Financial accounting information, organizational complexity and corporate governance systems ☆

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Abstract

We posit that limited transparency of firms' operations to outside investors increases demands on governance systems to alleviate moral hazard problems. We investigate how ownership concentration, directors' and executive's incentives, and board structure vary with: (1) earnings timeliness, and (2) organizational complexity measured as geographic and/or product line diversification. We find that ownership concentration, directors' and executives' equity-based incentives, and outside directors' reputations vary inversely with earnings timeliness, and that ownership concentration, and directors' equity-based incentives increase

with firm complexity. However, board size and the percentage of inside directors do not vary significantly with earnings timeliness or firm complexity.

1. Introduction

In the U.S. and in other economies with strong legal protection of outside shareholders' rights, transparency of a firm's operations and activities to outside investors disciplines managers to act in shareholders' interests.[1] We posit that limited corporate transparency increases demands on corporate governance systems to alleviate moral hazard problems resulting from a more severe information gap between managers and shareholders, ceteris paribus. We consider two factors that limit corporate transparency to varying degrees across large public U.S. companies: (1) relatively uninformative financial accounting systems characterized by the inability of firms' GAAP earnings to explain changes in shareholder value in a timely fashion (low earnings timeliness) and, (2) firm complexity due to extensive geographic and/or line of business diversification.

We develop and test two sets of hypotheses concerning how corporate governance systems vary with the diversification of firms and the timeliness of their earnings. Our first set of hypotheses predicts that corporate governance systems of diversified firms and firms with relatively low earnings timeliness are characterized by a relatively strong link between stock price performance and the wealth of executives and directors, and by high ownership concentration, to provide incentives to increase shareholder value through monitoring and other costly activities. Our second set of hypotheses concerns how the composition of the board of directors varies with the diversification of firms and the timeliness of their earnings. We predict that, in order to enable highly effective board monitoring, the boards of diversified firms and firms with low earnings timeliness have a relatively high percentage of outside directors with (1) a strong reputation as an outside director, and (2) expertise in the firm's main industry. We also explore how board size and the percentage of directors who are insiders vary with diversification and the timeliness of earnings, but make no directional predictions.

Our hypotheses build on prior research concerning the determinants of corporate governance structures. In a seminal paper, Demsetz and Lehn (1985) conjecture that the scope for moral hazard is greater for managers of firms with more volatile operating environments. They document that ownership concentration is increasing

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[1] We use the term corporate transparency to refer to the clarity of the activities and performance of the firm to outsiders.

in stock return volatility, consistent with the idea that benefits of ownership concentration increase in response to the difficulty of monitoring managers in volatile environments. Himmelberg et al. (1999) extend Demsetz and Lehn (1985) by considering additional firm attributes that proxy for the scope of managerial discretion, such as research and development, advertising, and intangible asset intensities. In related research, Smith and Watts (1992) document that firms' growth opportunities, as measured by book-to-market ratios, are associated with benefits to imposing risk on managers via bonus plans and stock option grants.

Consistent with this literature, we adopt the perspective that observed governance structures represent optimal contracting arrangements endogenously determined by firms' contracting environments.[2] We extend this literature by expanding the characterization of the scope for moral hazard to explicitly consider monitoring technology and organizational complexity. This extension flows naturally from Himmelberg et al. (1999). Using panel data, they document that a significant fraction of the cross-sectional variation in managerial equity ownership is explained by unobserved firm heterogeneity not captured by their proxies for the scope of moral hazard. We posit monitoring technology and organizational complexity as two important components of the scope for moral hazard that can be extracted from this "unobserved" firm heterogeneity and studied independently, while controlling for components considered in previous research.

With respect to monitoring technology, we conjecture that inherent limitations of firms' information systems in generating information relevant for monitoring managerial behavior influence governance structure formation by affecting the cost-benefit trade-off underlying governance mechanism configurations. Financial accounting systems are a logical starting point for investigating properties of information systems important for addressing moral hazard problems. Audited financial statements prepared under Generally Accepted Accounting Principles (GAAP) produce extensive, credible, low cost information that forms the foundation of the firm-specific information set available for addressing agency problems. In monitoring top managers, boards and outside investors cannot simply rely on stock price changes to provide necessary information about the *source* of changes to firm value. For example, agency models generally imply that managers should be held accountable for controllable events and not uncontrollable events, while stock returns aggregate the implications of all events. The accounting system facilitates boards' efforts to separate controllable from uncontrollable events. As an illustration, managers often submit budgets to the board and then make periodic reports explaining variances from budget, presumably aiding boards in separating controllable from uncontrollable events (e.g., Zimmerman, 2002, Chapter 6).

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[2] As noted by Hermalin and Weisbach (2002), governance research struggles with the issue of whether to interpret results as deriving from an equilibrium or out-of-equilibrium phenomenon. While some papers directly address the equilibrium issue (e.g., Himmelberg et al., 1999; Core et al., 1999), that is not our intention here. Thus, for example, we do not ask whether an optimal board should have 10% insider directors or 50% (see, e.g., Byrd and Hickman, 1992; Brickley et al., 1994). Instead, we posit optimality, and predict that in equilibrium relatively opaque firms will utilize relatively more costly monitoring and specialized information gathering.

We proxy for the intrinsic governance usefulness of accounting information with earnings timeliness, which, paralleling Basu (1997) and Ball et al. (2000), we define as the extent to which current GAAP earnings incorporate current economic income or value-relevant information. While accounting reports used internally to monitor managers may utilize methods that differ from GAAP, our premise is that earnings timeliness proxies for inherent limitations of any transactions-based accounting system to capture relevant information in a timely fashion, and that the usefulness of these internal financial reporting systems to the board depends on earnings timeliness. We predict that where the timeliness of financial accounting information is relatively low, firms will substitute towards relatively more costly monitoring and specific information gathering activities to at least partially compensate for low timeliness of the accounting information.[3]

While we posit earnings timeliness as an inherent property of firms' information systems that impacts governance choices, it is important to ask whether timeliness really is a distinct characteristic, rather than simply a byproduct determined by the set of fundamental firm characteristics examined in previous research as governance determinants. We examine this directly and conclude that timeliness is a distinct characteristic. We find that a small portion of the cross-sectional variation in our timeliness metric is explained by firm characteristics found to be linked with governance structures in prior work including firms' growth opportunities, return volatility, size, the number of years a firm is public, CEO tenure, industry and geographic diversification, and past performance.

We also investigate the relation between organizational complexity and governance structures. While the construct "organizational complexity" could encompass a wide range of organizational design features (see, e.g., Brickley et al., 1997, Chapters 8–10), we operationalize it with two measures of diversification. We utilize segment revenue information to compute Hirfindahl-Hirschman indices measuring with-in firm industry and geographic concentration. Our premise is that firms competing in multiple industries and/or multiple geographic regions face more complex operational and informational environments, and therefore, benefit more from costly monitoring activities and specific information than firms with tighter industry and geographic focus.

On the basis of a cross-section of 784 firms in the *Fortune* 1000, we find substantial support for the predicted negative relation between the "strength" of corporate governance systems and the timeliness of earnings, after controlling for other factors, including growth opportunities, return volatility, firm size, the number of years a firm is public, CEO tenure, whether the CEO or Chairman of the Board is the founder, past performance, and membership in the banking or utility industries. As predicted, we find that concentrated shareholdings, and the stock price-wealth link

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[3] This prediction parallels results demonstrating that traders increase costly, private information gathering and processing activities as the precision of accounting disclosures shrinks (e.g., Verrecchia, 1982). It is also consistent with evidence that incentive plans rely relatively more on non-accounting performance measures where financial accounting information is more limited (Bushman et al., 1996; Ittner et al., 1997; Hayes and Schaefer, 2000), and that ownership concentration across countries varies inversely with the quality of a country's accounting disclosures (La Porta et al., 1998).

of inside directors and the top five executives vary inversely with the timeliness of earnings. We also document the predicted negative relation between the reputation of outside directors and the timeliness of earnings. However, we fail to document a significant negative relation between the stock price-wealth link of outside directors and the timeliness of earnings unless we exclude the dummy variables for banks and utilities, and fail to find that the percentage of outside directors with expertise in the firm's main industry, the percentage of directors who are insiders, or board size vary significantly with the timeliness of earnings.

Our results concerning the predicted positive relation between the ''strength'' of corporate governance systems and firm diversification are mixed. We document that, as predicted, the stock price-wealth link of inside and outside directors increases with line of business diversification, and the stock-price wealth link of specific outside shareholders (i.e., ownership concentration) increases with geographic diversification. The other predicted relations between diversification and the stock price wealth links and the composition of the board are not supported.

The remainder of this paper is organized as follows. Section 2 further discusses the role of earnings timeliness and organizational complexity in influencing governance mechanism choices. Section 3 describes our governance variables and develops hypotheses concerning their sensitivity to the timeliness of accounting numbers and organizational complexity. Section 4 describes control variables, sample, and data. Section 5 describes our empirical design, results and sensitivity analyses. Issues relating to the possibility of reverse causality in our model are discussed in Sections 6 and 7, presents a summary and discussion of implications of the paper.

2. Measuring governance value of accounting numbers and organizational complexity

Section 2.1 discusses the timeliness of earnings as a measure of accounting's governance value and describes its construction. Section 2.2 further develops our approach to measuring organizational complexity.

2.1. Earnings timeliness as a measure of the governance usefulness of accounting information

We conjecture that the extent to which current accounting numbers capture the information set underlying current changes in value (i.e., earnings timeliness, as defined in our study) is a fundamental determinant of their governance value to directors and investors. Directors monitor managerial and firm performance, ratify managerial decisions, provide managerial incentives, and aid in strategic planning activities (e.g., strategy development, succession planning). To carry out these duties, directors demand information to help them understand both how and why equity values are changing. For example, the detailed accounting system facilitates boards' efforts to separate controllable from uncontrollable events to aid in the managerial evaluation process. Outside investors and financial analysts who monitor firm and managerial performance also demand such information. Stock prices provide

information about overall changes in equity value. Accounting systems, by collecting and summarizing the financial effects of firms' investment, operating, and financing activities, convey information about the underlying *sources* of changes in equity value.

