



# Board structure and the informativeness of earnings

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## Abstract

This study draws on prior research on corporate governance and examines whether the informativeness of earnings, proxied by the earnings–returns relationship, varies with the fraction of outside directors serving on the board and board size. The results suggest that earnings of firms with the smallest boards in the sample (with a minimum of five board members) are perceived as being more informative by market participants. By contrast, there is no evidence that board composition mitigates the earnings–returns relation. Policy implications are discussed. © 2000 Elsevier Science Ltd. All rights reserved.

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## 1. Introduction

Corporate boards are responsible for monitoring the quality of the information contained in financial reports. Board monitoring of the financial reports is important because managers often have self-interested incentives to manage earnings, potentially misleading shareholders. Interestingly, given widely varying board structures, the quality of board monitoring is likely to vary across firms. In particular, prior research has shown that smaller boards are more effective monitors, probably because process losses increase with board size (Yermack, 1996, pp. 186, 187). In addition, independent boards are more effective because they are less susceptible to undue influence by managers (e.g., Weisbach, 1988, p. 433). In this paper, I combine streams of research on earnings informativeness, proxied by the earnings–returns relation, and on

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board structure, hypothesizing that effective board structures enhance the informativeness of earnings by limiting the extent of earnings management. In particular, earnings is expected to be more informative when the board of directors which monitors the financial reporting process is small, and when a high fraction of outside directors serves on the board.<sup>1</sup>

The empirical tests employ governance and financial data on 307 US public firms over the period 1990–1994. The results suggest that earnings, defined as income before extraordinary items, are significantly more informative for firms with smaller boards, but that the fraction of outside directors serving on the board is unrelated to earnings informativeness. These findings are consistent with the notion that board size is inversely related to board monitoring quality, but inconsistent with the notion that board independence improves the usefulness of accounting earnings.

The remainder of the study is organized as follows: Section 2 reviews the literature and develops two testable hypotheses; Section 3 describes the data and methodology; Section 4 presents and discusses the results; Section 5 discusses several sensitivity tests, while Section 6 summarizes and concludes.

## **2. Research hypotheses**

Corporate directors perform two types of functions: (1) decision management functions, such as setting the firm's long-term strategy and making investment and finance decisions, and (2) decision control functions, such as hiring top-level managers, determining their compensation, firing them when necessary, and monitoring capital allocation decisions (Fama and Jensen, 1983, pp. 304, 315). Importantly, decision control functions include monitoring the quality of financial reporting information that is communicated to the public (e.g., Beasley, 1996, p. 447).

Fama and Jensen (1983, pp. 314, 315) highlight the importance of outside board members in carrying out the board's decision control function. Being independent of management's influence, outside directors are thought to be in a better position than insiders to protect shareholder interests from managerial opportunism (Fama and Jensen, 1983, p. 315). Empirical evidence on the importance of board outsiders has been mixed. One group of studies, discussed below, has explored the benefits of certain corporate decisions to shareholders

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<sup>1</sup> A large body of evidence suggests that the informativeness of earnings is proxied well by its association with stock returns, based on the notion that less noisy, and thus more useful, earnings elicit a stronger investor response, as reflected by security returns (e.g., Warfield et al., 1995, p. 65). In this vein, Warfield et al. (1995, p. 71) and Wild (1996, pp. 253–268) show that high levels of inside ownership and audit committee formation respectively also improve the earnings–returns relationship.

in relation to the composition of the boards that ratified such decisions. Consistent with the Fama and Jensen (1983, p. 315) arguments, shareholders benefit more when outsiders have voting control of the board in management buyouts (Lee et al., 1992, pp. 65–71), in tender offers for bidders (Byrd and Hickman, 1992, pp. 206–211), in poison pill adoptions (Brickley et al., 1994, pp. 378–382) and in tender offers for targets (Cotter et al., 1997, pp. 204–207). Moreover, the likelihood that a poorly performing CEO is ousted increases with the percentage of outsiders sitting on the board (Weisbach, 1988, p. 446). Finally, the likelihood that a departing CEO is replaced with a CEO outside the firm also increases with the percentage of outsiders sitting on the board (Borokhovich et al., 1996, pp. 349–353).

In contrast to such evidence, empirical studies examining the unconditional value-relevance of board composition have concluded that having more outside directors on the board does not necessarily result in better performance. Hermalin and Weisbach (1991, p. 108) discern no statistical link between board composition and ownership variables with firm value that is measured by an empirical approximation of Tobin's  $q$ . Bhagat and Black (1999, pp. 922, 923) re-examine the relationship between board structure and firm performance over a longer testing horizon; like Hermalin and Weisbach (1991, p. 108), Bhagat and Black (1999) do not find a significant link between board composition and the levels and changes of numerous variables proxying for future firm performance (Tobin's  $q$ , earnings-to-price, operating margin, return on assets, sales-to-employees, cash flows-to-assets, cash flows-to-sales) nor with stock returns. Klein (1998, p. 275) considers the fact that boards perform both decision management and decision control functions. Her (1998, pp. 275–278) main insight is that inside directors will be most valuable in setting long-term strategy due to their firm-specific knowledge and expertise. Klein (1998, pp. 275–278) abstracts from overall board composition by arguing and testing whether director affiliation becomes value-relevant in the context of board committees which specialize in either decision management functions (the investment and finance committees) or decision control functions (the compensation, audit, and nominating committees). The results of Klein (1998, pp. 285–303) suggest that the fraction of insiders in investment and finance committees is positively related to several accounting and stock market performance measures (return on assets, return on equity, operating income before depreciation, the Jensen productivity measure, raw market returns, and beta-adjusted returns). She (1998, pp. 285–303) found little evidence, however, that outsiders are similarly valuable in monitoring committees. Agrawal and Knoeber (1996, pp. 380–382) recognize that governance structures are endogenously determined so that firms economize on agency costs. Modelling the governance structure–performance relationship in a simultaneous equations framework, they conclude that outsider representation on the board is not positively related to firm value, as proxied by a market-to-book variable (Agrawal and Knoeber, 1996, p. 388). At

