سویی، با توجه به الگوی دوم، ۲۰/۲ درصد از تغییرات متغیر وابسته (کیفیت سود) را به‌وسیله متغیرهای مستقل (عدم تقارن اطلاعاتی) و کنترلی (اندازه شرکت و نسبت سپرده بانکی) پیش‌بینی کرد.

در نتیجه، طبق جدول ۱۱-الف، فرضیه اول پژوهش مبنی بر اینکه کیفیت سود بر عدم تقارن اطلاعاتی تأثیر دارد، پذیرفته می‌شود. سطح معناداری مربوط به متغیر کیفیت سود نشان‌دهنده آن است که کیفیت سود بر عدم تقارن اطلاعاتی تأثیر منفی و معناداری دارد. همچنین، طبق جدول ۱۱-ب، فرضیه دوم پژوهش مبنی بر اینکه عدم تقارن اطلاعاتی بر

کیفیت سود تأثیر دارد، پذیرفته می‌شود. سطح معناداری مربوط به متغیر عدم تقارن اطلاعاتی نشان‌دهنده آن است که عدم تقارن اطلاعاتی بر کیفیت سود تأثیر منفی و معناداری دارد.

جدول ۱۱. خلاصه نتایج آزمون فرضیه پژوهش

۱۱-الف. تأثیر کیفیت سود بر عدم تقارن اطلاعاتی.

مدل ۱: $\mathbf{ASSYMETRY_{jt} = \beta_0 + \beta_1 EQUALITY_{jt} + \beta_2 Size_{jt} + \beta_3 DEPO_{jt} + \varepsilon_{jt}}$

متغیر	ضرائب	خطای استاندارد	آماره **t**	سطح معناداری
کیفیت سود	۲/۶۵۹-	۰/۷۳۱	۳/۶۳۶-	۰/۰۰۰
اندازه شرکت	۰/۱۹۶	۰/۵۰۹	۰/۳۸۵	۰/۷۰۱
نسبت سپرده بانکی	۰/۱۵۰	۱/۴۲۸	۰/۱۰۵	۰/۹۱۶
مقدار ثابت	۱۲/۹۲۰	۳/۵۲۸	۳/۶۶۱	۰/۰۰۰
ضریب تعیین	ضریب تعیین تعدیل‌شده	آماره دوربین واتسن	آماره **F**	سطح معناداری
۰/۳۷۳	۰/۲۹۷	۱/۸۶۳	۴/۸۹۴	۰/۰۰۰

۱۱-ب. تأثیر عدم تقارن اطلاعاتی بر کیفیت سود.

مدل ۲: $\mathbf{EQUALITY_{jt} = \beta_0 + \beta_1 ASSYMETRY_{jt} + \beta_2 Size_{jt} + \beta_3 DEPO_{jt} + \varepsilon_{jt}}$

متغیر	ضرائب	خطای استاندارد	آماره **t**	سطح معناداری
عدم تقارن اطلاعاتی	۰/۰۲۳-	۰/۰۰۸	۳/۰۱۶-	۰/۰۰۳
اندازه شرکت	۰/۰۴۹	۰/۰۳۹	۱/۲۷۱	۰/۲۰۶
نسبت سپرده بانکی	۰/۱۵۵	۰/۱۰۳	۱/۵۱۲	۰/۱۳۳
مقدار ثابت	۰/۷۱۵	۰/۲۷۳	۲/۶۱۱	۰/۰۱۰
ضریب تعیین	ضریب تعیین تعدیل‌شده	آماره دوربین واتسن	آماره **F**	سطح معناداری
۰/۲۸۸	۰/۲۰۲	۱/۸۰۵	۳/۳۳۳	۰/۰۰۰

با توجه به آزمون علیت دو طرفه گرنجری مبنی بر تأثیر دو طرفه و هم‌زمان متغیرهای کیفیت سود و عدم تقارن اطلاعاتی و همچنین آزمون فرضیه‌ها مبنی بر تأثیر هر یک از این دو متغیر بر یکدیگر، نتیجه می‌شود که متغیرهای کیفیت سود و عدم تقارن اطلاعاتی بر یکدیگر، تأثیر متقابل و هم‌زمان دارند. در نتیجه فرضیه سوم پژوهش نیز پذیرفته می گردد.

بحث و نتیجه‌گیری

هدف از این پژوهش، بررسی تأثیر متقابل و هم زمان بین کیفیت سود بر عدم تقارن اطلاعاتی در صنعت بانکداری بود. اغلب پژوهش‌های پیشین تنها رابطه یک‌طرفه این دو متغیر را بررسی کرده‌اند. طبق مبانی نظری و پیشینه پژوهش‌های داخلی و خارجی تأثیر معنادار بین عدم تقارن اطلاعاتی بر کیفیت سود مستند شده است، حال در این پژوهش برخلاف سایر پژوهش‌های داخلی و خارجی تأثیر این دو متغیر به شکل متقابل و هم‌زمان، در جامعه آماری صنعت بانکداری بررسی نمود.

مهم‌ترین ریسک صنعت بانکداری ریسک اعتباری آنان است که ناشی از افزایش بدهی نسبت به سرمایه بانک‌هاست. نکته دیگر اینکه بخش اعظم دارایی بانک‌ها مطالبات ناشی از اعطای تسهیلات است، حال بسته به اینکه بازپرداخت مطالبات طی چه مراحل، سیاست و ابزارهای نظارتی بازپرداخت شود می تواند منجر به بی ثباتی بانک‌ها شود. مدیران در جهت منعکس نکردن شرایط عدم ثبات بانک ها ممکن است اقدام به مدیریت سود کنند که این اقدام آنان

کیفیت سود پایین را دربردارد و به دنبال آن سایر افراد فعال در بازار سرمایه از اطلاعات کامل و شفاف درون سازمانی محروم خواهند شد. این شرایط منجر به عدم تقارن اطلاعاتی را پیرامون صنعت بانکداری افزایش می‌دهد.

در این پژوهش با تحلیل داده‌های حاصل از آزمون فرضیه‌ها در سیستم معادلات همزمان یافته‌های فرضیه اول، نشان داد که کیفیت سود بر عدم تقارن اطلاعاتی تأثیر منفی و معنادار دارد. نتایج این پژوهش مشابه نتایج پژوهش‌های ثقفی و همکاران (۱۳۹۵)؛ باتاچاریا و همکاران (۲۰۱۰)؛ کورمیر و همکاران (۲۰۱۳) است. این پژوهشگران به این نتیجه رسیدند که کیفیت سود بر عدم تقارن اطلاعاتی تأثیر منفی و معنادار دارد. طبق یافته فرضیه دوم، عدم تقارن اطلاعاتی بر کیفیت سود تأثیر منفی و معنادار دارد. برخلاف نتایج مطالعات باباجانی و همکاران (۱۳۹۳) و آقایی و همکاران (۱۳۹۶)، کیفیت سود تأثیر منفی و معنادار بر عدم تقارن اطلاعاتی دارد. طبق یافته فرضیه سوم، این نتیجه حاصل شد که عدم تقارن اطلاعاتی و کیفیت سود در صنعت بانکداری به شکل متقابل و همزمان بر هم تأثیر منفی و معناداری دارند. به بیان دیگر در هر بانک اگر کیفیت سود بالا باشد باعث کاهش عدم تقارن اطلاعاتی می‌شود، همچنین اگر عدم تقارن اطلاعاتی در هر بانک افزایش یابد، کیفیت سود نیز در جهت معکوس کاهش می‌یابد.

پیشنهادهای پژوهش

پیشنهادهای کاربردی پژوهش

با توجه به نتیجه آزمون فرضیه اول پژوهش مبنی بر اینکه در صنعت بانکداری، کیفیت سود بر عدم تقارن اطلاعاتی تأثیر دارد، به سرمایه‌گذاران و اعتباردهندگان توصیه می‌شود به مفهوم کیفیت سود به عنوان یک مفهوم مهم حاصل از اطلاعات صورت‌های مالی توجه داشته باشند، زیرا با ارزیابی کیفیت سود بانکی می‌توانند از سطح عدم تقارن اطلاعاتی بین خود و افراد درون سازمانی مطلع شوند که این امر بر تصمیمات سرمایه‌گذاری و یا اخذ تسهیلات بانکی تأثیرگذار است.

از طرفی به دلیل نتیجه آزمون فرضیه دوم پژوهش مبنی بر تأثیر منفی عدم تقارن اطلاعاتی بر کیفیت سود، پیشنهاد می‌شود که کنترل و نظارت دقیق و سازمان‌یافته بر بانک‌ها برای انتشار اطلاعاتی مثل تحلیل‌های مدیریتی علاوه بر اطلاعات منتشر شده در صورت‌های مالی، اجرا شود، تا در این راستا شکاف اطلاعاتی بین افراد درون سازمانی و برون سازمانی کاهش یابد و استفاده‌کنندگان صورت‌های مالی بر اساس اطلاعات گزارش شده به شکل شفاف و قابل اتکا، تصمیم‌گیری کنند که یکی از اقلام گزارش شده سود با کیفیت بالا است.