Earnings timeliness measures the extent to which current earnings capture the information set underlying contemporaneous changes in stock price. However, we acknowledge that the nature of this measure raises conceptual issues about our hypothesis that earnings timeliness is a determinant of governance choices. In particular, if stock prices efficiently reflect all information available to market participants, is not the information also available to residual claimants and the board? And if so, why would firms need costly monitoring mechanisms or specific knowledge gathering to substitute for low earnings timeliness? Why not just use stock price directly, or simply extract the information included in stock price? We draw on economic theory to address these questions in support of our hypotheses.

The detailed information set reflected in stock price is not freely available to the board and residual claimants. Grossman and Stiglitz (1980) demonstrate that fully revealing stock prices are incompatible with costly information collection activities of investors. In an equilibrium where private information collection and processing activities are costly, prices cannot be fully revealing. This implies that boards and others cannot extract the underlying information from price.

However, one could argue that even if prices are not invertible back to the market's underlying information set, managers and directors have direct access to all this information. Is this the case? Research documents a significant relation between changes in stock price and subsequent investment decisions (e.g., Morck et al., 1990; Baker et al., 2001). One potential explanation for this is that stock price communicates new information to a firm's managers that is then incorporated into investment decision (see Morck et al., 1990 for a discussion of competing hypotheses).[4] But, even if a firm's managers know the entire information set, this does not imply that the board of directors knows it, and so board structure may respond to low earnings timeliness as the board seeks to close the information gap between them and top management.[5] In addition, even if the board knows the entire information set, it is not necessarily the case that residual claimholders know it, and so costly monitoring activities may respond to low earnings timeliness as residual claimholders attempt to compensate for the information gap between them and both the firm's executives and board of directors.

Finally, stock price formation is a complex process and the aggregated nature of information impounded in price potentially limits its governance usefulness (e.g., Paul, 1992). As a result, utilizing stock price as a substitute information source for

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[4] A number of recent theory papers formally derive equilibria supporting a strategy directing role of stock price (see Dow and Gorton, 1997; Subrahmanyam and Titman, 1999; Dye and Sridhar, 2001).

[5] Evidence in Frankel and Li (2001) suggests that earnings timeliness captures the extent of information asymmetry between managers and the market. Specifically, they find that the ability of insider trading activity to predict future stock returns—their measure of information asymmetry—is negatively related to the R^2 from a price on earnings and book value regression, after controlling for analyst following and the extent of voluntary disclosure.

poor accounting numbers is likely to involve substantial error and to require extensive sophistication, knowledge, and effort on the part of board members. Thus, consistent with our hypotheses, costly governance mechanisms characterized by strong equity-based incentives for outside shareholders, directors, and executives, as well as a relatively knowledgeable, capable, and highly motivated board are likely demanded when earnings timeliness is low.

Our timeliness metric aggregates three firm-specific metrics. The first two metrics are based on firm-specific regressions of annual earnings on contemporaneous stock returns over a period of at least 8 years beginning in 1985 and ending in 1994 as follows:

$$EARN_t = a_0 + a_1 NEG_t + b_1 RET_t + b_2 NEG_t \cdot RET_t + \varepsilon_t, \tag{1}$$

$EARN_t$ is "core" earnings of a given firm in year t, defined as earnings before extraordinary items, discontinued operations, and special items, deflated by the beginning of year market value of equity.[6] RET_t is the 15-month stock return ending 3 months after the end of fiscal year t. NEG_t is a dummy variable equal to 1 if RET_t is negative and 0 otherwise.[7] This specification allows b_1 to capture the speed with which good news in a firm's stock returns is reflected in earnings, while $b_1 + b_2$ captures the speed with which bad news is reflected in earnings.

Our first metric is b_1, which measures the relative speed with which firms' earnings reflects good news.[8] We expect low values of b_1 for firms with severe delays in their accounting recognition of value-enhancing activities and outcomes. Our second metric of the timeliness of earnings is R^2 from Eq. (1), which, as observed by Ball et al. (2000), is decreasing in the lag with which earnings capture the news reflected in stock returns.

Our third metric is R^2 from Eq. (2):

$$RET_t = a_0 + b_1 EARN_t + b_2 \Delta EARN_t + \varepsilon_t, \tag{2}$$

where RET and $EARN$ are defined as before, and $\Delta EARN_t$ is the change in core earnings from year $t - 1$ to year t, deflated by the market value of equity at the beginning of year t. As with Eq. (1), the estimation is conducted over a period of at least 8 years beginning in 1985 and ending in 1994. Eq. (2) allows stock prices to vary with both levels and changes in earnings. R^2 from Eq. (2) measures the "percentage" of all value relevant information captured by the level and change in annual

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[6] Managers are likely to have high levels of discretion in the timing of recognizing special items relative to their discretion in the timing of core earnings. To the extent that managers' ability and incentives to manipulate bottom line earnings vary with corporate governance structures, the use of core earnings is less likely to lead to a violation of our assumption that the timeliness of earnings is exogenous under GAAP. Section 6 further discusses the potential impact of earnings management activities on our earnings timeliness measures.

[7] Allowing the intercept and slope to vary with the sign of stock returns is patterned after Basu (1997) and Ball et al. (2000). For sample firms that do not have any negative stock returns during the estimation period for model (1) (i.e., $NEG = 0$ for all observations), we drop NEG and $NEG \cdot RET$ from the specification of Eq. (1).

[8] Although it also might be interesting to consider b_2 as a metric, it is not practical as a large number of sample firms have no negative annual stock returns during the estimation period.

earnings, and is expected to decrease in the lag with which earnings captures changes in equity value.

Throughout the paper, we refer to the slope estimate from Eq. (1) (i.e., b_1) as REV_SLOPE, R^2 from Eq. (1) as REV_R2, and R^2 from Eq. (2) as ERC_R2. We develop a composite index for these three individual metrics (REV_SLOPE, REV_R2, and ERC_R2) as our primary metric of the timeliness of earnings.[9] We calculate the percentile rank for each firm in the sample for each of the three metrics. The composite timeliness metric for a given firm, $EARN\_TIMELY$, is computed as the average of all three percentile rank values. Due to data limitations, we are unable to estimate Eq. (2) for 39 firms.[10] To maximize sample size, in these case we use the percentile rank for each firm in the sample for ERC_R2 only as the timeliness metric. Our results are not sensitive to this decision.[11]

We close this section by addressing a critical interpretative issue with our timeliness metric. As discussed above, our timeliness metric embeds two R^2 measures, with higher R^2 interpreted as more timely accounting information. The issue is how does one interpret an R^2 of one? Does this imply that, rather than being more useful, earnings information is actually superfluous? The answer is no. While stock price changes provide overall information about changes in firm value, information from the accounting system aids directors and investors in understanding the *source* of changes in firm value. For example, stock price changes commingle events under the control of managers with events that are not, while agency theory counsels that managers should be held accountable for controllable events and not uncontrollable events. The accounting system facilitates boards' efforts to separate controllable from uncontrollable events through analysis of budget variances and other techniques. Thus, even if disaggregated accounting information explained 100% of the variance in returns, accounting would not be superfluous to governance as stock price is not a sufficient statistic for the detailed information necessary to separate controllable from uncontrollable events.

2.2. Measures of organizational complexity

We focus on two aspects of organizational complexity: industry and geographic concentration. Existing research rarely incorporates industry and geographic

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[9] We do not use the slope from Eq. (2) because we expect different timing problems to have opposing effects on the slope from Eq. (2). For example, we expect the "smoothing" of the recognition of holding gains on assets in place over the lives of the assets to *increase* the slope in model 2 (analogous to positive effects of the persistence in earnings on ERCs documented in the prior literature). In contrast, we expect distortions in earnings resulting from mismatching of revenues and expenses to *decrease* the slope in Eq. (2).

[10] We require the estimation for both Eqs. (1) and (2) to have degree of freedom of at least 6, which requires at least 9 years of observations for estimating Eq. (1) and 8 years for Eq. (2).

[11] The use of a composite involving percentile ranks can mitigate potential measurement error in the timeliness metrics (Greene, 2000). Using the ranks of the timeliness metrics mitigates measurement error in the metrics only if the rank is determined by "timeliness" rather than the measurement error in metrics. In sensitivity analysis we also conduct our estimations using the first principal component of the earnings timeliness metrics. These analyses are discussed in Section 5.2.

diversification together as part of the same research design (exceptions include Bushman et al., 1995; Bodnar et al., 1998; Duru and Reeb, 2002; Denis et al., 2002). We reason that while industry and geographic diversification differ along many dimensions, they both impose significant operational and informational complexity. In this section, we first describe the nature of the complexities imposed by these organizational designs, and then discuss existing research that bears on our research design.

Multi-industry firms confront the possibilities that capital will be inefficiently allocated within the firm (e.g., Stein, 1997), that diverse firms reduce CEO focus and demand high levels of managerial talent, and that unrelated segments can have conflicting operational styles or corporate cultures. Managers of individual business segments are also shielded from takeover pressure (Cusatis et al., 1993) and less likely to receive powerful equity incentives (Schipper and Smith, 1983, 1986). Finally, combining diverse operations creates information aggregation problems that can result in substantial information asymmetries within the firm (Habib et al., 1997), or between firm insiders and outside investors by suppressing the activities of information intermediaries (Gilson et al., 2001). While diversified firms in the U.S. must disclose segment data, this information can suffer from problems associated with segment identification, cost allocations, and transfer pricing schemes (e.g., Givoly et al., 1999).