the margin, Agrawal and Knoeber (1996, p. 394) conclude, some US firms have added too many outsiders on their boards. Finally, Mayers et al. (1997, pp. 44–48) exploit differences in ownership structure within the insurance industry and document evidence that board outsiders complement ownership structure in monitoring management. The essential point of the preceding discussion is that the role of board outsiders has been found to enhance firm value in specific contexts requiring good monitoring performance such as takeovers, but that it is not related to ongoing firm performance.

Board size is another value-relevant dimension of board operations. Specifically, process losses increase as board size grows (Jensen, 1993, p. 865) because larger boards hinder the free and effective exchange of ideas between corporate directors. Moreover, it is also possible that coalition costs among board members increase as board size grows, thereby facilitating the CEO's dominance over other board members (Eisenberg et al., 1998, pp. 37, 38). As board size grows, process losses and coalition costs outweigh the benefit of having input by more directors (Yermack, 1996, p.186). That is, a larger board cannot perform its functions as effectively as a small board. In line with this notion, Yermack (1996, p. 195) shows that firms with smaller boards are valued more highly by the market (i.e., they have a higher Tobin's  $q$  ratio), a result that holds through numerous sensitivity checks, estimation techniques, and several additional controls. Similarly, Eisenberg et al. (1998, pp. 46–47) extend applicability of this result to a different class of firms and document an inverse association between board size and profitability for a sample of small and mid-size Finnish firms. Importantly, results on board size by Yermack (1996, p. 195) and Eisenberg et al. (1998, pp. 46–47) are unconditional (i.e., they do not pertain to firms adopting a specific decision or undergoing any kind of crisis).<sup>2</sup>

In a related vein, there has been increasing attention in the accounting literature about the role of the board of directors in enhancing the quality of financial reporting (e.g., Beasley, 1996, pp. 446–448). First, this interest springs from the board of director's responsibility to monitor the quality of financial reporting in a firm.<sup>3</sup> Second, it springs from the independent auditors' responsibility to obtain a "sufficient knowledge of the control environment to

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<sup>2</sup> The unconditional importance of other board characteristics has also been examined by prior research. Leadership structure (Brickley et al., 1997, p. 212) and director shareholdings (Hermalin and Weisbach, 1991, p. 107), were found to have an insignificant association with Tobin's  $q$ . Vafeas (1999, p. 131) finds evidence that higher board meeting frequency is preceded by declines in performance (measured by income before extraordinary items) and is followed by weak improvements in performance (pp. 134, 135).

<sup>3</sup> Board monitoring over the financial reporting process is usually expressed through the activities of the audit committee that consists of corporate directors (Beasley, 1996, p. 448). The audit committee forms the liaison between the external auditors and the board, thereby bridging the information asymmetry gap between them and facilitating the monitoring process (Klein, 1998, pp. 280–282).

understand management's and the board of director's attitude, awareness and actions concerning the control environment" (from AICPA SAS #55 (1988), paragraph 20; also see Beasley, 1996, p. 444). In firms with weak boards of directors, managers can make opportunistic accrual choices to side-step binding contracts and/or to advance their compensation benefits, at the expense of the shareholders. Therefore, firms should either institute strong boards for monitoring, or substitute board weaknesses with extensive internal and external auditor tests. It should also be recognized that effective board structures may lead to desirable managerial behavior proactively. That is, in fear of scrutiny by their firm's effective board, opportunistic managers may voluntarily report more accurate earnings information, thereby fending off unwelcome monitoring by the board.

In line with these arguments, Beasley (1996, pp. 445–447) examines the monitoring value of outside directors on the quality of financial reporting, conditioning his sample choice on cases of financial statement fraud. He (1996, pp. 456–459) found that the likelihood of financial statement fraud is inversely related to the number of outside directors serving on the board. Interestingly, he (1996, pp. 460–462) also found that the likelihood of financial statement fraud is positively related to director stock ownership and board tenure, and is inversely related to the number of directorship posts held by outside directors in other corporations. In a similar spirit, Dechow et al. (1996, pp. 4, 5) studied, in part, the governance structures of firms subject to enforcement actions by the SEC for alleged violations of generally accepted accounting principles (GAAP) and overstatement of reported earnings. They (1996, pp. 19–24) found that firms which allegedly violated GAAP and manipulated earnings are more likely to have insider-dominated boards, a CEO-chairman, and a CEO-founder, while they are less likely to have an audit committee or an outside blockholder. Such findings are generally in line with the views of shareholder activists who argue for a higher representation of outside directors on corporate boards (see, e.g., Strickland et al., 1996, p. 328). As such, these findings have clear policy implications (e.g., Blue Ribbon Committee, 1999). However, these studies condition their sample selection on firms with what they view as having low quality financial reporting (e.g., Dechow et al., 1996, pp. 2, 3; Beasley, 1996, pp. 443–445). Therefore, the results from these studies (i.e., the importance of governance structures on reporting quality) may not be generalizable to a broader set of firms.