پیشنهادهایی برای پژوهش‌های آتی

در این راستا، پیشنهاداتی برای پژوهش‌های آتی به شرح زیر مطرح می‌شود:

بررسی نقش تعدیلی متغیرهایی مانند: کیفیت افشا، کیفیت حسابرسی، ریسک نقدشوندگی، ریسک بازار، نسبت بدهی، ساختار سرمایه بر رابطه بین کیفیت سود و عدم تقارن اطلاعاتی در صنعت بانکداری.

بررسی رابطه متقابل کیفیت سود و عدم تقارن اطلاعاتی در دوره رکود و تورم اقتصادی در صنعت بانکداری.

بررسی رفتار جسورانه یا محافظه‌کارانه مدیران بر رابطه بین کیفیت سود و عدم تقارن اطلاعاتی در صنعت بانکداری.

محدودیت‌های پژوهش

برخی از این محدودیت‌ها در پژوهش حاضر به شرح زیر است:

با توجه به اینکه شکل ظاهری صورت‌های مالی بانک‌ها از سال ۱۳۸۷ تا به امروز یکسان سازی شده است، برخی اطلاعات مانند جزئیات ذخیره مطالبات سررسید گذشته یا سوخت شده در گزارش های مالی قبل از سال ۱۳۸۷ منتشر نشده بود. این امر در ارزیابی ذخیره مطالبات سررسید گذشته در سال‌های قبل از ۱۳۸۷ و در ادامه در الگوی ارزیابی کیفیت سود بانکی تأثیر داشت. همچنین برخی عوامل کلان اقتصادی هم چون عامل رکود و شرایط خاص بانک مرکزی در روند انجام پژوهش قابل کنترل نبود.

تقدیر و تشکر

از داوران گران‌قدر که با دقت نظر خود باعث ارتقای مقاله شدند، صمیمانه قدردانی می‌شود.

یادداشت‌ها

1. Francis, Lafond, Olsson and Schipper
2. Bhattacharya, Ecker, Olsson and Schipper
3. Flowerday and Von Solms
4. Barberis and Huang
5. Scott
6. Jensen and Meckling
7. Bhattacharya, Desai and Venkataraman
8. Cormier, Houle and Ledoux
9. Dye
10. Tran, Hassan, and Houston
11. Houcine and Houcine
12. Loan Less Provience (LLP)
13. Zainuldin and Liu
14. All-Inclusive Index
15. Beatty and Liao
16. Levin, Lin and Chui
17. Granger Causality
18. $GOF = \sqrt{Communality + R_i^2}$
19. Composite Reliability

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COVID-19 and Stock Market Reaction in Indonesia

Yanuar Trisnowati[1]* and Arianto Muditomo[2]

Abstract:
Research aims: COVID-19 Pandemic happens all over the world. Pandemic impact hits almost all elements of life, one of the affected real sectors is finance especially the stock market. This research is aimed to present the reaction of the equity market in Indonesia towards the COVID-19 pandemic
Design/Methodology/Approach: The research method that is used is the study to examine market reaction towards the pandemic and abnormal return around the occurrence by using two methods; mean-adjusted abnormal return and market model.
Research findings: From the research conducted over the 10 indicators of the stock market index in Indonesia, it is concluded that 8 industrial sectors that have tenacious reaction toward the COVID-19 pandemic hit in Indonesia, where it is also found that the agriculture sector; basic and chemical industry; miscellaneous, consumer goods; property and real estate; transport and infrastructure; finance; trade, service, and investment, give stronger reactions compared with mining and manufacture.
Theoretical contribution/Originality: Researches about the stock market reaction to the non-economy phenomenon have already been carried out, but the research that is specifically done to study sectoral index reaction towards the non-economy occurrences is still wide open to doing for deeper research.
Practitioner/Policy implication: This research can be important information for investors to understand the behavior of stock market efficiency in Indonesia in making decisions of investment
Research limitation/Implication: Non-economy event that becomes the subject of research is the COVID-19 pandemic that appeared and escalated fast all over the world. The researcher conducted the research and presented it as quickly as possible since the time is limited. It is meant to show a systematic and scientific thinking framework in addressing the non-economy events, but still in the context of reliability on the result of research to the same topic about the COVID-19 effect in other countries.
Keywords: COVID-19; Event-study; Indonesia Stock Market; Mean-Adjusted Abnormal Return; Market Model

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AFFILIATION:
[1,2] School of Business IPB University, West Java, Indonesia.

***CORRESPONDENCE:**
yanuartrisnowati@apps.ipb.ac.id

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Introduction

In the stock exchange or stock market, trading activity frequency is one of the elements that becomes the material to see the market reaction towards information that comes in the stock market (Taslim & Wijayanto, 2016).

The increase of frequency in trading transactions caused by high demand will push the stock price to ascend so the return will also be increasing. It is also able to increase the volume of trading transactions. The big trading volume shows that stock is preferred by investors. The investor tendency is to get interested in stocks that give high returns even if it is risky (Taslim & Wijayanto, 2016).

COVID-19 has become a world pandemic, counted globally from 27 September 2020, it has been stated that 32.730.945 COVID-19 cases are confirmed, including 991.224 deaths, reported by WHO (WHO, 2020). In Indonesia, the corona firstly appeared in March. This was stated by the President of Indonesia; Joko Widodo in his speech in the presidential palace, Jakarta, on 2 March 2020. President Jokowi said that two people that went positively affected by Coronavirus were Japanese citizens who came to Indonesia. Up to 27 September 2020 cases that confirmed positive in Indonesia reached 275.213 with the recovered patients are at the number of 203.014 and 10.386 casualties (Official Prevention Unit of COVID-19, 2020). Since the Coronavirus (COVID-19) was found and escalated from the regional crisis in Hubei province, China, that later became a global pandemic, stock market collapse and market volatility went rising high in the world. It even happened in the United States of America's market. The volatility level stock market in the middle of March 2020 has surpassed the biggest volatility condition ever happened in October 1987 and December 2008 which occurred at the end of 1929 and early 1931 (Baker, Bloom, Davis, Kost, Sammon, & Viratyosin, 2020). This COVID-19 pandemic can be classified as 'black swan' since it has economic consequences that are disadvantageous, as Taleb (2005) stated that a black swan is a random event with three characteristics: big impact, uncountable probability, and surprising effect (AlAli, 2020).

The COVID-19 pandemic caused panic for investors. This was evident from the decline of the IHSG which occurred from March 5 to March 9 by 6 percent. The Financial Services Authority (OJK) immediately responded by issuing a policy of movement of the Composite Stock Price Index (IHSG) and allowing the implementation of share repurchases issued by issuers (buyback) without obtaining approval from the General Meeting of Shareholders (RUPS). The issued regulation is contained in OJK Regulation No. 3 / SEOJK.04 / 2020 dated 9 March 2020 concerning Other Conditions as Market Conditions That Fluctuate Significantly in the Implementation of Shares Buyback Issued by Issuers or Public Companies.

Several studies have been found on the impact of COVID-19 on stock market returns, including the impact of the announcement of the first COVID-19 incident and the impact on the stock market (AlAli, 2020; Alam, Alam, & Chavali, 2020; Bash, 2020; Huo & Qiu, 2020), the impact of the pandemic on the Chinese stock market and specifically the characteristics of different companies/sectors in the Chinese stock market (He, Sun, Zhang, & Li, 2020; Huo & Qiu, 2020; Xiong, Wu, Hou, & Zhang, 2020), the specific effect of the number confirmed COVID-19 cases on stock market returns in several countries (Ashraf, 2020; Liu, Manzoor, Wang, Zhang, & Manzoor, 2020; Ruiz Estrada & Lee, 2020; Zeren & Hizarci, 2020). From previous studies, it is found that the result of this study generally presents a stock market reaction which is indicated by the average change of abnormal returns that went descending as the result of the first COVID-19 announcement at the stock markets in several countries.

Based on the result review of the previous studies, the researcher considers that it is necessary to examine the reaction of the Indonesian stock market as a result of the official government announcement when the first case of COVID-19 appeared in Indonesia on March 2, 2020, through abnormal return measurement proxy in the days before and after the announcement of the first COVID-19 case. The research gap that we found was that until the time this research was conducted there had not been any similar research in Indonesia. Moreover, we chose the index variable for each sector as the independent variable whose reaction to the announcement of the first case of COVID-19 was measured as the dependent variable. Research and presentation of this study's result will provide an empirical contribution related to the Indonesian stock market efficiency test through the average change proxy of abnormal return on the non-economic events, both domestically and globally.