Similar to multi-industry firms, multinational firms face a complex managerial decision-making environment that generates a range of monitoring difficulties. Such firms face cultural and legal diversity across markets and must develop, coordinate, and maintain organizations that span international boundaries. Information complexities arise due to geographic dispersion, multiple currencies, high auditing costs, differing legal systems, and cultural and language differences (Reeb et al., 1998; Duru and Reeb, 2002; Denis et al., 2002). Operational complexities can arise as firms act to arbitrage institutional restrictions such as tax codes and financial restrictions (Bodnar et al., 1998). For example, firms may employ complex transfer pricing schemes to shift profits to low tax jurisdictions that can complicate efforts by shareholders and board members to understand firms' foreign operations.

While we hypothesize that organizational complexity associated with diversification causes costly governance responses, some have suggested that diversification is a result of firms' governance structures (see Denis et al., 1997; Anderson et al., 1998). Prior studies document that firms diversified across industry segments or geographic regions tend to have lower values than portfolios of similar focused firms (e.g., Berger and Ofek, 1995; Lamont and Polk, 2002; Lang and Stulz, 1994; Servaes, 1996; Denis et al., 2002).[12] A related literature documents increases in performance following restructuring events such as spinoffs and carve-outs (e.g., Schipper and Smith, 1983, 1986; Comment and Jarrell, 1995; John and Ofek, 1995; Daley et al., 1997).

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[12] It is an open question as to whether diversification causes value losses. Campa and Kedia (1999) and Graham et al. (2002) argue that the method used to estimate diversification discounts may produce spurious discounts. Errunza and Senbet (1984) find that geographic diversification is associated with higher values.

Under the view that firms' existing governance structures are not optimally configured (see also footnote 2), one may argue that weak governance structures allow firm managers to engage in value-destroying diversification behavior. Existing evidence does not seem to support this argument, however. For example, Rose and Shepard (1997) document that CEOs of diversified firms are paid more than CEOs of focused firms, and that this wage premium is more consistent with an ability matching story than an entrenchment story.[13] Denis et al. (1997) find no evidence that existing governance structures are correlated with estimated diversification discounts, and Anderson et al. (1998) find no evidence that failures of internal governance mechanisms are associated with the decision to diversify. While we take the equilibrium view that firms' governance structures are optimally configured in response to their operating environments (given the costs of changing), what we classify as costly governance structures are often perceived as "strong" governance structures under the alternative, out-of-equilibrium view (for example, higher equity-based compensation plans). Therefore, if weak governance causes diversification, it should work against us finding evidence that costly monitoring is associated with diversified firms.

To measure within-firm industry (*IND_CONCENTRATION*) and geographic segment concentration (*GEOG_CONCENTRATION*), we use the Compustat Business Industry Segment File to compute revenue-based Hirfindahl-Hirschman indices, calculated as the sum of the squares of each segment's sales as a percentage of the total firm sales.[14] *IND_CONCENTRATION* and *GEOG_CONCENTRATION* are average values of the Hirfindahl-Hirschman indices over the years 1989–1993. Higher values of *GEOG_CONCENTRATION* and *IND_CONCENTRATION* indicate more geographic and industry concentration, respectively. These measures decrease (nonlinearly) with the number of segments, holding constant variance of segment size, and increase with variance of segment size, holding number of segments constant. Thus, a two-segment firm with equal segment sales is less concentrated than a two-segment firm with unequal segment sales. These measures have an upper bound of 1 (a single segment) and a lower bound of 0.1 (for a ten-segment firm with equal revenue in each segment).

3. Predictions and description of governance variables

This section develops hypotheses concerning the sensitivity of governance structures to the timeliness of earnings and organizational complexity, and describes

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[13] Contrary to CEO entrenchment explanations for industry diversification, Rose and Shepard (1997) find that the compensation premium for diversification is invariant to CEO tenure and that incumbents who diversify their firms earn less than newly hired CEOs at already diversified firms.

[14] Prior research uses various metrics to capture diversification including number of reported segments (Denis et al., 1997), dummy variables for multi-segments (Anderson et al., 1998), factor analysis of multiple measures (Duru and Reeb, 2002), entropy measures (Bushman et al., 1995) and variations of Hirfindahl-Hirschman indices (Rose and Shepard, 1997).

our governance variables.[15] Sections 3.1–3.3 concern the stock price-wealth links of specific outside investors, directors, and executives, respectively. Section 3.4 deals with the composition of the board.

3.1. Equity-based monitoring incentives of outside shareholders

In the spirit of Demsetz and Lehn (1985), we predict that the lower the timeliness of earnings and higher organizational complexity, the higher the concentration of stock ownership by outside shareholders.

Our measures of ownership concentration are: (1) The average value of stock held by individual outside investors (*STKVAL_SHLDR*), computed as total market value of outstanding common stock at the end of fiscal year 1994 minus the value of shares held by officers and directors as a group, divided by the number of common shareholders; (2) The average percentage of stock held by individual outside investors (*STK%_SHLDR*), computed as the reciprocal of the number of common stockholders as of fiscal year end 1994;[16] (3) The percentage of stock held by institutions (*%INST*); and (4) The percentage of stock held by blockholders owning 5% or more of the firms' shares (*%BLOCK*).

We compute a composite variable (*SHLDR_CONC*) representing the average within-sample percentile of *STKVAL_SHLDR*, *STK%_SHLDR*, *%INST* and *%BLOCK*. Each of the four individual metrics is sorted in ascending order before computing the percentile values. Hence, high values of *SHLDR_CONC* represent relatively large average shareholdings by individual outside shareholders.[17]

3.2. Equity-based incentives of inside and outside directors

Stock ownership directly links directors' financial incentives with those of outside shareholders. We predict that the stockholdings of inside directors will be relatively large in firms with limited accounting information and organizational complexity due to greater benefits of providing inside directors with equity-based incentives to act in the shareholders' interests. We also predict that the stockholdings of outside directors in these firms will be large to provide the outside directors with powerful financial incentives to engage in costly policing and advising activities for the benefit of the shareholders.

To capture directors' equity-based incentives, we include the average value and percentage of outstanding shares of common stock held by individual inside directors (*STKVAL_INDIR* and *STK%_INDIR*) and by individual outside directors (*STKVAL_OUTDIR* and *STK%_OUTDIR*). We compute composite variables to capture the strength of equity-based incentives of inside (*INDIR_INCENTIVES*)

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[15] Appendix A provides details concerning data sources and computation of all governance variables.

[16] Ideally we would exclude the number of officers and directors from the denominators of *STKVAL_SHLDR* and *STK%_SHLDR*. However, the number of officers and directors is likely small relative to the total number of common stockholders.

[17] We also conduct principal components analyses for each grouping of governance metrics as an alternative way to summarize the data in the individual metrics. We discuss these analyses in Section 5.2.

and outside directors (*OUTDIR_INCENTIVES*). Each composite variable represents the average within-sample percentiles of the percentage or value of shares held by the corresponding group. In all cases, high values of the composite variables represent relatively large shareholdings.

3.3. Executive compensation

We predict that as the timeliness of accounting earnings declines and organizational complexity increases, executive compensation packages will include both a higher proportion of equity-based incentives and a higher proportion of long-term incentives relative to total incentives to better align incentives. A similar prediction is made by Duru and Reeb (2002) relative to industry and geographic diversification.

To capture the structure of incentive packages of the top five officers, we include the percentage of the value of all their incentive plans represented by equity-based plans (*EQINC_TOT*) and by long-term plans (*LTINC_TOT*). We compute the value of all incentive plans during a year as the combined value of options and restricted stock granted that year as well as long-term performance plan payouts and annual bonus payments during the year from the ProxyBase dataset of Hewitt Associates which compiles information from annual individual firm proxy statements. *EQINC_TOT* is the percentage of total incentives represented by grants of stock options and restricted stock, and *LTINC_TOT* is the percent of managers' total incentive plans represented by grants of options and restricted stock plus any payouts from long-term performance plans (excludes annual bonus payments). For each measure we use the average of the ratio across the top five officers of a firm in each year 1994–97, and then average over the 4 years to minimize distortions associated with non-annual option grant frequencies. We compute a composite variable (*EXEC_INCENTIVES*) as the average of the percentiles of *EQINC_TOT* and *LTINC_TOT*. Both *EQINC_TOT* and *LTINC_TOT* are sorted in ascending order before computing percentiles so that high values of *EXEC_INCENTIVES* represent relatively high importance of long-term and equity-based incentive plans and relatively low importance of short-term bonus plans.

3.4. Board structure

We consider four aspects of board structure: (1) The percentage of directors who are insiders (%*INDIR*), defined as directors who are officers, retired officers, or relatives of officers of the sample firm; (2) Board size, measured as the total number of directors on the board (#_*DIR*); (3) Outside director industry expertise, computed as the percentage of outsiders with executive experience in the same Fama and French (1997) industry grouping as the sample firm (%_*EXPERT*); and (4) The average number of other boards on which outside directors serve (#*OTH_BOARD*). In considering the determinants of these four aspects, we recognize the possibility that boards perform multiple roles including hiring, firing and compensating top managers, ratifying decisions, and strategic planning (see, e.g., Adams, 2000). This introduces ambiguity into predictions regarding the effects of timeliness and

organizational complexity on optimal board structures, in particular with respect to %*INDIR* and #_*DIR*.

3.4.1. The percentage of directors who are insiders

An important question of board composition concerns the ideal combination of outside and inside members. Outsiders are more independent of a firm's CEO, but are potentially less informed regarding firm projects than insiders. Insiders are better informed regarding firm projects, but have potentially distorted incentives deriving from their lack of independence from the firm's CEO. Some argue that boards should be represented mostly by outsiders. Jensen (1993) advocates boards with the CEO as the only inside member. Weisbach (1988) finds a stronger association between prior performance and the probability of CEO resignation for companies with outsider-dominated boards than for companies with insider-dominated boards, and Borokhovich et al. (1996), Byrd and Hickman (1992) and Brickley et al. (1994) suggest a positive relation between the fraction of outsiders on the board and firm value. On the other hand, Bhagat and Black (1999), and Klein (1998) suggest that adding insiders on the board may improve firm performance for some firms.[18]

Our premise in this paper is that the optimal mix of inside versus outside directors may depend on the timeliness of earnings and organizational complexity. On the one hand, low earnings timeliness and high organizational complexity can increase the scope for moral hazard by making firms' operations less transparent to the board and outsiders. In this case, firms with relatively low earnings timeliness and high organizational complexity should have a relatively higher proportion of outside directors. On the other hand, low accounting timeliness and high organizational complexity increase the demand for additional information acquisition by the board. In this case, firms with relatively low earnings timeliness and high organizational complexity have a relatively higher proportion of insider directors. Unfortunately, these predictions go in opposite directions, undermining our ability to make unambiguous predictions about how %*INDIR* relates to earnings timeliness and organizational complexity. Thus, the question of which of these two conflicting forces is more powerful is ultimately an empirical question.