My paper proposes and tests the notion that board structures affect the quality of board monitoring over financial reports for a wider cross-section of firms. First, boards which are dominated by insiders are hypothesized to compromise the quality of financial reporting in the interests of management. To the extent managers influence the board's monitoring efforts over the firm's financial reporting practices, earnings management is likely to be overlooked by the board. By contrast, a higher number of board outsiders increases the

likelihood that the quality of financial information will be monitored and, when necessary, corrective action will be taken. Importantly, my study is concerned with a board's ability to monitor reporting quality unconditionally. The study does not isolate cases of fraudulent behavior such as those examined by Beasley (1996, pp. 444–445). Instead, the presence of outsiders on the board is expected to improve the usefulness of earnings in a general sense, as exhibited in a stronger earnings–returns relationship.

**Hypothesis 1.** The association between earnings and stock returns is positively related to the fraction of outside directors serving on the board.

Importantly, the value of outside directors in enhancing the information content of earnings may be non-linear. Understanding the financial reports will, in some cases, require firm-specific knowledge which will best be offered by insider directors. Thus, while the information content of earnings is expected to be increasing over most of the range of outside director representation, earnings usefulness may start declining for the highest fractions of outsiders, signifying that there exists an optimal number of outside directors on the board.

**Hypothesis 1a.** The association between earnings and stock returns rises and then drops with increases in the fraction of outside directors serving on the board.

Second, my study proposes that smaller boards are more effective in monitoring the quality of financial reporting and that the information content of earnings would be higher in firms with smaller boards. In a smaller board each individual board member will be more likely to take personal responsibility for the board's monitoring of the financial reports. By contrast, in larger boards the responsibility of monitoring management is likely to become diffused, as less of the burden falls on each director personally. Moreover, in a small board, directors have a better opportunity to discuss the actual financial reporting numbers compared to a 14- or 15-member board, where such detailed discussion would not be feasible.

It should be recognized that the board size–earnings informativeness relationship may also be non-linear. Specifically, when board sizes are very small, the costs of having insufficient people to monitor management adequately may outweigh the process losses resulting from having a larger board. Particularly small boards may therefore delimit the usefulness of earnings because they cannot adequately monitor the quality of financial reporting. As it turns out, only three firms in my sample had less than six board members and none has fewer than five board members. This suggests that firms recognize the need to have an adequate number of directors from which to draw. Therefore, this notion cannot be empirically tested in this paper. Thus, I propose that:

**Hypothesis 2.** For boards with a moderate to large number of members the association between earnings and stock returns is inversely related to board size.

The major contribution of my study is that it explores the unconditional importance of board structure on financial reporting quality, proxied here by the usefulness of earnings in explaining stock returns. Moreover, unlike most prior studies, it uses an extensive dataset of governance information from five consecutive years for the tests (rather than from a single year), abstracting from the assumption of unchanged governance structures for each firm during the sample period. Finally, this study controls for a wide range of variables suggested in the literature as significant determinants of the cross-sectional variation in the earnings–returns relationship (e.g., Dhaliwal et al., 1991, pp. 34–37).

### 3. Data and methodology

The sample comprises 307 of the 800 firms which are listed on the Forbes 1992 compensation survey (What 800 companies paid their bosses, 1993, pp. 124–172). These firms were selected in two stages: In the first stage, I selected the largest 350 firms in the survey, their size being measured by annual sales, which had available proxy statements for 1991 and 1993 in the SilverPlatter database and which belonged to the industrial or service sector (i.e., financial firms and utilities were excluded). Of the 800 Forbes firms, 166 were deleted for belonging to the financial industry, 65 for being utilities, and the remaining 219 for being too small, leaving a total of 350 companies. (The initial sample size was set to 350 companies to balance two issues: having a small enough sample so that extensive manual data collection would be practical, and having a large enough sample to ensure satisfactory statistical power in the tests.) In the second stage, I retained the subset of the 350 firms which have available data on the 1997 version of Compustat PC Plus, and for which at least one proxy statement could be obtained for years 1990, 1992, and 1994. The requirement that a third proxy statement be available was imposed so that at least three years of data are included for each sample firm over the sample period (see Vafeas, 1999, p. 119).<sup>4</sup>

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<sup>4</sup> See Yermack (1996, p. 189) for a discussion of a “survivorship bias” due to this “screening” process. Whatever the costs of this bias, they are likely to be outweighed by the many benefits of using a panel dataset. Moreover, the effects of this survivorship bias are likely to be limited given that Forbes firms are indicated to be the top public companies each year in the US (What 800 companies paid their bosses, 1993, p. 125). Last, any survivorship bias should work against my study’s research hypotheses since failing firms are more likely to have a lower quality of earnings.

Using fairly large, non-financial firms as the sample for this study may limit generalizability of the results depending on firm size and industry affiliation. Moreover, given that industry and size are likely to be correlated with corporate governance structures (Yermack, 1996, p. 189), this study's results are also more likely to be applicable to firms with dispersed ownership structures, a high fraction of board outsiders, and large board sizes. For example, the present sample does not allow tests of the non-linearity in the earnings usefulness–board size relationship because, as it turns out, none of the sample firms had a board with fewer than five directors. Nevertheless, the use of large firms is justified (1) by the fact that large industrials such as those studied here represent a significant fraction of the total market capitalization in the United States and (2) agency problems relating to financial reporting quality are more likely to appear in larger firms which are widely held, and where manager–shareholder interests are likely to be more divergent.