Literature Review and Hypothesis Development

In social science, the studies of events or more popularly known as event-studies have been widely carried out in a context that is related to economics and finance. Event studies are often used to measure the efficiency of the stock market in a semi-strong form. An efficient market is called a semi-strong-form efficiency if no single investor gets an abnormal rate of return through any information that is publicly available and is commonly tested by "event-studies". An event study in the stock market sector is a study conducted empirically to analyze the impact of an event on the capital market of a country (Suganda, 2018).

The COVID-19 pandemic event is not an economic event (non-economic event). Research related to event-studies for non-economic event and stock market reaction in Indonesia has been carried out, including political event happened on July 27, 1996 (Suryawijaya & Setiawan, 1998), the inauguration of the President (Asshodiqi, 2016; Pratama, Sinarwati, & Dharmawan, 2015), General Election (Luhur, 2010), Regional Head election (Wardhani, 2012), change of state officers (Islami & Sarwoko, 2012), to natural events/phenomena like a flood (Luhur, 2010; Yuwono, 2013), social, changes in fuel price (Andarini & Rahardjo, 2016; Ningsih & Cahyaningdyah, 2014), terrorism (Sari, 2007; Utama & Hapsari, 2012), to the issuance of government regulation and/or policy (Nanda & Saryadi, 2017; Wibowo, 2017), etcetera.

Another research is also found that observes the economic impact on each pandemic phase (Figure 1) from the beginning of the first case up to the period after the pandemic (Barua, 2020). It also stated that the pandemic period would impact the supply chain performance (Narjoko, 2020) because the social and physical distancing is applied. This is such an interesting one to observe since the industrial sector in the supply chain becomes the dominant economic mover for all this time.

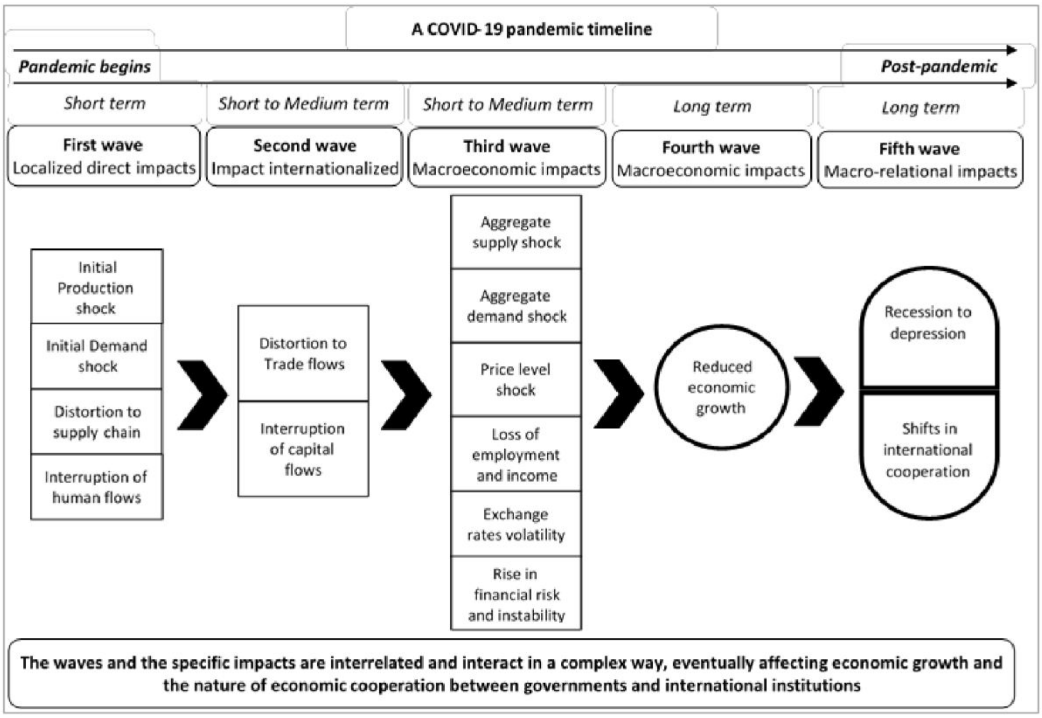

Figure 1 General Mapping of The Possible Economic Impacts of the COVID-19
Source: (Barua, 2020)

This research is expected to enrich the scientific reference for event-studies on non-economic events and their direct impact on the capital market in Indonesia generally and the impact of reactions on the related industrial sector, but still paying attention to the robustness of research results through a critical review of similar research on the impacts COVID-19 among other countries.

Through this research, it is hoped that investors will be able to recognize the behavior of the Indonesian stock market better so that they can make the best investment decision in every event (economic and non-economic) that occurs.

In this study, the hypothesis to test is whether there is a difference in sectoral abnormal return (ABR) and cumulative abnormal return (CABR) on the Indonesian stock exchange before and after the announcement of the first case of positive COVID-19 patients in Indonesia on March 2, 2020.

***H*$_1$**: *the difference in sector-i abnormal return index was found before and after the announcement of the first positive patient case for COVID-19 in Indonesia on March 2, 2020.*

Research Method

The research method used in this research is the event study methodology (ESM). This method is used to take a closer look at the Indonesian stock market's reaction to the COVID-19 pandemic. The event study methodology uses an abnormal return approach so that it can be observed whether the market reaction in obtaining an abnormal return from stock market movement is affected by this pandemic event. The data used in this study are secondary in the form of sectoral indices on the Indonesia Stock Exchange, which are the sectors of Agriculture (SxAGRI), Mining (SxMNG), Basic Industry (SxBSC), Miscellaneous (SxMCL), Infrastructure (SxINF), Financial (SxFNC), Trading (SxTRD) and Manufacture (SxMNF). The research data is sourced from the sectoral index of the Indonesia Stock Exchange from January - March 2020. The observation period was carried out for 10 days before and 10 days after the announcement of the first COVID-19 case in Indonesia, March 2, 2020. Data analysis techniques will use the paired test. sample t-test on abnormal return before and after the event.

This study uses two methods to calculate the abnormal return. Actual return is the return that occurs and is received by the investor in the current period compared to the previous day, either in the form of capital gain or capital loss. Actual return calculation uses the current closing index compared to the previous day's closing index which is calculated by equation (1) as follows:

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \text{..} (1)$$

The expected return is the stock return expected by the investor in the future. The calculation of expected return uses the Single Index Market Model based on the price of securities that fluctuate in the direction of the market price index, which is proxied by the Composite Stock Price Index (IHSG) as shown in equation (2) as follows:

$$Rm_t = \frac{\sum_{t=-10}^{+10} R_{i,t}}{21} \text{..} (2)$$

Abnormal return from sectoral index (i) on the day -t with equation 3 below

$$AR_{i,t} = R_{i,t} - Rm_t \text{.......................................} (3)$$

Ri is the average return of the 10 indexes studied on day t. Rm is the average return index during the estimated range (-10, +10).

Furthermore, the stock market reaction is identified by comparing the results of the abnormal return calculation from equation 3 above (and the likes, for example, the mean-adjusted return as (Brown & Warner, 1985)) against the calculation results of the market model method as one of them was developed (Dodd & Warner, 1983) with the equation (4) below.

$$AMR_{i,t} = R_{i,t} - (\alpha_{i,t} + \beta_{i,t} Rm_t) \text{..............} (4)$$

Where Rmt is the return of the Composite Stock Price Index. $\alpha_{i,t}$ and $\beta_{i,t}$ are the coefficients obtained from the OLS regression during the estimation window (-10, +10). From the results of the calculation and presentation of the graphs of equation (3) and equation (4), the hypothesis to be tested in this study is that there is no difference between cumulative mean-adjusted abnormal return and cumulative market model method before and after the announcement of confirmed cases. COVID-19 on March 2, 2020, in Indonesia.

Result and Discussion

The Indonesia Stock Exchange (BEI) oversees 688 listed issuer companies consisting of 10 industrial sectors; Agriculture, Mining, Basic Industry and Chemical, Miscellaneous Industry, Consumer Goods Industry, Property, Infrastructure, Finance, Trading and Manufacture. Figure 2 shows the 10 sectoral movements in the Indonesia Stock Exchange. The index movement did not fluctuate too much during the study period, which was up on February 17, 2020 to March 16, 2020. The President of Indonesia announced the first positive patient case for COVID-19 in Indonesia on March 2, 2020. The index movement 10 days before the event announcement did not appear to experience too much difference or it can be said that the movement went slope. However, after the announcement, there was a sectoral index market movement in the Indonesian stock market, which was reflected when sectoral movement descended.