3.4.2. Board size

Concerning board size, smaller boards have the advantage of lower coordination costs and less free riding among board members, but the disadvantage of fewer advisors and monitors of management. Jensen (1993) advocates small size boards, and Yermack (1996) and Eisenberg et al. (1998) document an inverse association between board size and firm value, holding firm size constant. In contrast, Agrawal and Knoeber (1999) argue for larger size boards in firms where information is otherwise difficult to obtain, and Adams and Mehran (2002) find that banking firms with larger boards perform better (we add a control for banking firms).

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[18] Recent theory work on this issue include Raheja (2001) and Hermalin and Weisbach (1998). See Hermalin and Weisbach (2002) and John and Senbet (1998) for reviews of the literature on boards.

As with %*INDIR*, it is difficult to make unambiguous predictions relative to #_*DIR*. It is quite plausible that low timeliness and organizational complexity would lead firms to smaller board size. In this case, firms would be willing to give up the potential knowledge contribution of an additional director in order to increase cooperation and reduce free-riding. It is also possible that complex firms with low timeliness would utilize more directors as a response to a demand for specific information.

3.4.3. Outside director industry expertise

We predict that firms with relatively low earnings timeliness and high organizational complexity will have a relatively higher percentage of outside directors with industry expertise. The idea is that these firms have a higher demand for outside directors with complementary knowledge to help managers with specialized decision problems (Fama and Jensen, 1983). There is one caveat to our predictions. Because we measure director expertise as the percentage of outsiders with executive experience in the same Fama and French (1997) industry grouping, our measure of board member expertise is likely noisy for multi-industry segment firms.

3.4.4. Quality (reputation) of outside directors

Fama and Jensen (1983) suggest that board effectiveness is enhanced by outside directors with labor market incentives to develop reputations as experts in decision control. Following Shivdisani (1993), we measure the reputation of outside directors with the average number of other boards on which outside directors serve (#*OTH_BOARD*).[19] We predict that in response to a demand for costly monitoring, firms with relatively low earnings timeliness and high organizational complexity will utilize outside directors with relatively higher reputations.

4. Control variables, sample, and data

4.1. Control variables

We include a number of variables in our cross-sectional regression models to control for factors affecting governance structures documented in prior studies. Many of these variables have been used in prior research as determinants of governance choice. We acknowledge the possibility that earnings timeliness may be determined by these variables, which are the true determinants of governance choices. In Section 5.1, we explore this possibility by examining the relation between timeliness and these control variables.

Prior studies show that firms' growth opportunities explain cross-sectional differences in governance configurations. We use several proxies for investment

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[19] A large number of other boards may also indicate that directors are too busy and perhaps of low quality. To address this concern, we rerun all of our analysis eliminating firms where the average number of other boards is greater than 4 and obtain qualitatively similar results.

opportunities, including the ratio of the book value of equity to the market value of equity (*BTM*), sales growth (*GROWTH_SALE*), research and development expenses scaled by net sales (*RD_SALES*) and advertising expenses scaled by net sales (*AD_SALES*). We use principal component analysis to compute a composite measure of these four variables, *GROWTH*, using the first principal component which captures a substantial portion of the variance in these variables.

We include two variables motivated by Demsetz and Lehn (1985)—the standard deviation of stock returns (*STD_RET*) and the market value of equity (*MV*). Demsetz and Lehn (1985) document a significant relation between these factors and ownership concentration. We expect a positive association between our governance structure variables and *STD_RET*, consistent with greater volatility increasing demand for costly monitoring. We include *MV* to control for the impact of various unspecified differences relating to size (e.g., information environment, marginal product of manager effort).

Prior research finds that board composition and managerial ownership depend on past performance (see Hermalin and Weisbach, 2002; Himmelberg et al., 1999; Kole, 1996). We use prior period return on equity (*ROE*) to proxy for performance history. We also consider the number of years the CEO has been a director of the firm (*CEO_TENURE*), an indicator variable for whether the CEO is a founder of the firm (see Finkelstein and Hambrick, 1989; Klein, 1998), and the number of years a firm has been public (*FIRM_AGE*).

With the exception of *STD_RET*, *FIRM_AGE* and *FOUNDER*, all of the control variables are measured as the average over the period of 1989–1993. *FIRM_AGE* is measured by the number of years a firm has been on CRSP as of year end 1994 and *STD_RET* is estimated over the same period used to estimate models (1) and (2) in Section 2.2. *FOUNDER* is a dummy variable that takes a value of one if the CEO or Chairman of the Board in place during 1994 is also a founder of the firm and zero otherwise. Founder status was determined by review of individual firm proxy statement biographies of CEOs and Chairmen of the Board. Finally, to control for the role of regulation in the formation of governance systems (e.g., Demsetz and Lehn, 1985; Denis et al., 1997; Anderson et al., 1998; Kole and Lehn, 1999; Gillan et al., 2003), we include dummy variables for utilities and banks. Regulation may impact a firm's governance structure due to additional third-party monitoring like regulatory bank audits, which may systematically influence optimal governance structures for these firms.

It is possible that a low relative earnings timeliness value could simply capture situations where alternative sources of public information vary across firms. As a sensitivity check, we thus consider an additional variable to capture alternative sources of public information: the number of analyst long-term earnings growth rate forecasts for the firm from the Zacks database. These analyses are discussed in Section 5.2.

4.2. Sample and data

We select our sample from the Fortune 1000 firms included on ProxyBase, a database derived from firms' annual proxy statements maintained by Hewitt

Associates. We obtain data for fiscal year 1994 from ProxyBase on the number of directors, the number of inside and outside directors, and directors' stock ownership. We also use ProxyBase to obtain the structure of compensation packages of the top five officers for 1994 through 1997. We obtain the percentage of stock held by officers and directors as a group (as reported in proxy statements for fiscal year 1994) from Compact Disclosure. We collect data from proxy statements for fiscal 1994 concerning the *FOUNDER* status of CEO or Chairman of the board, backgrounds of outside directors, and current and prior employers. We assess whether outside directors have industry-specific expertise by examining director biographies in proxy statements to determine whether they have served as an executive of another firm in a given sample firm's industry. For this analysis, we assign firms to industries on the basis of the classification scheme reported in Fama and French (1997).[20] We require sample firms to have data on annual earnings and the market value of equity on Compustat and monthly stock return data on the CRSP database for at least 8 years during the period 1985 through 1994 to allow computation of the firm-specific timeliness variables. All other financial data are from Compustat.

Table 1 describes the industry membership of the 784 sample firms with complete data assigned on the basis of 4-digit SIC codes and the Fama and French (1997) industry classification scheme. 45 industries are represented by sample firms, with 26 industries represented by at least ten firms. Utilities (97 firms), banks (81 firms), insurance (45 firms), retail (42 firms), chemicals (33 firms), wholesale (33 firms), computers (31 firms), machinery (30 firms), petroleum and natural gas (29 firms), business supplies (28 firms), and business services (25 firms) are each represented by at least 25 firms.

Table 2 includes summary statistics for our metrics for the timeliness of earnings and organizational complexity. The mean and median levels of the *ERC_R*2 are 0.37 and 0.35, respectively, while the mean and median levels of *REV_R*2 are 0.33 and 0.29, respectively. *REV_SLOPE*, the slope on positive returns in Eq. (2), has a mean (median) value of 0.04 (0.03). Mean values of *IND_CONCENTRATION* and *GEOG_CONCENTRATION* are 0.65 and 0.81, respectively, suggesting greater geographic concentration than industry concentration. Table 2 also summarizes the sample distribution of other firm characteristics considered in our governance estimations, including the market value of equity (*MV*), the standard deviation of 15-month stock returns (*STD_RET*), firm age (*FIRM_AGE*), the book-to-market ratio (*BTM*), sales growth (*GROWTH_SALE*), the ratios of research and development and advertising to net sales (*RD_SALES* and *AD_SALES*, respectively) ROE of prior years, CEO tenure (*CEO_TENURE*) and CEO founder information (*FOUNDER*). Finally, Table 2 summarizes the sample distribution of all our governance variables. Table 2 reveals that all model variables display a fair amount of variation across sample firms.

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[20] We make one change to the Fama and French (1997) industry classification scheme; we classify SIC code 7372 (Prepackaged Software) as Computers rather than Business Services.

Table 1
Industry membership of sample firms[a]

Industry	No. of firms	Industry	No. of firms
Agriculture	1	Measuring and control equipment	10
Aircraft	5	Medical equipment	16
Alcoholic beverages	3	Nonmetallic mining	4
Apparel	8	Personal services	1
Automobiles and trucks	20	Petroleum and natural gas	29
Banking	81	Pharmaceutical products	14
Business services	25	Precious metals	2
Business supplies	28	Printing and publishing	14
Candy and soda	3	Recreational products	6
Chemicals	33	Restaurants, hotel, motel	9
Computers	31	Retail	42
Construction material	19	Rubber and plastic products	5
Construction	13	Shipbuilding, railroad equipment	6
Consumer goods	22	Shipping containers	4
Defense	2	Steel works, etc.	14
Electrical equipment	11	Telecommunications	16
Electronic equipment	22	Textiles	10
Entertainment	2	Tobacco products	2
Fabricated products	1	Trading	5
Food products	17	Transportation	21
Healthcare	2	Utilities	97
Insurance	45	Wholesale	33
Machinery	30		
		Total	784

[a] Industries are defined on the basis of 4-digit SIC codes using the industry groupings identified in Fama and French (1997). The only departure from the Fama and French industry groupings is our classification of SIC code 7372 as Computers rather than Business Services.