A total of 1 352 firm-year observations for the 307 firms comprise the final sample of observations. An advantage of my study is that it allows matching the corporate governance characteristics of a firm for a particular year to the earnings and returns information for that year. Prior research by Warfield et al. (1995, p. 68) used governance data from a single year matching that with earnings and returns data from other years on the assumption governance characteristics change little through time (an assumption which, as it turns out, is largely supported by my empirical results).<sup>5</sup>

Information on the size and composition of corporate boards was collected from annual proxy statements. Board size was defined as the number of directors as of the proxy statement date. Consistent with Vafeas and Afxentiou (1998, p. 37), outside directors were defined as those directors who are not active or retired firm employees, their relatives, or employees of subsidiaries. Moreover, among outsiders, directors are partitioned into affiliated directors, those with potential business ties to the firm such as management consultants, lawyers, and financiers, and independent directors such as public directors, executives in other firms, and private investors (see Vafeas and Afxentiou, 1998, p. 37). The presumption is that affiliated directors are not completely independent of management. Therefore, two measures of board independence are used: (1) the fraction of outside-to-total directors, and (2) the fraction of independent-to-total directors.

The financial information is defined as follows: earnings is income before extraordinary items divided by the market value of equity at the start of the year and stock return is the difference between the firm's raw annual stock return and the median sample return in that year. Moreover, the following

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<sup>5</sup> Given that observations are not independent through time, in addition to pooled time-series cross-sectional regressions, separate by-year models are estimated. The results from these models are described in Section 5.



control variables, which have been shown to be significant determinants of the variation in the earnings–returns relation, are also included in the model:<sup>6</sup> inside ownership is the percentage of stock held by all officers and directors as a group on the date of the proxy statement for the year under consideration; firm equity size equals the log of the market value of the firm’s equity capitalization at the start of the year; the market-to-book value of assets equals equity capitalization plus the book value of total liabilities, all divided by the book value of total assets, all taken at the start of the year. A loss dummy is set to one if earnings before extraordinary items is negative and zero otherwise. Beta is computed from a one-factor market model using monthly returns data between 1990 and 1994. Financial leverage is the ratio of total liabilities to total assets at the start of the year. The set of ERC determinants used as control variables in this study were empirically examined by Warfield et al. (1995, pp. 72–76) except for the loss dummy which has been suggested by Hayn (1995, p. 135).

Descriptive statistics on the governance and financial characteristics of the sample firms are presented in Table 1. The median representation of outsiders on the board (73.3%), the representation of independent outsiders (55.6%), board size (12), and inside ownership (2.3%) are similar to those reported by most recent studies using similar samples (see, for example, Yermack, 1996, p. 191). Interestingly, there exist no firms with fewer than five board members. Moreover, firms report negative earnings (losses) in around ten percent of firm years. The mean and median betas are slightly less than one. Finally, total liabilities are, on average, 62.5% of total assets. The next section of the paper explores whether an optimal number of board outsiders and a smaller board size enhance the strength of the earnings–returns relationship.

#### 4. Empirical results

Initially, the earnings–returns relationship is examined through Spearman rank correlations between income before extraordinary items deflated by assets and median-adjusted stock returns across the range of outsider representation (in Panel A of Table 2) and across the range of board sizes (in Panel B). This approach, albeit simple, is useful in that it allows observing variation in the earnings–returns relationship across the range much more finely than would be practical in regression equations. Moreover, ranked orders reduce substantially the effect of outliers on the results. The results in Panel A suggest that the informativeness of earnings generally declines with increases in outsider board

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<sup>6</sup> The relation between earnings and returns is captured by the coefficient of earnings in a regression of earnings on stock returns and is referred to as the earnings response coefficient (ERC). For a discussion of previously known determinants of ERC see Dhaliwal et al. (1991, pp. 34–37) and Subramanyam and Wild (1996, pp. 263–265).

Table 1  
Descriptive statistics on selected variables for 307 sample firms between 1990 and 1994<sup>a</sup>

Variables	Mean	Median	SD	First quartile	Third quartile	Minimum	Maximum
Earnings (annual)/equity cap. (beginning)	6.80%	5.74%	40.25%	7.87%	2.98%	-293%	1204%
Raw stock return (annual)	13.35%	8.98%	58.15%	29.32%	-10.89%	-96.8%	711%
No. of board outsiders/board size	71.8%	73.3%	14.8%	83.3%	63.6%	10.0%	93.3%
No. of Independent Outsiders/board size	52.8%	55.6%	19.10%	66.7%	40.0%	0.0%	92.9%
Board size	11.8	12.0	2.9	14	10	5	24
Pct. common stock owned by officers and directors as a group	7.1%	2.3%	11.4%	7.4%	1%	0.04%	78.8%
Equity capitaliz. (in \$millions; beginning)	7899	3195	13,136	7815	1645	2.0	119,989
Market-to-book value of assets	1.83	1.52	0.97	2.09	1.23	0.67	7.57
One if income before extraordinary item is less than zero, and zero otherwise.	0.10	0	0.30	0	0	0	1
Beta from the market model from 1990 to 1994	0.97	0.96	0.35	1.18	0.79	-0.48	2.20
Total liabilities/assets (beginning)	62.5%	62.4%	19.6%	73.6%	51.1%	0.06%	213%

<sup>a</sup> Earnings for a year is income before extraordinary items for that year deflated by the market value of equity at the start of the year, in percentage points. Stock return is the raw return on the common stock during the fiscal year. Board outsiders are all board members who are not firm employees, their relatives, or retired firm employees. Independent outsiders also exclude affiliated directors such as consultants, financiers, and lawyers. Inside ownership is the percentage of common stock owned by all officers and directors as a group. All proxy statement data are collected from the statement issued at the end of the year under consideration. Market-to-book is the quotient of equity capitalization plus the book value of total liabilities, all divided by the book value of total assets, all values taken at the start of the year being considered. The loss dummy is set to one if earnings is negative and zero otherwise. Beta is estimated from an one-factor market model over the five-year sample period using monthly returns.

representation. The correlation coefficient declines from 0.47 for firm-observations where outsiders hold between 40% and 50% of the total board seats to 0.37 for firms where outsiders exceed 90% of all board members. This result is inconsistent with Hypothesis 1 and with the expectation that better monitoring by outside directors would guard the quality of earnings, thereby rendering earnings figures more informative.