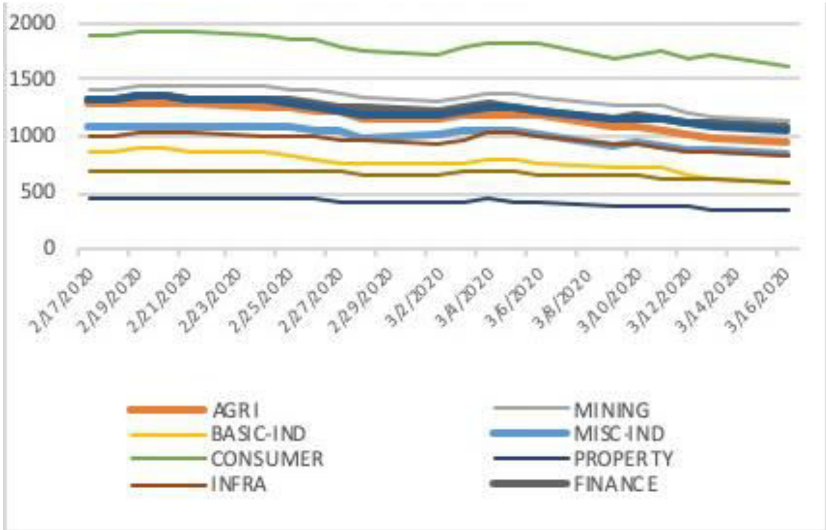

Figure 2 Sectoral Index
Source: Yahoo Finance (accessed at Mei 2020)

The mean-adjusted abnormal return (ABR) and cumulative abnormal return (CABR) for the two models used are illustrated in Figure 3 for the IHSG and sectoral movement in the Indonesian stock market. It can be seen from the figure where the CABR shows a quick descending since day 0 when the first confirmed COVID-19 case in Indonesia was announced that shows a greater effect on the return of the stock market. The average difference between cumulative returns before and after the event date uses the event range (-10, + 10) for the 10 industries sector movement. The results presented in table 1 indicate that there is a statistically significant difference in the mean returns to CAMR at the 99% confidence level.

Table 1 Mean Equality Test for Cumulative Abnormal Return (CABR)

Mean-Adjusted Abnormal Return					
Event Window	Sector	Before (%)	After (%)	After-Before (%)	Sig.
-10,+10	AGR-Agriculture	-0.38	-0.68	-0.29	0.000***
	MNG-Mining	0.18	-0.08	-0.26	0.415
	BSC-Basic Industry	-0.50	-0.80	-0.30	0.000***
	MCL- Miscellaneous	-0.13	-0.55	-0.43	0.091*
	SCM-Consumer Goods	-0.20	0.62	0.83	0.016**
	PRO- Property	0.24	-0.54	-0.78	0.024**
	INF- Infrastructure	0.13	0.00	-0.13	0.000***
	FNC-Finance	0.00	0.10	0.10	0.001***
	TRD-Trade	0.21	0.09	-0.12	0.000***
	MNF-Manufacture	-0.29	0.00	0.29	0.277
	IHSG-Composite	-0.72	-1.28	-0.55	0.586
Market Model					
Event Window	Sector	Before (%)	After (%)	After-Before (%)	Sig.
-10,+10	AGR-Agriculture	-0.46	-1.01	-0.55	0.554
	MNG-Mining	0.90	-0.87	-1.77%	0.063*
	BSC-Basic Industry	1.62	0.17	-1.45	0.127
	MCL- Miscellaneous	2.30	0.20	-2.10	0.104
	SCM-Consumer Goods	0.33	0.75	0.41	0.685
	PRO- Property	-1.41	-1.85	-0.44	0.546
	INF- Infrastructure	-1.22	0.94	2.17	0.123
	FNC-Finance	0.39	0.40	0.00	0.998
	TRD-Trade	-3.18	-2.37	0.81	0.193
	MNF-Manufacture	1.06	0.49	-0.56	0.559

*,**,*** represent the confidence level at the 90%, 95, and 99% levels respectively

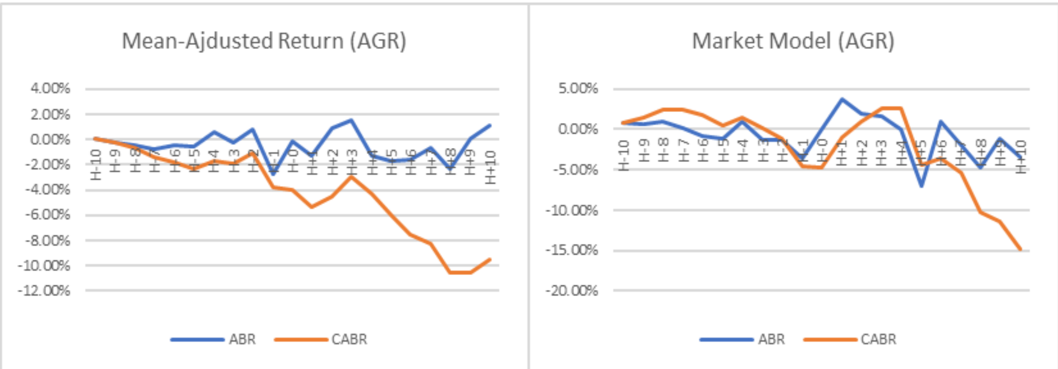

Figure 3 Abnormal Return and Cummulative Abnormal Return

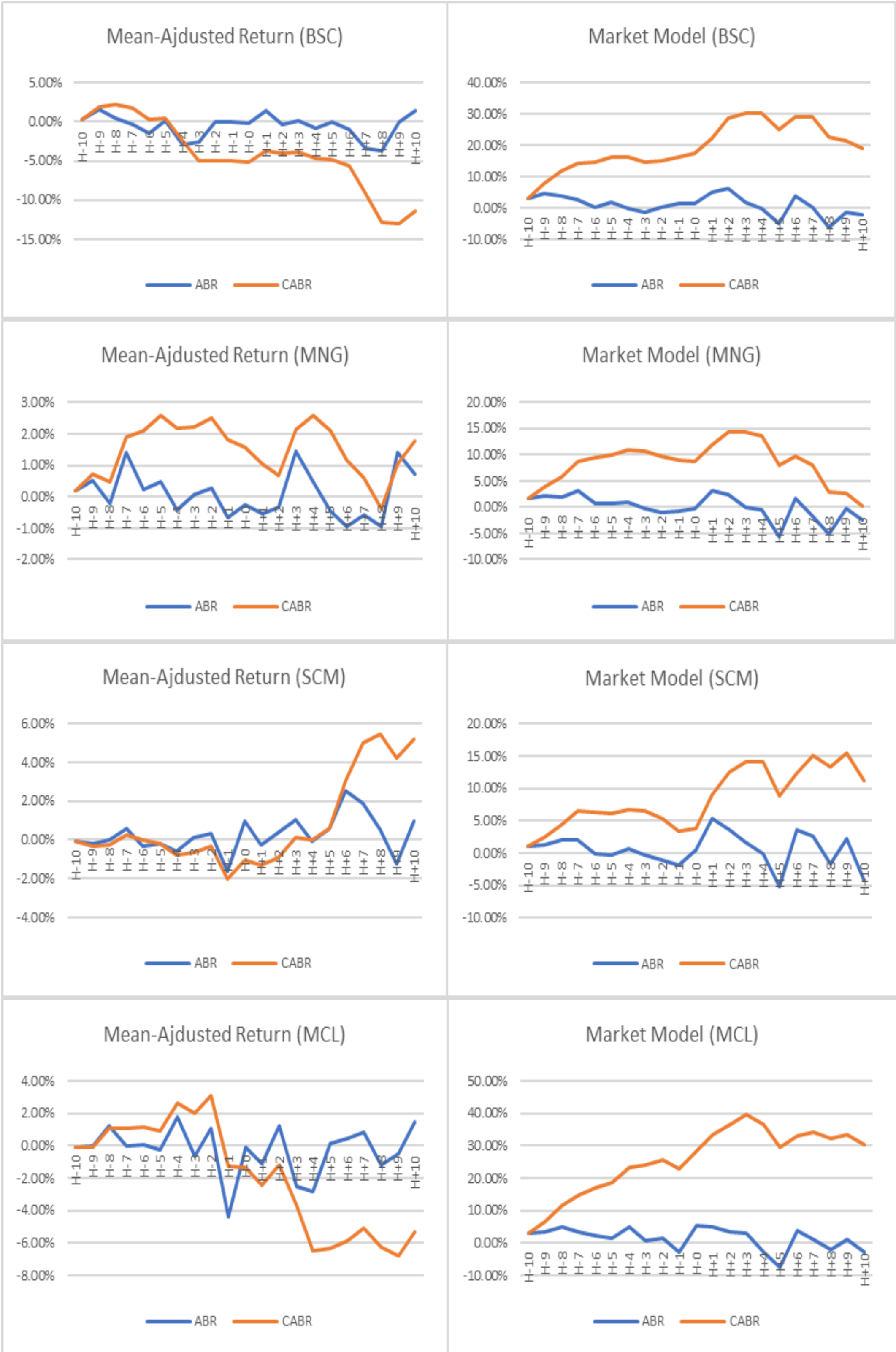

Figure 3 Abnormal Return and Cummulative Abnormal Return (cont')