5. Empirical design and results

In Section 5.1, we examine relations between earnings timeliness and other firm characteristics. Section 5.2 presents empirical results on the relation between governance variables and our metrics for earnings timeliness and organizational complexity.

5.1. Relations between earnings timeliness and other firm characteristics

We take the perspective in this paper that earnings timeliness has a direct effect on governance choices that is distinct from the effects of other firm characteristics. It is thus logical that we begin our empirical analysis by directly examining the extent to which our timeliness metric is distinct from other fundamental firm characteristics. Univariate correlations reported in Table 3, panel A show that the three timeliness measures are significantly correlated among themselves at the 1% level. Panel A also reveals that the individual and composite earnings timeliness metrics are each significantly negatively correlated with the growth opportunities composite variable,

Table 2
Sample distribution of model variables[a]

Variable	Nobs	Mean	Std. dev.	Q1	Median	Q3
Earnings timeliness metrics:						
EARN_TIMELY	784	0.50	0.22	0.33	0.50	0.67
ERC_R2	784	0.37	0.23	0.17	0.35	0.55
REV_R^2	745	0.33	0.21	0.16	0.29	0.47
REV_SLOPE	745	0.04	0.15	−0.01	0.03	0.09
Organizational complexity:						
GEOG_CONCENTRATION	784	0.81	0.27	0.61	1.00	1.00
IND_CONCENTRATION	784	0.65	0.28	0.40	0.63	0.99
Other firm characteristics:						
MV ($ millions)	784	3347.85	7048.44	480.38	1083.08	2978.03
STD_RET	784	0.41	0.24	0.25	0.35	0.47
FIRM_AGE	783	30.07	17.98	22.00	24.00	39.00
BTM	784	0.78	0.69	0.38	0.61	0.95
GROWTH_SALE	784	0.09	0.13	0.03	0.06	0.12
RD_SALES	784	0.02	0.06	0	0	0.02
AD_SALES	784	0.01	0.03	0	0	0.01
ROE	784	0.10	1.18	0.07	0.11	0.15
CEO_TENURE	778	12.14	9.20	5.0	10.0	17.0
FOUNDER	784	0.14	0.35	0	0	0
Governance structure metrics:						
Outside shareholder incentives						
STKVAL_SHLDR (in $thousands)	776	268.11	445.35	62.80	151.31	308.34
STK%_SHLDR	753	0.19	0.22	0.03	0.10	0.26
%INST	782	0.53	0.20	0.38	0.56	0.68
%BLOCK	782	0.22	0.22	0.06	0.16	0.32
Board of director stock-based incentives						
STKVAL_INDIR (in $ millions)	780	37.90	235.17	3.04	9.06	21.91
STK%_INDIR	780	0.02	0.04	0.00	0.01	0.02
STKVAL_OUTDIR (in $ millions)	783	10.85	80.09	0.18	0.72	3.36
STK%_OUTDIR	783	0.00	0.02	0	0	0
Executives stock-based incentives						
LTINC_TOT	779	0.57	0.22	0.43	0.60	0.72
EQINC_TOT	779	0.49	0.24	0.32	0.51	0.67
Board structure						
#OTH_BOARD	757	2.08	1.16	1.17	2.00	2.83
%_EXPERT	756	0.08	0.14	0.00	0.00	0.13
%INDIR	784	0.22	0.12	0.13	0.20	0.28
#_DIR	784	11.22	3.30	9.00	11.00	13.00

[a] See Appendix A for variable definitions.

GROWTH, and the firm size variable, *LOG_MV* and significantly positively correlated with the organizational complexity variables, *IND_CONCENTRATION* and *GEO_CONCENTRATION*. These correlations are quite intuitive—one might expect firms with high growth opportunities and less industry and geographic concentration to have low earnings timeliness.

In Table 3, panel B, we report results from multiple regressions of composite timeliness (*EARN_TIMELY*) on the various firm characteristics to determine how

Table 3
Analyses of earnings timeliness metrics[a]

Panel A: Correlation between earnings timeliness metrics and firm characteristics

	ERC_R2	*REV_R2*	*REV_SLOPE*	*EARN_TIMELY*
ERC_R2	1.000			
REV_R2	0.407***	1.000		
REV_SLOPE	0.373***	0.268***	1.000	
EARN_TIMELY	0.799***	0.737***	0.724***	1.000
GROWTH	−0.088**	−0.084**	−0.177***	−0.134***
BTM	−0.045	0.017	−0.018	−0.027
GROWTH_SALE	−0.038	−0.042	−0.139***	−0.079**
RD_SALE	−0.166***	−0.071**	−0.120***	−0.124***
AD_SALE	−0.045	−0.061*	−0.054	−0.071**
STD_RET	−0.033	0.050	−0.060*	−0.009
LOG_MV	−0.058*	−0.137***	−0.118***	−0.136***
GEOG_CONCENTRATION	0.126***	0.128***	0.118***	0.145***
IND_CONCENTRATION	0.159***	0.114***	0.096***	0.160***
FIRM_AGE	−0.025	−0.028	0.071*	−0.003
ROE	0.101***	−0.015	−0.082**	0.011

Panel B: Multiple regressions of composite earnings timeliness metric on firm characteristics
Dependent variable: *EARN_TIMELY*

	(1)	(2)	(3)	(4)
Intercept	0.383 (10.01)***	0.401 (9.99)***	0.259 (4.47)***	0.283 (4.73)***
LOG_MV	−0.019 (−3.22)***	−0.019 (−3.20)***	−0.019 (−2.99)***	−0.018 (−2.95)**
STD_RET	−0.017 (−0.47)	−0.007 (−0.19)	−0.025 (−0.68)	−0.018 (−0.49)
GROWTH	−0.100 (−1.37)	—	−0.010 (−1.29)	—
BTM		−0.017 (−1.08)	—	−0.013 (−1.09)
GROWTH_SALE		−0.077 (−1.13)	—	−0.090 (−1.31)
RD_SALE		−0.324 (−2.20)**	—	−0.275 (−1.83)*
AD_SALE		0.128 (0.46)	—	0.229 (0.82)
FIRM_AGE			0.001 (1.36)	0.001 (1.09)
ROE			0.009 (1.35)	0.007 (1.08)
GEOG_CONCENTRATION			0.038 (1.18)	0.035 (1.07)
IND_CONCENTRATION			0.117 (3.84)***	0.120 (3.96)***
Adjusted R^2	0.014	0.018	0.037	0.041
No. of obs.	784	784	784	784

***, **, * indicate significant at less than the 1%, 5%, 10% level, respectively.

[a] See Appendix A for variable definitions.

distinct earnings timeliness is from these characteristics that have been considered in prior governance studies. We include an extensive list of fundamental characteristics discussed in Section 4.1 including growth opportunities, return volatility, firm size, industry and geographic concentration, past performance, and the number of years a firm is public. Panel B reveals that firm size and industry concentration are significantly associated with timeliness, consistent with the univariate correlations. Overall, however, the vector of firm characteristics explains a small portion of the cross-sectional variation in *EARN_TIMELY*, with adjusted R^2 ranging from 0.014 to 0.041 across specifications. The inability to explain the cross-sectional variation in *EARN_TIMELY* with firm characteristics previously linked with governance factors is consistent with the idea that timeliness is distinct relative to these other fundamental firm characteristics. Thus, we posit that earnings timeliness captures an inherent property of the firm's information environment, and leave further analysis of this premise to future research.

5.2. Primary model and regression results

We now present our primary model to test our main hypotheses of the association between governance structures and the information environment and organizational complexity of the firm.

Specifically, we estimate the following cross-sectional regression models:

$$
\begin{aligned}
DEP\_VAR = \alpha &+ \beta_1 EARN\_TIMELY + \beta_2 GEOG\_CONCENTRATION \\
&+ \beta_3 IND\_CONCENTRATION + \delta_1 GROWTH \\
&+ \delta_2 LOG\_MV + \delta_3 STD\_RET + \delta_4 FIRM\_AGE + \delta_5 ROE \\
&+ \delta_6 CEO\_TENURE + \delta_7 FOUNDER + \delta_8 UTILITY \\
&+ \delta_9 FINANCIAL + \varepsilon.
\end{aligned}
\tag{3}
$$

DEP_VAR represents (1) the four variables for board structure, and the composite variables for (2) equity-based incentives of outside shareholders, (3) equity-based incentives of inside or outside directors, or (4) the composition of executive compensation plans. For each *DEP_VAR* variable whose value is bounded between zero and one, we apply a logistic transformation before estimating the model.[21] Appendix A includes detailed descriptions of all variables.

Our main interest is in the coefficients on the earnings timeliness and organizational complexity metrics (i.e., β_1, β_2, and β_3 in Eq. (3)). As discussed in Section 3.1, we predict $\beta_i < 0$ (for $i = 1$ through 3) for the models incorporating the governance metrics related to outside shareholder concentration (*SHLDR_CONC*), board and officer incentives (*INDIR_INCENTIVES* and *OUTDIR_INCENTIVES*), and executive incentives (*EXEC_INCENTIVES*) to reflect the hypothesized negative

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[21] Specifically, we use the formula $\log[DEP\_VAR/(1 - DEP\_VAR)]$ to transform each composite metric. The transformation is designed to convert the bounded distribution into an unbounded one, and is similar to that conducted by Demsetz and Lehn (1985) and Himmelberg et al. (1999) in a similar setting. The reported results for the transformed variables are similar to results using the variables before conducting the transformation.

relation between costly governance and metrics for the timeliness of earnings and geographic and industry concentration (i.e., the inverse of organizational complexity). Further, since high values of the board structure variables %_EXPERT and #OTH_BOARD represent governance systems that facilitate costly monitoring activities by investors and directors, we predict $\beta_i < 0$ (for $i = 1$ through 3) for these variables as well. As discussed earlier, we do not make unambiguous predictions for coefficient estimates on EARN_TIMELY, GEOG_CONCENTRATION, or IND_CONCENTRATION relative to board characteristics %INDIR and #_DIR due to the possibility of offsetting forces deriving from the multiple board roles of monitoring and specific knowledge acquisition.