Focusing next on the results on the mitigating role of board size in Panel B, there appears to be little significant difference among the correlations for board sizes up through 11, with the highest correlation being observed for firms with eleven board members. Importantly, consistent with the study's second hypothesis, each of the six categories with the largest boards (with 12 or more members) exhibits a lower earnings–returns correlation than each of the six categories with the smallest boards. This evidence is in agreement with Yermack's findings that firms with smaller boards are more effective in monitoring

Table 2  
Spearman rank correlations between median-adjusted annual stock returns and earnings across the range of outsider board participation (panel A) and board size (panel B)<sup>a</sup>

	Number of firm-year observations	Earnings–returns correlation
<i>Panel A: Outsider board participation</i>		
<40%	35	0.47**
40–50%	55	0.47**
50–60%	158	0.44**
60–70%	269	0.46**
70–80%	375	0.41**
80–90%	335	0.38**
90–100%	125	0.37**
Total	1 352	
<i>Panel B: Board size</i>		
Six or less	43	0.43**
Seven	52	0.52**
Eight	76	0.44**
Nine	122	0.56**
Ten	147	0.41**
Eleven	179	0.59**
Twelve	206	0.37**
Thirteen	179	0.36**
Fourteen	118	0.39**
Fifteen	101	0.24*
Sixteen	58	0.34**
Seventeen or more	71	0.30*
Total	1 352	

<sup>a</sup> All correlations are computed for the pooled sample of firms over the 1990–1994 sample period. There are no boards in this sample with fewer than five board members or with less than 10% of outside directors.

\*,\*\* Significant at the 0.05 and 0.01 levels, two-tailed, respectively.

management's actions and with the study's expectation that the informativeness of earnings is higher in firms with smaller boards (cf. Yermack, 1996, pp. 209, 210).

To further explore the mitigating role of board size and board composition on the non-parametric earnings–returns correlation, I also split the sample in half (1) according to the fraction of outsiders and (2) according to the board-size median (results of the two partitions are not tabulated). The subsamples with fewer outside directors ( $r = 0.47$ ) and smaller board sizes ( $r = 0.50$ ) exhibit a substantially stronger correlation than the respective above-median subsamples (with correlations of 0.37 and 0.35, respectively). Thus, while variation within subsamples is rather limited, there appear to be important differences across subsamples partitioned at the median.

Table 3 presents results from ordinary-least squares (OLS) regressions of earnings, board composition, board size, and interactive terms on stock returns. In all five models in Table 3, the coefficient for earnings is positive and significant as in prior research. The coefficient ranges from 1.48 in model 4 to 2.92 in model 3. These magnitudes suggest that a one percent change in earnings is associated with a 1.48%–2.92% change in median-adjusted stock return. In the first two models the variable of interest is the earnings–board composition interactive term. This interactive term captures the difference in earnings usefulness between firms with a high fraction of outside directors and all remaining firms. This term is expected to be positive, signifying that, among firms with a high fraction of outside board members, the earnings–returns relationship is stronger (i.e., significantly more positive) than it is for all remaining firms. Thus, the usefulness of earnings among firms with many outside directors is expected to be higher. The interactive term of interest is estimated twice: once by defining outsider representation as a binary variable, splitting at the variable median; the second by partitioning the sample into quartiles according to the distribution of outsider representation. The second empirical model allows examination of the non-linear effect of board composition on earnings informativeness suggested by Hypothesis 1a. Both empirical models produce a fairly high adjusted  $R$ -squared (10.9% in both cases) with a highly significant earnings variable (the  $t$ -statistic equals 10.15 and 7.98, respectively). In the first model, the coefficient of the earnings–returns relation is lower by  $-0.45$  among firms exceeding the median number of outside directors compared to all remaining firms. Inconsistent with Hypothesis 1, this suggests that for firms with above-median board outsiders, a 1% change in earnings causes a smaller change in returns by 0.45%, compared to firms with below-median board outsiders. Similarly, in model 2, the coefficients for the two quartiles with the least board outsiders are 0.48 and 0.12, respectively, suggesting that within these quartiles the earnings–returns relation is greater than for the third quartile, while in the fourth quartile it is less, in line with an inverse association between board independence and earnings usefulness. In contrast to expecta-

Table 3  
 OLS regressions examining the mitigating role of board composition and board size in the earnings–returns relationship<sup>a, b</sup>

	(1)	(2)	(3)	(4)	(5)
Intercept	-0.16*** (-2.80)	-0.19*** (-3.13)	-0.12** (-2.29)	-0.15*** (-2.66)	-0.26*** (-3.19)
Earnings	2.43*** (10.15)	2.15*** (7.98)	2.92*** (11.74)	1.48*** (6.05)	1.57*** (4.76)
Earnings if outsiders are more than median, zero otherwise	-0.45 (-1.50)				
Earnings if outsiders in first quartile, zero otherwise		0.48 (1.23)			0.241 (0.62)
Earnings if outsiders in second quartile, zero otherwise		0.12 (0.31)			0.09 (0.24)
Earnings if outsiders in fourth quartile, zero otherwise		-0.44 (-1.29)			-0.50 (-1.46)
Pct. board outsiders	0.12 (1.46)	0.16* (1.88)			0.16 (1.88)
Earnings if board size ≥ 12 (max. of 19), zero otherwise			-1.23*** (-4.09)		
Earnings if board size <10 (min. of 5), zero otherwise				2.23*** (5.61)	2.21*** (5.53)
Earnings if board size ≥ 10 and <12, zero otherwise				0.85** (2.45)	0.78** (2.24)
Earnings if board size ≥ 14 (max. of 19), zero otherwise				0.40 (1.15)	0.29 (0.81)
Board size			0.01 (0.69)	0.01 (1.18)	0.01 (1.20)
Adjusted R-square	10.9%	10.9%	12.0%	12.9%	13.0%
Sample size	1 303	1 303	1 303	1 303	1 303
F-value	58.0***	32.7***	60.3***	39.4***	22.5***