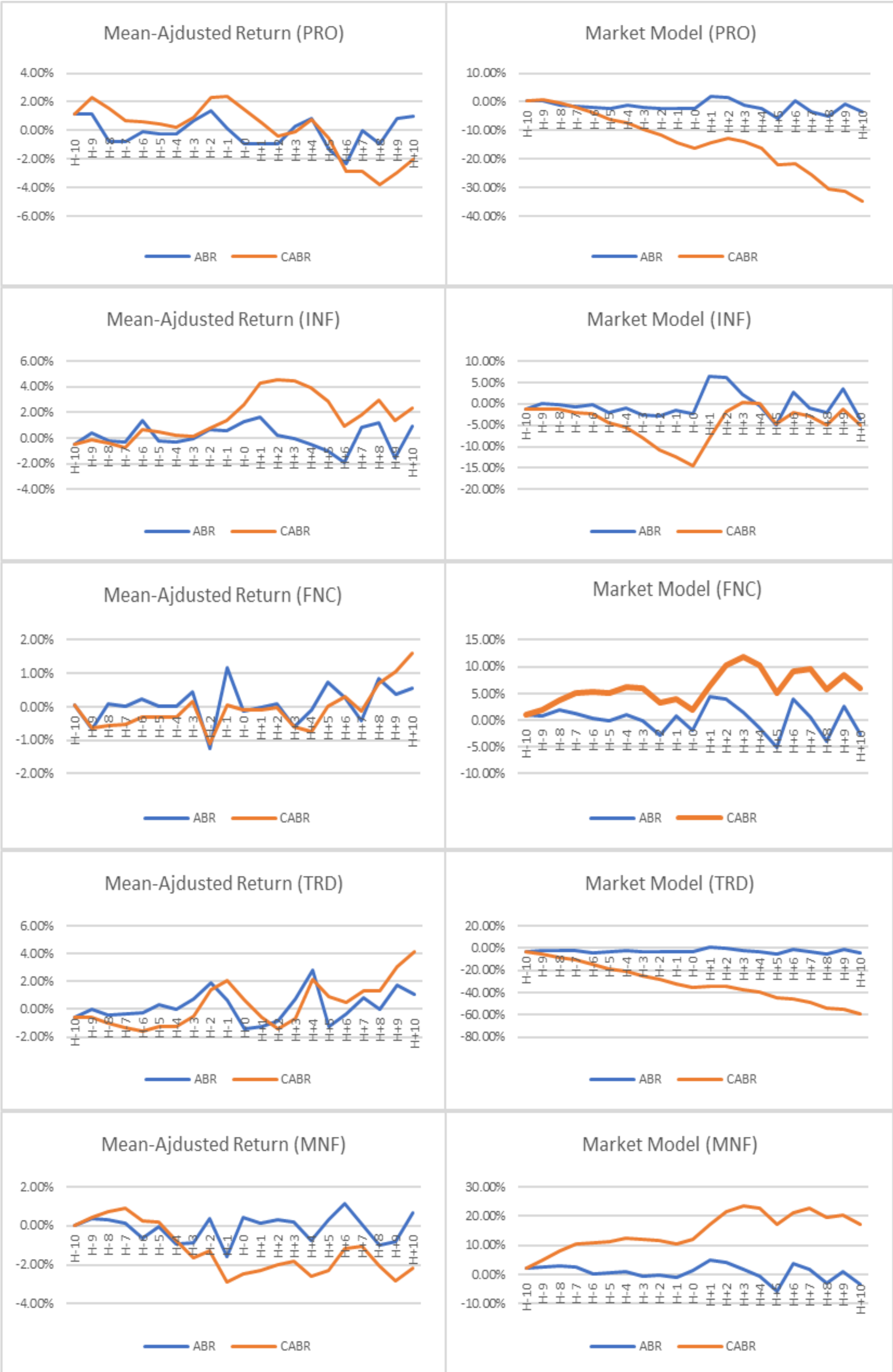

Figure 3 Abnormal Return and Cummulative Abnormal Return (cont')

The analysis result by paired samples test on the mean-adjusted abnormal return method showed a difference between the Abnormal Return (ABR) values before and after the announcement of the first positive patient case in Indonesia announced by the President.

The results of partial analysis on each sector index show that 8 sectors experienced differences in ABR values before and after the announcement of the first positive patient case. They are agricultural sector (SxAGR); basic and chemical industry (SxBSC); various industries (SxMCL); consumer goods industry (SxSCM); property and real estate (SxPRO); transportation and infrastructure (SxINF); finance (SxFNC); trading, services, and investment (SxTRD). Meanwhile, the mining (SxMNG) and manufacturing (SxMNF) sectors have no difference in ABR values before and after the announcement of the first positive patient case in Indonesia. Analysis with the market model shows that only the mining sector (SxMNG) has a difference in abnormal return before and after the the first case of corona sufferer in Indonesia announced.

The finding on 8 sectors that is proven statistically experiencing the abnormal return in Indonesia stock market is in line with the research result (Baldwin & Mauro, 2020) in China stock market and USA (Figure 4 and 5) that shows relative responsiveness of stock on the sectors of transportation industry, property, retail, finance/investment and primary industry/chemicals and consumer goods/personal. On the other side the response difference between the stock market in Indonesia and China/AS can be found in the energy sector/mining where the impact towards Indonesia stock market has not been seen yet statistically, when the significant impact is found in China and USA stock market.

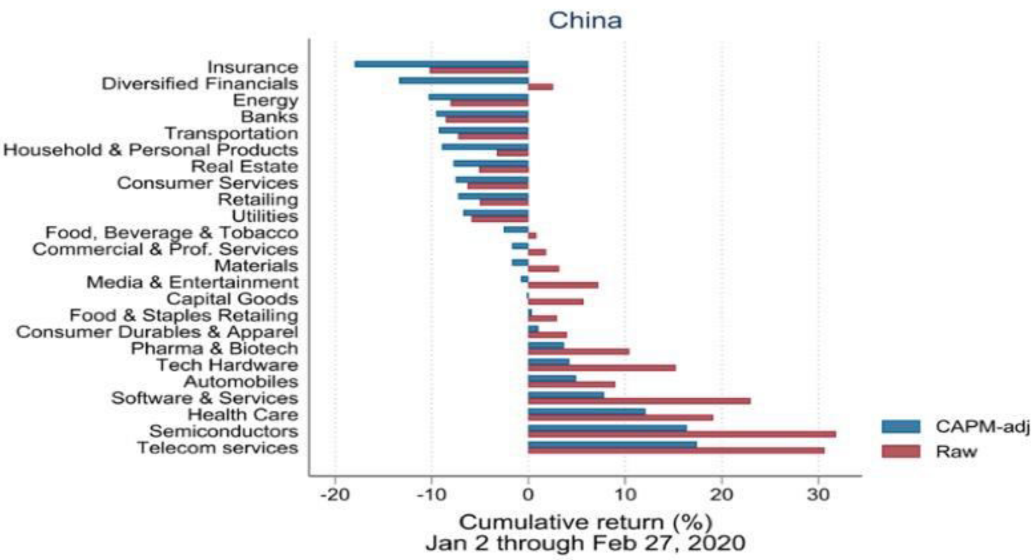

Figure 4 Return of Sector Industry in China during the COVID-19 Pandemic

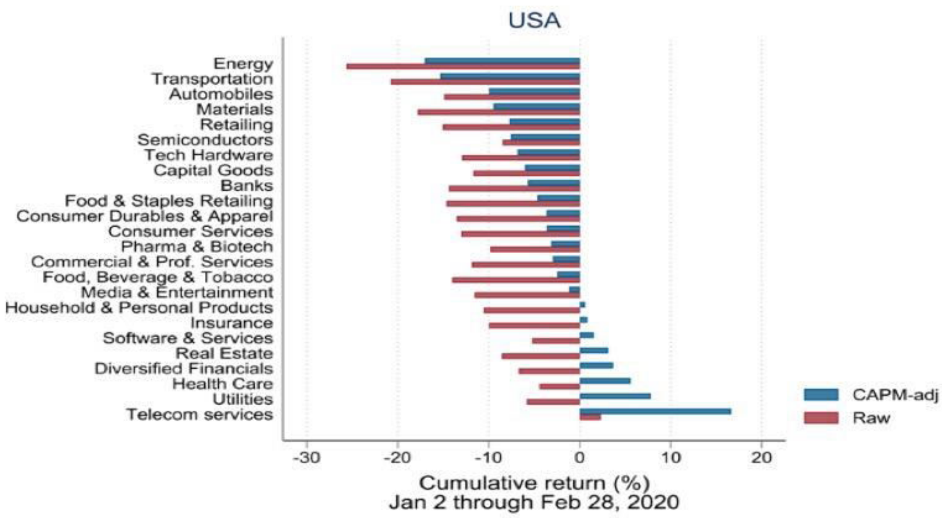

Figure 5 Return of Sector Industry in USA during the COVID-19 Pandemic

This different result shows the expectation gap to the future of company, industry, and market economy reflected from the investor behavior on the stock market (Wagner, 2020). Abnormal return response of the 10 average sectors of stock market industry in Indonesia (0.0057) supports the research (Liu et al., 2020) examining the 21 stock markets response in many countries with abnormal return of Indonesia stock exchange at the number of 0,0069 (absolute).