Table 4 reports that consistent with our predictions, EARN_TIMELY is significantly negatively related to three of the four composite governance variables. These negative coefficients are statistically different from zero for outside shareholder concentration (SHLDR_CONC), executive incentive structure (EXEC_INCENTIVES), and insider directors' equity holdings (INDIR_INCENTIVES) at the 1%, 5% and 10% levels of significance, respectively.[22] While negative, the coefficient on EARN_TIMELY is not statistically different from zero in the model of OUTDIR_INCENTIVES. In untabulated estimations of Eq. (3) that exclude the regulated industry controls, we find that EARN_TIMELY is negative and significant for all four composite governance metrics, suggesting that utilities and banks have high timeliness and low use of alternative costly monitoring mechanisms. Is the low use of costly monitoring in these businesses because of high timeliness or because of regulatory monitoring? Our design cannot distinguish between these alternatives.

Table 4 documents a significant negative relation between organization complexity metrics and three of the four governance composites. In particular, IND_CONCENTRATION is negatively related to inside director's incentive (INDIR_INCENTIVES) (at below the 1% level in a two-sided test), and outside directors' incentive (OUTDIR_INCENTIVES) (at below the 10% level) while GEOG_CONCENTRATION is significantly negatively associated with SHLDR_CONC (at below the 1% level).[23] Neither organizational complexity measure is significantly associated with EXEC_INCENTIVES.[24] We observe that IND_CONCENTRATION and GEOG_CONCENTRATION do not appear to be equally important across the governance choices (i.e., only one of the two variables is

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[22] We remove significant outliers determined by absolute values of Cook's distance greater than one and studentized residuals greater than three.

[23] Denis et al. (1997) find a negative relation between the fractional ownership of officers and directors as a group and an alternative measure of diversification, the number of industry segments. While our multivariate analyses document a negative relation between IND_CONCENTRATION and fractional ownership of officers and directors as a group, we observe a positive, but insignificant univariate correlation (untabulated) between these two measures.

[24] In a related study, Duru and Reeb (2002) find that both industry and geographic diversification are correlated with the higher equity incentives for executives. We get similar results before controlling for banks and utilities, but with these controls find that more geographic diversification leads to higher equity incentives while more industry diversification leads to lower equity incentives.

Table 4
Summary statistics from regressions of composite governance variables on earnings timeliness, organizational complexity measures and various control variables

$$DEP\_VAR = \alpha + \beta_1 EARN\_TIMELY + \beta_2 GEOG\_CONCENTRATION + \beta_3 IND\_CONCENTRATION$$
$$+ \delta_1 GROWTH + \delta_2 LOG\_MV + \delta_3 STD\_RET + \delta_4 FIRM\_AGE + \delta_5 ROE$$
$$+ \delta_6 CEO\_TENURE + \delta_7 FOUNDER + \delta_8 UTILITY + \delta_9 FINANCIAL + \varepsilon$$

	(1)	(2)	(3)	(4)
	SHLDR_CONC	INDIR_INCENTIVES	OUTDIR_INCENTIVES	EXEC_INCENTIVES
EARN_TIMELY	−0.43 (−3.68)***	−0.29 (−1.63)*	−0.13 (−0.59)	−0.56 (−2.38)**
GEOG_ CONCENTRATION	−0.43 (−4.05)***	0.07 (0.41)	0.24 (1.22)	−0.34 (−1.58)
IND_CONCENTRATION	−0.15 (−1.48)	−0.54 (−3.49)***	−0.37 (−1.92)*	0.33 (1.66)
GROWTH	0.06 (2.25)**	0.02 (0.43)	0.12 (2.45)**	0.10 (1.99)**
LOG_MV	−0.11 (−5.35)***	0.001 (0.04)	−0.12 (−3.06)***	0.22 (5.48)***
STD_RET	0.21 (1.82)*	0.60 (3.38)***	−0.22 (−1.01)	0.65 (2.78)***
FIRM_AGE	−0.01 (−4.26)***	−0.01 (−4.47)***	−0.02 (−5.62)***	−0.00 (−0.31)
ROE	0.02 (0.72)	−0.004 (−0.13)	−0.06 (−1.60)	−0.21 (−3.04)***
CEO_TENURE	0.002 (0.62)	0.04 (10.08)***	−0.00 (−0.62)	−0.02 (−2.65)***
FOUNDER	−0.02 (−0.21)	0.64 (5.39)***	0.38 (2.60)**	−0.18 (−1.13)
UTILITY	−1.14 (−12.86)***	−1.62 (−11.88)***	−1.17 (−6.95)***	−0.99 (−5.59)***
FINANCIAL	−0.02 (−0.27)	0.17 (1.41)	0.41 (2.78)**	−0.11 (−0.72)
Adjusted R^2	0.40	0.46	0.21	0.15
No. of obs.	773	764	772	765

DEP_VAR = variables reflecting composite corporate governance used as dependent variables in the above regression analyses. See Appendix A for descriptions and measurement information for specific DEP_VAR composites and all other model variables. Summary statistics include coefficient estimates with t-statistics in parentheses. ***, **, and * indicate significance level for a two-sided test at less than the 1%, 5% and 10% level, respectively.

significant in each model). Our theory does not distinguish between the two organizational complexity metrics with respect to governance structures nor does it offer predictions on which would dominate for a particular governance choice—both of these issues are left for future research.

We also observe in Table 4 that a number of control variables are significantly related to the four governance structure composites. We highlight the significant positive relation between return volatility (*STD_RET*) and three of the governance choices—shareholder concentration, inside director incentives and executive incentives. The positive relation between *STD_RET* and *SHLDR_CONC* is consistent with the findings in Demsetz and Lehn (1985). Other influential control variables include size (*LOG_MV*), growth opportunities (*GROWTH*), *FIRM_AGE*, and *CEO_TENURE*, *FOUNDER* and regulation (*UTILITY*).

Table 5 presents the results of Eq. (3) with the four board structure variables as dependent variables. Table 5 documents that consistent with predictions, *#OTH_BOARD* is negatively associated with both *EARN_TIMELY* and *IND_CONCENTRATION* at the 5% and 1% levels, respectively, suggesting that firms with low earnings timeliness and operations in multiple industries have outside directors with high reputations. We also find a negative and significant relation between %*_EXPERT* and *GEO_CONCENTRATION* at below the 1% level, suggesting that firms with greater geographic diversification have more outside directors with industry expertise. We do not find the predicted negative relation between %*_EXPERT* and *EARN_TIMELY*. Recall that in contrast to the predictions for the models involving board structure variables %*EXPERT* and *#OTH_BOARD*, we do not offer a prediction on the other two board structure variables, %*INDIR* and *#_DIR* with respect to earnings timeliness and organizational complexity due to the opposing predictions from theory. Our results reflect the opposing predictions from theory—we do not find statistically significant relations between %*INDIR* and *#_DIR* and the earnings timeliness metric and either organizational complexity metric.

Tables 4 and 5 also reveal that both %*INDIR* and *INDIR_INCENTIVES* increase in *FOUNDER* and *CEO_TENURE*, consistent with the theory in Hermalin and Weisbach (1998) that founding CEOs or CEOs with long tenures have large bargaining power in determining board composition. It is also intuitive that *INDIR_INCENTIVES* would be higher for a firm *FOUNDER* and a long tenure CEO (Table 4, Column 2), as the CEO is likely to have accumulated more stock holdings in these cases. Consistent with Adams and Mehran (2002), we also document that banks (*FINANCIAL*) have more outside directors (column 3) and larger boards (column 4) than non-banks.

For completeness, Table 6 reports the results of estimating Eq. (3) with the individual governance measures underlying the governance composites used in Table 4. These analyses allow us to determine which individual governance variables contribute to the significant coefficients in the models using governance composites. For convenience of comparison, we also include the coefficients on the composite variables. Following predictions on the composite measures, we expect that all of the individual governance variables will be negatively related to *EARN_TIMELY*,

Table 5
Summary statistics from regressions of board structure variables on earnings timeliness, organizational complexity measures and various control variables

$$DEP\_VAR = \alpha + \beta_1 EARN\_TIMELY + \beta_2 GEOG\_CONCENTRATION + \beta_3 IND\_CONCENTRATION$$
$$+ \delta_1 GROWTH + \delta_2 LOG\_MV + \delta_3 STD\_RET + \delta_4 FIRM\_AGE + \delta_5 ROE$$
$$+ \delta_6 CEO\_TENURE + \delta_7 FOUNDER + \delta_8 UTILITY + \delta_9 FINANCIAL + \varepsilon$$

	Pred. sign	(1) #OTH_BOARD	(2) %_EXPERT	Pred. sign	(3) %INDIR	(4) #_DIR
EARN_TIMELY	(−)	−0.09 (−2.04)**	−0.001 (−0.01)	(?)	−0.03 (−0.66)	0.00 (0.38)
GEOG_ CONCENTRATION	(−)	−0.04 (−1.02)	−0.05 (−2.90)***	(?)	−0.05 (−1.29)	0.04 (1.18)
IND_CONCENTRATION	(−)	−0.10 (−2.73)***	0.03 (1.59)	(?)	−0.05 (−1.20)	−0.01 (−0.43)
GROWTH		−0.02 (−2.55)**	0.004 (0.88)		−0.002 (−0.23)	−0.02 (−2.11)**
LOG_MV		0.07 (10.25)***	−0.01 (−2.05)**		−0.002 (−0.29)	0.08 (12.04)***
STD_RET		−0.03 (−0.75)	0.06 (3.13)***		0.14 (3.26)***	−0.12 (−2.82)***
FIRM_AGE		0.002 (2.65)***	−0.001 (−3.41)***		−0.00 (−0.93)	0.001 (1.77)*
ROE		0.00 (0.27)	−0.00 (−0.19)		0.01 (1.52)	−0.01 (−1.36)
CEO_TENURE		−0.004 (−3.55)***	−0.001 (−1.53)		0.01 (7.27)***	−0.00 (−0.40)
FOUNDER		−0.08 (−2.73)***	0.03 (2.51)***		0.18 (5.95)***	−0.04 (−1.56)
UTILITY		−0.08 (−2.53)**	−0.04 (−2.45)**		−0.00 (−0.05)	0.01 (0.38)
FINANCIAL		−0.02 (−0.75)	−0.03 (−2.03)**		−0.08 (−2.85)***	0.23 (8.44)***
Adjusted R^2		0.29	0.13		0.19	0.33
No. of obs.		750	749		776	775

DEP_VAR = variables reflecting board structure used as dependent variables in the above regression analyses. See Appendix A for descriptions and measurement information for specific DEP_VAR variables and all other model variables. Summary statistics include coefficient estimates with t-statistics in parentheses. ***, **, and * indicate significance level for a two-sided test at less than the 1%, 5% and 10% level, respectively.