<sup>a</sup> The dependent variable is median-adjusted stock return defined as the raw return on the common stock during the fiscal year minus the raw return of the median sample firm for that year (mean = 7.64% and SD = 58.37). Earnings is income before extraordinary items deflated by the market value of equity at the start of the year, in percentage points. Board outsiders are all board members who are not firm employees, their relatives, or retired firm employees. Information on corporate boards is collected from annual proxy statements.

<sup>b</sup>  $Ret_{it} = a_0 + a_1 \text{Earnings} + a_2 \text{Earnings} * \text{Board outsiders} + a_3 \text{Board outsiders} + a_4 \text{Earnings} * \text{Board size} + a_5 \text{Board size}$

\*,\*\*,\*\*\* Significant at the 0.10, 0.05, and 0.01 levels, two-tailed, respectively.

There are no boards in this sample with fewer than five board members or with less than 10% of outside directors.

tions and Hypotheses 1 and 1a, however, all earnings–board composition interactive terms in models 1 and 2 are statistically insignificant, suggesting that earnings usefulness does not differ statistically across different categories of outsider representation on the board. This result holds under both the two- and four-way partitions of the board composition variable.

Models 3 and 4 in Table 3 present analogous results on the importance of smaller board sizes in enhancing the earnings–returns relationship. Similar to the treatment of outsider representation in models 1 and 2, the board-size variable is partitioned into two (four) parts, and the earnings–returns relationship is examined across halves (quartiles) of the board-size distribution in models 3 and 4, respectively. Again, the variable of interest is the board size–earnings interactive term which captures the difference in earnings usefulness between firms having small boards and all remaining firms. The two models are highly significant in explaining returns (adjusted *R*-squared of 12.0% and 12.9%, respectively). Consistent with expectations and Hypothesis 2, the coefficient of the earnings–returns relation is lower by 1.23 for firms with a board size above the sample median. This suggests that for firms with above-median board sizes, a 1% change in earnings is associated with a smaller absolute change in returns by 1.23%, compared to firms with below-median board sizes. Importantly, in line with Hypothesis 2, the coefficient of the board size–earnings interactive term in the model with the two-way partition is negative and statistically significant ( $t = -4.09$ ). Moreover, when a four-way partition is used, the earnings–returns relation is higher for the lowest board-size quartiles by 2.23 and 0.85, respectively, compared to the base third board-size quartile. The most significant positive earnings–returns relationship is exhibited by firms with less than 10 members (interactive term  $t = 5.61$ ), followed by boards with 10 or 11 members ( $t = 2.45$ ).<sup>7</sup> Finally, in model 5 of Table 3 the board composition/earnings and the board size/earnings interactive terms are examined together in a single model, using the quartile partitions from models 2 and 4. In general, the results from model 5 do not differ meaningfully from earlier results reinforcing prior evidence on the (lack of) significance for board composition and the significance of board size in mitigating the earnings–returns relationship.

In sum, the results from models 3 and 4 are generally consistent with the results presented in Table 2, and with the notion that smaller boards are more effective in monitoring the quality of financial reporting by the sample firms, as predicted by Hypothesis 2. By contrast, neither the pairwise Spearman's rank correlations nor the OLS regression results reveal an enhancing role of board composition on earnings quality as predicted by Hypothesis 1, nor a discernible non-linear relationship as predicted by Hypothesis 1a. Importantly, these

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<sup>7</sup> Given that board size is a discrete variable, the partitioning scheme does not precisely measure halves and quartiles as would be the case with a continuous variable. Importantly, modifying the partition points does not alter the substance of the results.

associations can be spurious in the absence of controls for other known determinants of the variation in earnings usefulness. Thus, the mitigating role of board composition and board size are re-examined in a single model (the full model), after controlling for the mitigating role of the following:

1. ownership concentration as proxied by the percentage of ownership held by officers and directors as a group,
2. firm growth as proxied by a firm's market-to-book ratio,<sup>8</sup>
3. firm size as proxied by equity capitalization,
4. the sign of reported earnings (gain vs loss),
5. default risk proxied by financial leverage,
6. systematic risk as proxied by beta.

The full model is also estimated twice: first in the way described above, and second after substituting the fraction of *independent* outside directors for the fraction of all outside directors in the model. This substitution explores whether affiliated directors compromise the quality of monitoring by board outsiders as a whole, by removing their representation from the related variable. Results from the two regression equations are presented in Table 4.

In general, the results in Table 4 reinforce prior evidence. First, the earnings variable is positive and significant; its coefficient of 2.13 (1.95 in model 2) suggests that a change in deflated earnings by 1% leads to an analogous change in median-adjusted stock returns by 2.13% (1.95%). In contrast to Hypothesis 1, the outsider representation–earnings interactive term is insignificantly different from zero, suggesting that board composition is not related to earnings informativeness, unconditionally. This result holds regardless of the definition of outsider representation. Importantly, there remain significant differences in earnings usefulness across board-size categories even after controlling for numerous firm characteristics such as size, growth, board composition, ownership structure, systematic risk, and default risk. In fact, the interactive term coefficient suggests that the difference in the earnings–returns relation between firms with large boards (with 12 or more members) and firms with small boards remains substantially unchanged compared to the difference suggested by model 3 in Table 3 which excludes the control variables (−1.28 vs −1.23, respectively). The persistence of this finding is interesting and remains in line with the increased monitoring effectiveness of smaller boards.