One of the investors' behaviors during the global pandemic is to avoid the uncertainty (Ashraf, 2020), so the expectation of the future over the industries will influence the investment decision. An investor can use both methods; mean-adjusted abnormal return and market model. From both models, the market model is stronger in depicting the abnormal return achieved because of the market model also counts the risk index and condition of the market index occurred in the stock exchange.

Conclusion

The analysis result shows that the eight industry sectors in Indonesia which are agriculture industry; primary industry and chemicals; consumer goods; property and real estate; transportation and infrastructure; finance; trading, service, and investment give fast response to the government announcement since the first COVID-19 case in Indonesia on 2 March 2020. This reaction explains that those sectors have observed the direct impact of the pandemic on their industries. They are agriculture sector that will be impacted on the bargain side and agriculture product demand, primary industry sector and chemical will face the demand change of medical product, property sector and real estate will deal with the decreasing demand, transportation sector and infrastructure will experience the descending user potency and new development investment, finance industry will change its transaction volume that all happens since the social distancing is applied and government purchasing priority and household changed because of the pandemic. The slower reaction is found in the mining industry, various industry, and manufacture that happen because in short period they haven't been getting the beneficial impact caused by pandemic and still operate to fulfill the market before the pandemic hits. But the analysis result using the market model shows the different abnormal return in mining sector.

This result is in line with the previous research (Ashraf, 2020; Baldwin & Mauro, 2020; Liu et al., 2020; Wagner, 2020) that in the first period of COVID-19 pandemic happened globally, affected industrial sectors related to supply chain, and investor's expectation to the future of certain industry post-pandemic, while in the mid and long term industry will be adapting with the behavioral change of consumer expenditures that will prioritize the primary goods for the daily needs (Pratomo, 2020). This result has beneficial value for investor to understand the stock market behavior in giving response to non-economic events so investor will take the best investment decision on the economic and non-economic events that might happen in the future.

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Prof. Dr. Nera Marinda Machdar, SE Ak., Pg. Dipl. Bus., MCom (Acctg) adalah Profesor di bidang Akuntansi dan saat ini sebagai Guru Besar di Fakultas Ekonomi dan Bisnis, Universitas Bhayangkara Jakarta Raya.

Penulis pernah mengajar di Kalbis Institute, Universitas Trisakti, Universitas Kristen Indonesia, dan Perbanas Institute.

Penulis menyelesaikan pendidikan S-1 Akuntansi di Fakultas Ekonomi dan Bisnis, Jurusan Akuntansi, Universitas Indonesia. Penulis melanjutkan pendidikan S-2 Double Degree Post Graduate Diploma in Business (Accounting) dan Master of Commerce in Accounting di School of Business, Curtin University of Technology, Australia. Penulis menyelesaikan pendidikan S-3 Doktor Ilmu Ekonomi Spesialis Akuntansi di Universitas Trisakti, Jakarta. Selain mengajar, Penulis juga Konsultan Pajak. Penulis aktif di organisasi profesi Yayasan Pengembangan Ilmu Akuntansi Indonesia (YPIAI) sebagai ketua. Penulis juga aktif dan memiliki keanggotaan di Institute of Certified Sustainability Finance Practitioner (ICSFP), The Institute of Internal Auditor (IIA), Ikatan Akuntan Indonesia (IAI), Ikatan Konsultan Pajak Indonesia (IKPI) serta Ikatan Sarjana Ekonomi Indonesia (ISEI). Penulis memiliki sertifkasi professional, yaitu Chartered Accountant (CA), Certified Sustainability Reporting Specialist (CSRS), Certified Sustainability Reporting Assurance. (CSRA), dan Bersertifikat Konsultan Pajak (BKP).

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35. Machdar, N. M., (2019), Corporate Social Responsibility Disclosure Mediates the Relationship Between Corporate Governance, and Corporate Financial Performance in Indonesia, *Academy of Accounting and Financial Studies Journal*, 23(3), 1-14.
36. Machdar, N. M., (2020), Penghindaran Pajak, Tanggung Jawab Sosial Perusahaan, Spesialis Auditor, dan Manajemen Laba, *Konferensi Ilmiah Akuntansi VII*.
37. Machdar, N. M., (2020), Financial Inclusion, Financial Stability and Sustainability in the Banking Sector: The Case of Indonesia, *International Journal of Economics and Business Administration*, VIII (1).
38. Machdar, N. M. & Nurdiniah, D., (2021), Does Transfer Pricing Moderate the Effect of Deferred Tax Assets and Deferred Tax Expenses on Accrual Earnings Management

of Firms in Indonesia? *European Journal of Business and Management Research*, VI (3), 104-110.
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Dr. Jhonni Sinaga, MM., kelahiran Padang Sidempuan, Sumatera Utara, pada 20 Desember 1968. Putra dari ayah dan ibu yang berprofesi sebagai guru ini menamatkan pendidikan dasar hingga menengah atas di Kotamadya Sibolga, Sumatera Utara.

Pada tahun 1990, menyelesaikan pendidikan Bahasa Inggris di Universitas Sumatera Utara. Studi Ekonomi Manajemen juga ditempuh dan diselesaikannya di universitas yang sama pada tahun 1994. Pada tahun 2014, ia menyelesaikan Program Magister Manajemen (S-2; M.M.) di Universitas Mulawarman. Studi Program Doktor Manajemen (S-3) juga ditempuh dan diselesaikannya di universitas yang sama pada tahun 2019. Jhonni Sinaga telah menulis beberapa buku sebagai berikut:

1. Penentu Nilai Perusahaan Dengan Kebijakan Dividen Dan CSR Sebagai Pemoderasi. RV Pustaka Horizon. Oktober 2019.
2. Agency Theory: A Reading. PT. Adler Manurung Press. Agustus 2022 (Sebagai Penulis Kedua).
3. Corporate Finance: A Reading. PT. Adler Manurung Press. Oktober 2022 (Sebagai Penulis Ketiga).
4. Empirical Investment: A Reading. PT. Adler Manurung Press. Oktober 2022 (Sebagai Penulis Kedua).
5. Risk Management: A Reading. PT. Adler Manurung Press. Oktober 2022 (Sebagai Penulis Kedua).
6. Corporate Governance: A Reading. PT. Adler Manurung Press. Oktober 2022.
7. Initial Public Offering: A Reading. PT. Adler Manurung Press. Oktober 2023.

Pada tahun 1996 – Maret 2000, ia bekerja sebagai Kepala Seksi Akuntansi dan Keuangan pada Salim Plantations (Indofood Plantations, Tbk.). Semenjak April 2000, ia dipercaya sebagai *Head of Internal Audit Department* pada B.W. Plantations, Tbk. Pada perusahaan ini karirnya meningkat pada Juli 2003, ia diangkat menjadi *Accounting and Tax Manager*. Per Desember 2005, ia menjabat *Head of Internal Audit Department* pada REA Kaltim Plantations Group (*Subsidiary of REA Holding, a U.K. Public Listed Company at London Stock Exchange*). Sebelas tahun kemudian, mulai Agustus 2016, ia menjadi Head of Operation Finance and Accounting. Pada 01 Agustus 2019, ia resmi mengundurkan diri dari REA Kaltim Plantations Group. Pada April 2020 mendirikan lembaga yang bergerak dalam bidang konsultasi manajemen perusahaan dengan bendera J. J. Manajemen Konsultasi dan pada Nopember 2020 resmi mendirikan entitas yang bergerak dalam bidang transportasi (*trucking and logistic*) dengan bendera PT. JeJe Harapan Transindo (JeJe Trans Group). Kedua bidang usaha ini tumbuh dan berkembang melampaui ekspektasi hingga saat ini.