Table 6
Summary statistics from regressions of individual and composite governance variables on earnings timeliness, organizational complexity measures and various control variables

$$DEP\_VAR = \alpha + \beta_1 EARN\_TIMELY + \beta_2 GEOG\_CONCENTRATION + \beta_3 IND\_CONCENTRATION$$
$$+ \delta_1 MV + \delta_2 STD\_RET + \delta_3 FIRM\_AGE + \delta_4 BTM + \delta_5 GROWTH\_SALE + \delta_6 ROE$$
$$+ \delta_7 CEO\_TENURE + \delta_8 FOUNDER + \delta_9 UTILITY + \delta_{10} FINANCIAL + \varepsilon$$

DEP_VAR	Pred. sign	EARN_TIMELY	GEOG_CONCENTRATION	IND_CONCENTRATION	Adj. R^2
Outside shareholder concentration					
SHLDR_CONC	(−)	−0.43 (−3.68)***	−0.43 (−4.05)**	−0.15 (−1.48)	0.40
STKVAL_SHLDR	(−)	−0.12 (−2.81)***	−0.15 (−3.81)***	−0.05 (−1.51)	0.33
STK%_SHLDR	(−)	−0.04 (−1.32)	−0.07 (−2.71)***	−0.03 (−1.25)	0.67
%INSTN	(−)	−0.16 (−3.64)***	−0.11 (−2.86)***	−0.03 (−0.82)	0.20
%BLOCK	(−)	−0.06 (−1.47)	−0.05 (−1.42)	−0.01 (−0.40)	0.26
Board and officer incentives					
INDIR_ INCENTIVES	(−)	−0.29 (−1.63)*	0.07 (0.41)	−0.54 (−3.49)***	0.46
STKVAL_INDIR	(−)	−0.04 (−1.02)	0.01 (0.22)	−0.11 (−3.38)***	0.44
STK%_INDIR	(−)	−0.07 (−2.26)**	0.00 (0.01)	−0.07 (−2.54)***	0.61
OUTDIR_ INCENTIVES	(−)	−0.13 (−0.59)	0.24 (1.22)	−0.37 (−1.92)*	0.21
STKVAL_OUTDIR	(−)	−0.02 (−0.55)	0.04 (0.95)	−0.08 (−2.08)**	0.20
STK%_OUTDIR	(−)	−0.03 (−0.77)	0.05 (1.44)	−0.06 (−1.76)*	0.37
Executive incentives					
EXEC_INCENTIVES	(−)	−0.56 (−2.38)**	−0.34 (−1.58)	0.33 (1.66)*	0.15
LTINC_TOT	(−)	−0.09 (−1.95)*	−0.08 (−1.87)*	0.05 (1.28)	0.14
EQINC_TOT	(−)	−0.09 (−1.95)*	−0.06 (−1.56)*	0.09 (2.38)**	0.12

DEP_VAR = variables reflecting composite and individual corporate governance used as dependent variables in the above regression analyses. See Appendix A for descriptions and measurement information for specific DEP_VAR variables and all other model variables. Summary statistics include coefficient estimates with t-statistics in parentheses. Coefficients and t-statistics for variables other than EARN_TIMELY, GEOG_CONCENTRATION and IND_CONCENTRATION are not tabulated for ease of presentation.
***, **, and * indicate significance level for a two-sided test at less than the 1%, 5% and 10% level, respectively.

IND_CONCENTRATION and *GEOG_CONCENTRATION*. Although the full set of control variables is included in the estimation, Table 6 reports only the coefficients on the earnings timeliness and organization complexity variables for ease of presentation.

Results in Table 6 show that in the governance categories involving outside shareholder concentration (*SHLDR_CONC*) and executive incentives (*EXEC_INCENTIVES*), the coefficients on *EARN_TIMELY* and *GEOG_CONCENTRATION* are negative and significant in each individual governance metric estimation except for *EARN_TIMELY* in the models with *STK%_SHLDR* and *%BLOCK* and *GEOG_CONCENTRATION* in the model with *%BLOCK*. Not surprisingly, the coefficients on *IND_CONCENTRATION* in the estimations for individual governance metrics underlying the outside shareholder concentration and executive incentives composites parallel those of the composite metrics. In particular, *IND_CONCENTRATION* is insignificantly related with the individual outside shareholder concentration metrics, and significantly positively related with the *EQINC_TOT* metric. Table 6 also shows that, consistent with the negative and significant coefficients on *IND_CONCENTRATION* in the estimations of *INDIR_INCENTIVES* and *OUTDIR_INCENTIVES*, the coefficients on *IND_CONCENTRATION* for all individual governance metrics are significantly negative.

We test the sensitivity of the use of average percentile ranks in developing composite measures of earnings timeliness and governance metrics. As an alternative mechanism to summarize the multiple variables for the earnings timeliness and governance structure constructs, we conduct principal components analyses using the various measures for each construct.[25] We find that the first principal component from the three earnings timeliness metrics explains more than half of the variation in the three measures and is the only component with an eigenvalue greater than one. Similarly, the first principal component of the inside and outside director incentives and executive incentive variables explains a large proportion of the variance and is the only component with an eigenvalue greater than one. We find two important principal components in analyzing the shareholder concentration metrics—the first and second principal component have eigenvalues greater than one and collectively explain approximately 70% of the variation in the four underlying shareholder concentration metrics.[26] We re-estimate the governance models underlying Eq. (3)

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[25] We use average percentile ranks to develop a composite earnings timeliness measure in our main analysis in order to maximize sample size. Due to data limitations (too few bad news observations for 39 firms), we are unable to estimate Eq. (2) to produce the *REV_R2* and *REV_SLOPE* metrics. We compute the percentile rank composite for these firms from the *ERC_R2* metric only. These 39 firm observations, however, are lost using a principal components approach. We observe that the univariate correlation between the percentile rank composite and the first principal component of the earnings timeliness variables is highly significant ($\rho = 0.96$; p-value < 0.001) and report as sensitivity analyses the results using a principal components approach.

[26] The first principal component draws approximately equally between the variables *STKVAL_SHLDR*, *STK%_SHLDR* and *%BLOCK* while the second principal component draws primarily from the *%INSTN* variable suggesting that institutional holdings are distinct from the other measures of shareholder concentration.

using the metrics from our principal components analyses in place of the composite governance and earnings timeliness metrics reported in Table 4. We estimate five models—we employ the first principal component for (1) inside director incentives, (2) outside director incentives and (3) executive incentives and estimate model using both the first and second principal component for the shareholder concentration variables. The coefficients on the earnings timeliness variable in these estimations (not tabulated) are qualitatively similar to those reported in Table 4 for shareholder concentration and executive incentive estimations while the coefficient on the earnings timeliness metric loses significance in the inside director incentives model. In particular, the coefficient on the first principal component of earnings timeliness is significant for the models using the first and second principal component for shareholder concentration (at the 10% and 1% levels of significance, respectively) and in the executive incentive model (at the 5% significance level). Given that the significance of *EARN_TIMELY* in the inside director incentives model was only marginally significant in Table 4 (p-value = 0.10), we conclude that the use of the alternative aggregation approach does not significantly alter our results.

We also re-estimated Eq. (3) after including an additional control variable capturing other aspects of the firms' information environment: the number of analyst long-term earnings growth forecasts for the firm obtained from Zack's database. Univariate correlations (not tabulated) show that the number of analyst forecasts is significantly negatively correlated with *EARN_TIMELY* and *GEOG_CONCENTRATION*. The results of the estimations with the additional information environment control (not tabulated) reveal that the coefficients on *EARN_TIMELY*, *GEOG_CONCENTRATION* and *IND_CONCENTRATION* are similar in sign and significance in each governance structure regression to those reported in Tables 4 and 5.

6. Issues of reverse causality

While accounting information systems per se may directly influence governance choices, we must acknowledge the possibility that governance structures also influence the properties of accounting numbers through accounting policy choices and earnings management activities.[27] One econometric solution to this question would involve using an instrumental variable technique. This, however, does not appear to be a fruitful approach in this case, as it is not obvious what to use as a

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[27] Studies addressing governance and earnings management or manipulation include Healy (1985), Gaver and Gaver (1995) and Holthausen et al. (1995) which address the impact of executive bonus plan structures on earnings manipulation, Warfield et al. (1995) which examine the impact of ownership structures on discretionary accrual levels and the magnitude of earnings response coefficient and Dechow et al. (1996) which finds that firms with alleged GAAP violations are more likely to have boards dominated by insiders.

reasonable instrument. As documented in Table 3, only a small amount of the cross-sectional variation in earnings timeliness is explained by a wide range of firm characteristics. While we could use any or all of these variables as an instrument (e.g., two-stage least square), it would result in throwing out over 95% of the cross-sectional variation in timeliness (recall that the explanatory power of the earnings timeliness models using various firm characteristics in panel B of Table 3 ranged from 0.014 to 0.041).