The results on the control variables are generally in agreement with prior research with the exception of the result on systematic risk. Specifically, (1) firms with high inside ownership levels exhibit a stronger earnings–returns relationship, consistent with inside ownership providing management with incentives to safeguard a high quality of earnings information; (2) the

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<sup>8</sup> The market-to-book value of assets and equity have been shown to be highly correlated with more sophisticated Tobin's *q* approximations (see, for example, Perfect and Wiles (1994, pp. 313–341)) and are used widely in the literature (e.g., Warfield et al., 1995, p. 277).

Table 4

OLS regressions examining the mitigating role of board structure and control variables on the earnings–returns relationship<sup>a, b</sup>

	(1)	(2)
Intercept	0.07 (0.66)	0.12 (1.19)
Earnings	2.13*** (4.49)	1.95*** (4.02)
Board size	0.01* (1.78)	0.01 (1.71)
Earnings if board size > sample median, zero otherwise	-1.28*** (-4.44)	-1.30*** (-4.49)
Pct. board outsiders	0.13* (1.71)	0.10 (1.61)
Earnings if pct. board outsiders > sample median, zero otherwise	(-0.22) (-0.77)	0.02 (0.07)
Pct. Inside ownership	-0.00 (-1.14)	-0.00 (-1.19)
Earnings if inside ownership > sample median, zero otherwise	0.90*** (3.26)	0.95*** (3.45)
Market-to-book value of assets	-0.02* (-1.93)	-0.02* (-1.94)
Earnings if market-to-book > sample median, zero otherwise	1.77*** (6.36)	1.92*** (7.63)
Log (equity capitalization)	-0.04*** (-3.27)	-0.04** (-3.32)
Earnings if log (equity capital.) > sample median, zero otherwise	1.05*** (3.47)	1.07*** (3.53)
One if earnings <0, zero otherwise	-0.02 (-0.49)	-0.02 (-0.45)
Earnings if earnings <0, zero otherwise	-1.46** (-2.10)	-1.41** (-2.02)
Financial leverage	0.06 (0.90)	0.06 (0.96)
Earnings if leverage > median, zero otherwise	-0.53* (-1.78)	-0.52* (-1.76)
Beta	-0.03 (-1.05)	-0.03 (-1.01)
Earnings if beta > median, zero otherwise	-0.53 (-0.03)	-0.00 (-0.00)



Table 4 (continued)

	(1)	(2)
Adjusted <i>R</i> -square	19.7%	19.7%
Sample size	1 285	1 285
<i>F</i> -value	19.5***	19.6***

<sup>a</sup> The dependent variable is median-adjusted stock return defined as the raw return on the common stock during the fiscal year minus the raw return of the median sample firm for that year (mean = 7.64% and SD = 58.37). Earnings is income before extraordinary items deflated by the market value of equity at the start of the year. In model 1, board outsiders are all board members who are not firm employees, their relatives, or retired firm employees. In model 2, board outsiders also exclude affiliated directors such as consultants, financiers, and lawyers. Inside ownership is the percentage of common stock owned by all officers and directors as a group. Market-to-book is the quotient of equity capitalization plus the book value of total liabilities, all divided by the book value of total assets. The loss dummy is set to one if earnings is negative and zero otherwise. Betas are estimated from a one-factor market model over the five year sample period using monthly returns. Leverage is the ratio of total liabilities to total assets.

<sup>b</sup>  $Ret_{it} = a_0 + a_1 \text{Earnings} + a_2 \text{Earnings} * \text{Board outsiders} + a_3 \text{Board outsiders} + a_4 \text{Earnings} * \text{Board size} + a_5 \text{Board size} + a_6 \text{Inside ownership} + a_7 \text{Earnings} * \text{Inside ownership} + a_8 \text{Market-to-book} + a_9 \text{Earnings} * \text{Market-to-book} + a_{10} \text{Log (MVE)} + a_{11} \text{Earnings} * \text{Log(MVE)} + a_{12} \text{Loss} + a_{13} \text{Earnings} * \text{Loss dummy} + a_{14} \text{Leverage} + a_{15} \text{Earnings} * \text{Leverage} + a_{16} \text{beta} + a_{17} \text{Earnings} * \text{beta}$

\*\*\*,\*\*\* significant at the 0.10, 0.05, and 0.01 levels, two-tailed, respectively. There are no boards in this sample with fewer than five board members or with less than 10% of outside directors.

earnings–returns relationship is stronger for firms with more growth opportunities; (3) the earnings–returns relationship is stronger when a firm is larger; (4) the information content of losses is lower than the information content of gains; and finally, (5) the information content of earnings is lower for firms with higher levels of default risk.

## 5. Sensitivity tests

This section reports results on several sensitivity tests that examine the robustness of the inferences drawn earlier in the paper. On balance, these sensitivity tests do not alter the substance of the paper's inferences. First, in addition to simple OLS techniques, models (1) and (3) in Table 3 were estimated using a fixed effects analysis of covariance model, controlling for company and time fixed effects. This approach has the potential advantage of limiting problems with omitted variables. Interpretation of the empirical results produced by that model is similar in spirit to the discussion presented in the previous section of the paper.

Second, the *t*-values in the OLS regressions assume homoskedasticity of the regression errors. The *t*-statistics of the regressions in Table 4 were re-estimated after substituting the standard errors of the coefficients produced by OLS with

standard errors that were estimated using the consistent variance–covariance matrix suggested by White (1980). The coefficient of the board composition–earnings interactive term remains statistically insignificant, while the board size–earnings coefficient is negative and significant at  $p < 0.01$ , both consistent with the results reported here.