Penulis adalah pemegang Sertifikat Internasional:
1) Certified International of Program Financial Model (CIPFM).
2) Certified International of Enterprise Risk Management (CIERM).

Semenjak Agustus 2021 menjadi dosen tidak tetap di Universitas Kristen Indonesia (UKI) dan Januari 2022 diangkat sebagai dosen tetap di Universitas Bhayangkara Jakarta Raya hingga saat ini. Selama bekerja sebagai profesional perusahaan, ia aktif sebagai tutor untuk materi-materi seperti *Internal Control*, *Good Corporate Governance* (GCG), *Supervision Management*, *Coaching for Performance*, *Motivation*, *Budgetting*, dan *Finance and Accounting*. Pada tahun 2006, ia berhasil menciptakan konsep usaha perkebunan kelapa sawit baru dengan nama "***PRO EXISTENCE***".

Dr. David Pangaribuan, SE, M.Si

Penulis lahir di Garoga, Kabupaten Tapabuli Utara tepatnya 25 Juli 1968. Saat ini penulis bekerja sebagai Dosen Home Base di Universitas Bhayangkara Jakarta Raya sejak 1 Maret 2021. Sebelum bergabung dengan Universitas Bhayangkara Jakarta Raya. Penulis sudah malang melintang diberbagai perguruan Tinggi di Wilayah DKI Jakarta, Tangerang dan Ciputat. Berbagai Pengalaman dalam Mengasuh Mata Kuliah yang berhubungan dengan Akuntansi dan Perpajakan. Disamping itu penulis juga aktif dalam seminar dan workshop. Jenjang Pendidikan Penulis dimulai dari S1 akuntansi pada STIE Kampus Ungu, 1998, Magister Akuntansi dari Universitas Trisakti tahun 2008 dan Doktor Ilmu Ekonomi Konsentrasi Akuntansi dari Universitas Trisakti tahun 2016. Pengalam Kerja sebagai tenaga structural dimulai dari staf administrasi keuangan di ASMI Pulo Mas tahun 1994 sebagai Sekretaris Jurusan Akuntansi pada STIE Kampus Ungu, Direktur ASMI Buddhi Tangerang, Ketua Lembaga Penelitian, Pengabdian dan Publikasi (LP2kM) Universitas Buddhi Dharma Tangerang dan Dosen Tetap Universitas Pembangunan Jaya Ceputat Tangerang.

Adler Haymans Manurung, dilahirkan di Porsea, Tapanuli Utara pada 17 Desember tahun 1961. Pendidikan Sekolah Dasar (SD) sampai Sekolah Menengah Atas di Medan. Selanjutnya, pendidikan perguruan tingginya dimulai dari Akademi Ilmu Statistik dengan lulus Ranking Pertama pada tahun 1983. Sarjana Ekonomi (SE) diperolehnya dari Program Extension Fakultas Ekonomi Universitas Indonesia pada tahun 1987. Pendidikan program S2 dengan gelar Master of Commerce (M.Com) dari University of Newcastle, Australia pada tahun 1995 dan Magister Ekonomi (ME) dari Fakultas Ekonomi Universitas Indonesia pada tahun 1996. Doktor dalam bidang Keuangan diperoleh dari FEUI pada 17 Oktober 2002 dengan predikat “Cum-Laude”. Lulus Sarjana Hukum dengan menekuni Hukum Ekonomi dari Fakultas Hukum Universitas Kristen Indonesia pada tahun 2007. Adler juga telah menyelesaikan Kursus Pajak Brevet A dan B di STAN, Jakarta pada tahun 2007.

Dalam Bidang Bisnis, Adler saat ini mengelola beberapa perusahaan, President Direktur PT Valuasi Investindo, PT Finansial Bisnis Informasi, dan PT Adler Manurung Press. Juga menjadi Komisaris PT Rygrac Capital dan PT Putra Nauli (bergerak dalam bidang pupuk kompos di Porsea – Kabupaten Tobasa, SUMUT) dan Ketua Dewan Pembina Yayasan Tobasa Membangun. Sebelumnya, Adler bergabung dengan PT Nikko Securities Indonesia pada periode Nopember 1996 sampai April 2010 dengan jabatan Direktur Fund Management dan dimana sebelumnya bekerja pada PT BII Lend Lease Investment Services sebagai Associate Direktur Riset sejak Maret 1995 sampai dengan Oktober 1996 dan sebagai Senior Manager Research Analyst pada Lend Lease Corporate Services, Australia, sejak Juli 1994. Sebagai Fund Manager telah mengalami asam garam dan saat ini telah mengelola dana diatas Rp. 2 trilliun. Investor yang sangat mengenalnya menyebut **pelindung dana investor** karena sangat hati-hatinya. Adler memulai karir dalam pasar modal pada tahun 1990 dan bekerja sebagai Research Analyst di perusahaan sekuritas. Pada periode 2010 – 2014 menjadi Ketua Komite Tetap Fiskal dan Moneter, Kadin Indonesia. Adler telah menulis buku sebagai berikut:

1. Statistik Lanjutan (Advanced Statistics Problem) Penerbit : Universitas Tarumanegara (1989).
2. Teknik Peramalan Bisnis dan Ekonomi (Forecasting Method for Business and Economic) Penerbit: PT. Rineka Cipta (1990)
3. Pengambilan Keputusan; Pendekatan Kuantitatif (Decision Theory; Quantitative and Economic) Penerbit: PT. Rineka Cipta (1991)
4. Analisis Saham Indonesia (Stock Analysis in Indonesia) Penerbit: Economic Student’s Group (1992)
5. Lima Bintang untuk Agen Penjual Reksa Dana, Penerbit: Ghalia Indonesia, 2002.

6. Memahami Seluk Beluk Instrumen Investasi. Penerbit: PT Adler Manurung Press, April - 2003
7. Berinvestasi, Pendirian dan Pembubaran Reksa Dana: Pegangan untuk Manajer Investasi dan Investor; Penerbit: PT Adler Manurung Press, Agustus – 2003.
8. Pasar Keuangan & Lembaga Keuangan Bank & Bukan Bank; Penerbit: PT Adler Manurung Press, Agustus 2003. (Sebagai Penulis Ketiga)
9. Strategi Memenangkan Transaksi Saham di Bursa (Strategic to win stock transaction in Bourse), PT Elex Media Komputindo (Gramedia Group); Agustus 2004.
10. Penilaian Perusahaan (Company Valuation); Penerbit: PT Adler Manurung Press, September 2004 – diperbaharui dengan Judul "Valuasi Wajar Perusahaan".
11. Dasar-dasar Keuangan Bisnis: Teori dan Aplikasi; Penerbit: PT Elex Media Komputindo, Jakarta, Mei 2005., (Penulis Kedua dari tiga Penulis)
12. Wirausaha: Bisnis UKM, Kompas Agustus 2005
13. Ke Arah Manakah Bursa Indonesia dibawa?, Penerbit: PT Elex Media Komputindo, Jakarta Oktober 2005
14. Ekonometrika: Teori dan Aplikasi; PT Elex Media Komputindo, Jakarta Desember 2005. (Penulis Kedua dari tiga penulis)
15. Ke Mana Investasi ? Kiat dan Panduan Investasi Keuangan di Indonesia; Penerbit Buku Kompas, Maret 2006.
16. Dasar-Dasar Investasi Obligasi; PT Elex Media Komputindo; Mei 2006.
17. Aktiva Derivatif: Pasar Uang, Pasar Modal, Pasar Komoditi, dan Indeks; PT Elex Media Komputindo; Desember 2006, (Penulis Kedua)
18. Cara Menilai Perusahaan; PT Elex Media Komputindo; Januari 2007,
19. Sekuritisasi Aset, PT Elex Media Komputindo, Maret 2007
20. Wanita Berbisnis UKM – Makanan, Kompas Maret 2007
21. Pengelolaan Portofolio Obligasi, PT Elex Media Komputindo, April 2007
22. Reksa Dana Investasiku, Kompas September 2007.
23. Pendanaan UKM, Kompas Januari 2008.
24. Financial Planner, Kompas, Maret 2008
25. Obligasi: Harga, dan Perdagangannya, ABFI Institute Perbanas, Januari 2009. Direvisi dan diterbitkan PT Adler Manurung Press, 2011.