While we cannot definitively rule out reverse causality, we note that our timeliness metrics are based on "core" earnings, defined as earnings before special items, extraordinary items and discontinued operations. While it is of course possible to manipulate core earnings, the focus on core earnings excludes discretionary accruals within special items, extraordinary items and discontinued operations, which are arguably outlets for earnings management activity.

Further, it is not clear how much discretion managers have over earnings timeliness. As shown in Table 3, earnings timeliness is relatively insensitive to a wide range of important firm characteristics. Even if executives were significantly manipulating earnings, it is not clear if this would impact earnings timeliness. If marginal sophisticated investors see through earnings management, then earnings management unlikely impacts timeliness. In this instance, our timeliness composite metric, $EARN\_TIMELY$, could also be impacted if earnings management introduces noise in earnings. If they are being fooled, then earnings management could increase earnings timeliness as investors are fooled into thinking that current earnings are more informative than they really are. In the end, it is not clear how or if earnings management impacts earnings/returns relations estimated over long time periods.

7. Summary and implications

This paper investigates how ownership concentration, equity incentives of directors, executive compensation and board structure vary with inherent limitations of firms' information systems and with firms' organizational complexity. We adopt the perspective that observed governance structures represent optimal contracting arrangements endogenously determined by firms' contracting environments. We proxy for the intrinsic governance usefulness of accounting information with earnings timeliness, defined as the extent to which current accounting earnings incorporate current economic income or value-relevant information. We empirically document that only a small portion of the cross-sectional variation in earnings timeliness can be explained by firms' growth opportunities, return volatility, size, industry and geographic diversification, and past performance. Our inability to explain the cross-sectional variation in earnings timeliness is consistent with the idea that timeliness is distinct from other fundamental firm characteristics. We capture organizational complexity by utilizing segment revenue information to compute Hirfindahl-Hirschman indices measuring within firm industry and geographic concentration.

We explore cross-sectional relations between corporate governance systems and both earnings timeliness and organizational complexity of 784 firms in the Fortune 1000. As predicted, we find that "strong" governance systems characterized by high ownership concentration, strong directors' and executives' equity-based incentives, and the strong reputation (i.e., quality) of outside directors, vary inversely with the timeliness of earnings. In addition, we find some evidence that ownership concentration and directors' equity-based incentives increase, as predicted, with firm complexity. However, board size and the percentage of inside directors do not vary significantly with either the timeliness of earnings or firm complexity.

We acknowledge that caution should be exercised in inferring causality. While we take extensive efforts to address alternative explanations, it is possible that our timeliness and complexity metrics are picking up the effects of omitted correlated variables or that the direction of causality should be reversed.

This paper extends the capital market and stewardship literatures in accounting (see, e.g., Bushman and Smith, 2001). Most existing research into the stewardship relevance and research into the value relevance of accounting have proceeded independently. We explore whether the relative importance of accounting numbers in equity valuation appears to "matter" in the determination of corporate governance systems of large public companies in the U.S. Although causal inferences are problematic, associations between measures of the usefulness of accounting numbers in valuation and governance structures are a necessary (although not sufficient) condition for concluding that governance structures are influenced by the limitations of accounting numbers for valuation purposes.

Finally, our evidence supports the notion that the firm-specific timeliness metrics capture meaningful differences across large public U.S. companies in the information properties of accounting numbers. This provides a basis for using such firm-specific metrics to investigate other economic consequences of the information properties of accounting, such as voluntary disclosures, corporate signaling, analyst activity, corporate investment decisions, financing choices, and the cost of debt and equity capital.

Appendix A. Model variable measurement

Dependent variables: (All the dependent variables are calculated at their 1994 values except for *LTINC_TOT* and *EQINC_TOT* which are averaged over 1994–1997).

Outside shareholder concentration:

STKVAL_SHLDR :	(market value of common stock −value of stock held by officers and directors)/(number of common shareholders at 1994 fiscal year end).
STK%_SHLDR :	1/(number of common shareholders at 1994 fiscal year end);
%INST :	(number of shares held by institutions)/(total number of common shares outstanding at 1994 fiscal year end);

%BLOCK   percentage of the firms' shares held by over 5%
                                blockholder;

SHLDR_CONC :   average of percentile ranks of *STKVAL_SHLDR*,
                                STK%_SHLDR, %INST, and %BLOCK (ascend-
                                ing);

Board and officer incentives:

STKVAL_INDIR :   (average number of common shares owned by each
                                inside director)∗(stock price at 1994 fiscal year end);

STK%_INDIR :   (average number of shares owned by each inside
                                director)/(total number of common shares outstand-
                                ing at 1994 fiscal year end);

INDIR_INCENTIVES :   average of percentile ranks of *STKVAL_INDIR*
                                (ascending) and *STK%_INDIR* (ascending);

STKVAL_OUTDIR :   (average number of common shares owned by each
                                outside director)∗(stock price at 1994 fiscal year
                                end);

STK%_OUTDIR :   (average number of shares owned by each outside
                                director)/(total number of common shares outstand-
                                ing at 1994 fiscal year end);

OUTDIR_INCENTIVES :   average of percentile ranks of *STKVAL_OUTDIR*
                                and *STK%_OUTDIR* (ascending);

Executive incentives:

LTINC_TOT :   (value of grants of long-term incentives)/(value of
                                grants of long-term incentives plus annual bonuses);
                                Long-term incentives include grants of restricted
                                stock and stock options and amounts under long-
                                term incentive plans. Values of grants of all long-
                                term incentives are obtained from the ProxyBase
                                dataset of Hewitt Associates which obtains informa-
                                tion from annual firm proxy statements and reflect
                                average annual values over the years 1994 through
                                1997.

EQINC_TOT :   (value of grants of equity-based incentives)/(value of
                                grants of long-term incentives plus annual bonuses);
                                Equity-based incentives include grants of restricted
                                stock and stock options. Values of grants of equity-
                                based incentives are obtained from the ProxyBase
                                dataset of Hewitt Associates which obtains informa-
                                tion from annual firm proxy statements and reflect
                                average annual values over the years 1994 through
                                1997. Value of grants of long-term incentives (in
                                denominator) are as described with *LTINC_TOT*
                                above.

EXEC_INCENTIVES :	average of percentile ranks of *LTINC_TOT* (ascending) and *EQINC_TOT*; (ascending);

Board structure:

OTH_BOARD :	(total number of other boards outside directors serve on)/(number of outside directors);
%_EXPERT :	(number of expert outside directors)/(number of outside directors), where a director is coded as expert if he has had experience as an executive in the same industry);
%INDIR :	(number of inside directors)/*#_DIR*;
#_DIR:	total number of directors.

Note: Rank values of governance metrics are used in the estimations involving individual governance measures (Table 6) for comparability with governance composite measures.

Measures of earnings timeliness:

ERC_R2 :	R^2 of the firm-specific regression of 15-month (ending 3 months after fiscal year end) stock return on the level of and change in annual core earnings, both deflated by market value of equity at the beginning of the period. Each regression starts from 1985 and has at least 8 years of observations. Fisher transformation of the R^2 is used in the regression estimations. The percentile ranking, *Rank_ERC_R2*, (ascending) of the Fisher transformed *ERC_R2* is included in *EARN_TIMELY* (composite);
REV_R2 :	R^2 of the firm-specific regression of annual earnings deflated by price at the beginning of the period on (1) 15-month (ending 3 months after fiscal year end) stock return and (2) an interactive variable of the 15-month stock return times a dummy variable = 1 if the 15-month stock return is negative. Each regression starts from 1985 and has at least 8 years of observations. Fisher transformation of the R^2 is used in the regression estimations. The percentile ranking, *Rank_REV_R2*, (ascending) of the Fisher transformed *REV_R2* is included in *EARN_TIMELY* (composite);
REV_SLOPE :	The estimated coefficient on the 15-month positive stock return from the model described in *REV_R2* above. The percentile ranking, *Rank_REV_SLOPE*, (ascending) is included in *EARN_TIMELY* (composite);
EARN_TIMELY :	average of *Rank_ERC_R2*, *Rank_REV_R2* and *Rank_REV_SLOPE*;

Note: All of the following variables are the average values of the variable over 1989–1993.

Measures of organizational complexity:

GEOG_CONCENTRATION : the sum of the squares of (firm sales in each geographic segment/ total firm sales). Segment data obtained from Compustat Business Industry Segment file.

IND_CONCENTRATION : the sum of the square of (firm sales in each industry segment/total firm sales). Segment data obtained from Compustat Business Industry Segment file.

Other firm characteristics

MV : market value of equity (stock price #199*number of common shares outstanding #25);

STD_RET : standard deviation of the dependent variable in the ERC regression;

FIRM_AGE : number of years a firm has been included in the CRSP database as of the end of 1994;

BTM : ratio of book value to market value of common equity;

GROWTH_SALE : growth rate of net sales computed as (change in net sales)/(prior year net sales);

RD_SALES : research and development expenses (#46) scaled by net sales (#12);

AD_SALES : advertising expenses (#45) scaled by net sales (#12);

GROWTH : first principal component of the above investment opportunity variables (*BTM, GROWTH_SALE, RD_SALES and AD_SALES*);

ROE : net income before extraordinary items (#18)/total shareholders' equity (#216)

CEO_TENURE : number of years the CEO has been a director of the firm;

FOUNDER : dummy variable equal to 1 if CEO or Chairman of the Board is a founder of the firm; zero otherwise; Founder status determined by review of individual firm proxy statement biographies of CEOs and Chairmen of the Board.

UTILITY : Dummy variable equal to 1 if the firm is a utility firm as defined in Table 1; zero otherwise;

FINANCIAL : Dummy variable equal to 1 if the firm is in the banking business as defined in Table 1; zero otherwise;

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