Third, raw returns were alternatively used in place of median-adjusted returns as the dependent variable. In all cases, the results using raw returns are very similar to the results reported in this paper. Similarly, earnings were alternatively defined as EBIT (earnings before interest and taxes) divided by equity capitalization at the start of the year. Consistent with evidence reported here, results also reveal that board composition does not enhance the informativeness of earnings while smaller board sizes do.

In the results reported here, analyses exclude extreme observations, defined as observations falling in the highest or lowest percentile of their respective variable distributions, in order to reduce the undue influence of extreme values. The practice of excluding extreme observations is consistent with prior research (e.g. Subramanyam and Wild, 1996, p. 268) given the occasionally erratic behavior in earnings. Analyses were repeated under two alternative definitions of outliers, when the definition of outliers extends to exclude observations falling in the highest and lowest 2% and 5% of their respective variable distributions; the results were similar to those reported here.

Fifth, given that pooling firm-years may lead to biased  $t$ -statistics due to the fact that observations are not independent, the regressions in Table 3 were re-estimated for each of the five sample years separately. Although much of the test power is lost due to sample reduction, the earnings–board size interactive term suggests that firms with the highest board sizes have significantly less informative earnings in three of the five sample period years: 1992, 1994, 1995. The interactive term of interest is statistically insignificant in the remaining two years. Year-by-year analysis of board composition does not produce any evidence supporting the role of outside directors in enhancing the informativeness of earnings.

In addition to the six determinants of the variation in the informativeness of earnings which are considered here, prior work has suggested that the variability of and persistence in unexpected earnings may explain earnings informativeness (e.g., Subramanyam and Wild, 1996, pp. 263–265). Accordingly, using data from COMPUSTAT for the 10-year period from 1986 to 1995, I estimated earnings persistence for each sample firm as the first-order autocorrelation in earnings changes over the sample period. Similarly, I estimated earnings variability as the variance in earnings changes during the sample period. Earnings persistence, earnings variability and their respective interactive terms with earnings are then included in Table 4-type models. Neither interactive term is statistically significant in explaining returns, while the main results on board composition and size persist.

Models 2 and 4 in Table 3 use the third quartile as the base quartile and exclude that from the model. When each of the other three quartiles was used as the base quartile and excluded from models 2 and 4, respectively, the results were interpreted in the same spirit as those reported here. Alternatively, the full sample of firm-year observations was partitioned to four subsamples according to board size. The informativeness of earnings was examined for each of the four subsamples separately. Earnings are the most informative among firms in the two lowest board-size quartiles. While the informativeness of earnings for firms in the highest board-size quartile are higher than for firms in the second board-size quartile exhibiting a slight abnormality in the hypothesized pattern, both models exhibit a substantially lower explanatory power, lower coefficients and lower *t*-statistics for the earnings variable than the two lower board-size quartiles. In an analogous manner, the informativeness of earnings was examined across subsamples partitioned by board composition. Again, the informativeness of earnings is found to be somewhat higher in firms with fewer outside directors, in contrast to expectations.

Finally, in addition to the binary partition for the board-size variable in Table 4, this variable was also partitioned into quartiles and into quintiles in the model including all control variables. The partitions into quartiles and quintiles produce similar results as those presented in Table 3. These results are also consistent with an inverse association between board size and earnings usefulness for firms in this sample. Similar partitions of the board composition variable into quartiles and quintiles do not uncover a clear pattern in the association between board composition and the informativeness of earnings. Together, the robustness checks discussed in this section reinforce the evidence presented in Tables 3 and 4 that smaller board size, but not a larger proportion of outside directors, enhances the informativeness of earnings information.

## **6. Discussion and conclusions**

My study investigated the importance of board structure in mitigating the usefulness of earnings in explaining stock returns. Two measures of board structure were used: (1) the fraction of outsiders serving on the board, and (2) board size. The empirical results suggest that board composition is generally unrelated to the usefulness of earnings. By contrast, the empirical results suggest that investors value more highly earnings information by firms with smaller boards (down to five board members) although the choice of sample firms delimits tests of the non-linearity of this relation across the full range of possible board sizes by excluding firms with very small boards. This evidence persists after controlling for several known determinants of the variation in the informativeness of earnings.

One limitation of my study is that its sample is drawn from a population of larger firms in unregulated industries (the Forbes sample). To the extent governance structures vary across firm size and industry, the study's results on the mitigating role of board structures on the informativeness of accounting earnings are not generalizable to smaller firms and firms in regulated industries. This caveat notwithstanding, the evidence in this study is in general agreement with evidence on the efficacy of alternative board structures in other settings. Importantly, this evidence is unconditional; that is, the sample selection is not restricted by any type of specific setting endangering the interests of shareholders. Therefore, the lack of significance for the board composition variable is similar to the lack of evidence linking board composition and firm value. Moreover, the important role of board size in explaining earnings usefulness is analogous to the strong association between board size and firm value documented by Yermack (1996, p. 195) and Eisenberg et al. (1998, pp. 46, 47).

These results contribute to the public policy debate surrounding board structures, and are consistent with the notion that reducing board sizes is a simple, but apparently effective technique in attaining higher quality monitoring. Interestingly, my study does not find evidence to support the popular notion (see, for example, the Blue Ribbon Committee Report, 1999) that more outsiders should be added on corporate boards in order to enhance financial reporting quality. While outsiders seem important at times of crises, their monitoring input seems to be offset by the experience and information that is contributed by inside directors. Further research under alternative settings of financial reporting would be fruitful towards gaining a better understanding of the relationship between outside directors and earnings quality.

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