26. Ekonomi Keuangan dan Kebijakan Moneter; Penerbit Salemba Empat, 2009 (Penulis Kedua, dengan Dr. Jonni Manurung)
27. Successful Financial Planner: A Complete Guide, PT Gramedia Widiasarana Indonesia, Agustus 2009
28. Kaya dari Bermain Saham; Penerbit Buku Kompas, Oktober 2009 (Di Revisi pada Maret 2021).
29. Metode Riset: Keuangan dan Investasi Empiris, ABFI Institute Perbanas Press, November 2009 – Bersama Wilson R. L. Tobing Ph.D.
30. Sukses Menjual Reksa Dana, PT Grasindo, 2010
31. Kaya dari Bermain Opsi; Penerbit Buku Kompas, 2010
32. Ekonomi Finansial; PT Adler Manurung Press, Jakarta, 2010
33. Metode Penelitian: Keuangan, Investasi dan Akuntansi Empiris; PT Adler Manurung Press, Mei 2011, diperbaiki dan diterbitkan Kembali pada tahun 2019 dengan penulis kedua Dr. Dyah Budiastuti.
34. Restrukturisasi Perusahaan: Merger, Konsolidasi, Merger dan Akuisisi serta Pembiayaannya, PT Adler Manurung Press, Agustus 2011
35. Teori Keuangan Perusahaan; PT Adler Manurung Press, Januari 2012
36. Teori Investasi: Konsep dan Empiris; PT Adler Manurung Press, Agustus 2012.
37. Investasi dan Manajemen Portofolio, Modul untuk FE Universitas Terbuka, 2012
38. Initial Public Offering (IPO): Konsep, Teori dan Proses; PT Adler Manurung Press, April 2013
39. Otorias Jasa Keuangan: Pelindung Investor; PT Adler Manurung Press, September 2013.
40. Berani Bermain Saham, Buku Kompas, September 2013.
41. Pasar Futures Indonesia: Tradisional to Finansial; PT Adler Manurung Press, Agustus 2014.
42. Pengukuran Risiko, PT Adler Manurung Press, Oktober 2014
43. Manajemen Treasuri: Dasar dan Instrumen; PT Adler Manurung Press, 2015
44. Konstruksi Portofolio Efek di Indonesia; PT Adler Manurung Press, Februari 2016

45. Raja Manurung tu Tuan Sogar Manurung dan Pomparannnya: “Mulak Ma Ogung tu Sakke Na; Jakarta: PT Adler Manurung Press, September 2016
46. Cadangan Devisa dan Kurs Valuta Asing; Buku Kompas, Oktober 2016
47. Manajemen Risiko Finansial: Perbankan, PT Adler Manurung Press, Februari 2017. Telah direvisi dengan judul “Manajemen Risiko Finansial untuk Industri Jasa Keuangan” ditulis Mohammad Hamsal, Adler Haymans Manurung, Benny Hutahayan dan Jenry Cardo Manurung.
48. Manajemen Aset dan Liabilitas, PT Adler Manurung Press, Juni 2017
49. Model dan Estimasi dalam Riset Manajemen dan Keuangan; PT Adler Manurung Press, Juli 2019.
50. Enterprise Risk Management, PT Adler Manurung Press, Jakarta, Februari 2020.
51. Bank Business Performance, PT Adler Manurung Press, Nopember 2020, Penulis Pertama dari 4 Penulis (Benny Hutahayan, Kevin Deniswara dan Tipri Rose Kartika)
52. Investasi: Teori dan Empiris; PT Adler Manurung Press, Nopember 2020
53. Manajemen: Teori dan Perkembangannya, PT Adler Manurung Press, Februari 2021
54. Keuangan Perusahaan, PT Adler Manurung Press, Juli 2021
55. Financial Modeling: Microsoft Excel, PT Adler Manurung Press, Februari 2022.
56. Regression and Extension, PT Adler Manurung Press, Maret 2022
57. Market Microstructure: A Reading, PT. Adler Manurung Press, Agustus 2022

Disamping sebagai penulis buku, Adler juga aktif sebagai kolumnis dalam bidang pasar modal diberbagai surat kabar, majalah nasional serta majalah internasional serta **pengasuh kolom Investasi di Harian Kompas Minggu**. Tulisan penelitian empirisnya dapat dibaca pada Jurnal terkemuka di Indonesia, seperti Jurnal Riset dan Akuntansi Indonesia (JRAI), Jurnal Kelola dari UGM dan Management Usahawan dari FEUI serta Jurnal Perbankan dari STIE Perbanas. Disamping itu, Adler juga menjadi pembicara dalam konferensi ilmiah internasional dan juga menjadi staf pengajar pada MM-FEUI, Pascasarjana FEUI; Doktor Bisnis di MB – IPB dan

Program Doktor Manajemen Bisnis, Universitas Padjadjaran, Bandung dan Pascasarjana ABFI Institute Perbanas; Magister Manajemen – Universitas Negeri Jakarta serta Fakultas Ekonomi – Universitas Tarumanagara. Kepangkatan penulis dalam mengajar dari Departemen Pendidikan yaitu ”**Professor**” pada tahun 2008 dalam bidang Investasi, Pasar Modal, Keuangan dan Perbankan dengan dengan Surat Keputusan Menteri Pendidikan Nasional Republik Indonesia Nomor: 77548/A4.5/KP/2008, tertanggal 1 Desember 2008. Adler telah ditugaskan BAN-PT sebagai Assessor BAN-PT. Penulis juga menjadi Chief Editor Journal Keuangan dan Perbankan yang diterbitkan ABFI Institute Perbanas dan merupakan satu dari lima jurnal terakreditasi B di Dirjen Perguruan Tinggi. Adler telah memperoleh ijin sebagai Wakil Manajer Investasi dan Wakil Penjamin Emisi Efek dari Bapepam. Penulis juga memperoleh gelar professional Chartered Financial Consultant (ChFC) dan Chartered Life Underwriting (CLU) dari American College serta Registered Financial Consultant (RFC) dari International Association of Registered Financial Consultant, Agustus 2004. Adler juga memiliki sertifikasi Eksekutif Risk Management Corporate Professional (ERMCP) pada tahun 2009 dari ERMI - Singapore. Penulis juga aktif dalam bidang organisasi sebagai Ketua Assosiasi Pengelola Reksa Dana Indonesia (APRDI) pada periode 2001 – 2004. Saat in penulis menjadi Technical Advisor pada Internasional Association of Registered Financial Consultant for Indonesia. Pada tahun 2004, penulis masuk nominasi 10 besar ”The Most Popular Analyst “dan memperoleh ”The Most Popular Analyst 2005” atas survey **Frontier Indonesia.** Adler juga menjadi salah satu juri di REBI (Recognize Bisnis) yang dikoordinir Koran Sindo dan Frontier.

Sejak September 2012, Prof. Adler H. Manurung diangkat menjadi Guru Besar Pasar Modal, Investasi, Keuangan dan Perbankan pada Sampoerna School of Business (SSB) dan kemudian 1 September 2012 menjadi Kepala Program Studi Manajemen dan sejak 1 Mei 2013 diangkat Putera Sampoerna Foundation menjadi Ketua STIE Putera Sampoerna dan kemudian menjadi Dekan Fakultas Bisnis, Universitas Siswa Bangsa Internasional (USBI). Jurnal Bisnis dan Kewirasusahaan dibangun di SSB dan sudah terbit dan beredar bagi para akademisi maupun praktisi. Jabatan Ketua STIE Putera Sampoerna berakhir pada 30 April 2014. Menjadi adviser PT Bursa Berjangka Jakarta sejak 1 Juli 2013 sampai sekarang dalam rangka membuat produk Bonds *Futures*. Prof. Dr. Adler H. Manurung diangkat menjadi Dosen Tetap dan sekaligus Guru Besar Pasar Modal, Investasi dan Perbankan di

Fakultas Ekonomi Universitas Bina Nusantara, Jakarta sejak 1 Nopember 2014. Februari 2021 menjadi Guru Besar Pasar Modal dan Perbankan Universitas Bhayangkara Jakarta Raya dan mendirikan Program Studi Doktor Ilmu Manajemen. Sejak Oktober Tahun 2013 mendirikan Assosiasi Analis Pasar Investasi dan Perbankan dan menjadi Presiden assosiasi ini, dimana assosiasi ini memberikan sertfikasi professional dengan gelar CIMBA. Penulis juga telah menyelesaikan Pendidikan Kepemimpinan Nasional, PPSA-XX, Lemhanas 2015. Sejak 2016, mulai mengajar di Universitas Pertahanan (UNHAN) dibawah Kementerian Pertahanan (KEMENHAN).

Prof. Dr. Adler Haymans Manurung menikah dengan Ir. Marsaurina Yudiciana boru Sitanggang pada tahun 1990. Atas pernikahan tersebut dikaruniai anak dua orang yaitu Castelia Romauli dan Adry Gracio. Castelia Romauli sudah menyelesaikan kuliah di Universitas Negeri Jakarta dan sedang mengikuti kuliah Pascasarjana di Atmajaya dan bekerja pada Bank Internasional. Adry Gracio telah lulus dari Jurusan Ilmu Ekonomi di FEUI dengan predikat Cum-Laude, serta juga telah lulus Master of Science dari London School Economics – UK dan saat ini sudah bekerja.