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Higher market valuation of companies with a small board of directors

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Abstract

I present evidence consistent with theories that small boards of directors are more effective. Using Tobin's Q as an approximation of market valuation, I find an inverse association between board size and firm value in a sample of 452 large U.S. industrial corporations between 1984 and 1991. The result is robust to numerous controls for company size, industry membership, inside stock ownership, growth opportunities, and alternative corporate governance structures. Companies with small boards also exhibit more favorable values for financial ratios, and provide stronger CEO performance incentives from compensation and the threat of dismissal.

Key words: Boards of directors; Corporate governance
JEL classification: G30; G32; K22

1. Introduction

A growing body of empirical research examines the structure and effectiveness of corporate governance systems. An important insight from this literature is that top managers' decisions appear to be influenced by executive compensation, takeover threats, monitoring by boards of directors, and other control

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mechanisms. I contribute to this literature by evaluating a proposal for limiting the size of boards of directors in order to improve their effectiveness. My evidence supports this proposal, as I find an inverse association between firm value and board size in a panel of major U.S. companies.

Lipton and Lorsch (1992) state that '. . . the norms of behavior in most boardrooms are dysfunctional', because directors rarely criticize the policies of top managers or hold candid discussions about corporate performance. Believing that these problems increase with the number of directors, Lipton and Lorsch recommend limiting the membership of boards to ten people, with a preferred size of eight or nine. The proposal amounts to a conjecture that even if boards' capacities for monitoring increase with board size, the benefits are outweighed by such costs as slower decision-making, less-candid discussions of managerial performance, and biases against risk-taking. Jensen (1993) takes up this theme, pointing out the 'great emphasis on politeness and courtesy at the expense of truth and frankness in boardrooms' and stating that 'when boards get beyond seven or eight people they are less likely to function effectively and are easier for the CEO to control'.

Some evidence shows that reducing board size has become a priority for institutional investors, dissident directors, and corporate raiders seeking to improve troubled companies. Kini et al. (1995) present evidence that board size shrinks after successful tender offers for under-performing firms. At American Express, the outside director who in 1993 organized the removal of the company's CEO cited the 'unwieldy' 19-person board as an obstacle to change, stating that the 'size of the board does make a difference', according to Monks and Minow (1995). Smaller boards have emerged recently during overhauls of corporate governance at such prominent companies as General Motors, IBM, Occidental Petroleum, Scott Paper, W.R. Grace, Time Warner, and Westinghouse Electric. Institutional investor pressure reportedly contributed to many of these changes, such as the 1995 reduction in Grace's board from 22 directors to 12.

In a sample of 452 large U.S. public corporations observed over the period 1984 to 1991, I find an inverse relation between firm market value, as represented by Tobin's Q, and the size of the board of directors. The association appears in both cross-sectional analyses of the variation among firms and in time-series analyses of the variation within individual companies. The negative relation between board size and firm value attenuates as boards become large, implying that the greatest incremental costs arise as boards grow from in size from small to medium. The loss in firm value when boards grow from six to 12 members, for example, is estimated to be equal to the value lost when boards grow from 12 to 24. Very few boards have fewer than six or more than 24 directors.

A range of additional evidence is consistent with the finding that companies achieve the highest market value when boards are small. Several measures of

operating efficiency and profitability are negatively related over time to board size within firms. Smaller boards are more likely to dismiss CEOs following periods of poor performance. Similarly, evidence shows that CEO compensation exhibits greater sensitivity to performance in companies with small boards. Stock returns for a sample of companies announcing significant changes in board size show that investors react positively when boards shrink and negatively when board size increases.

The inverse association between board size and firm value proves robust to a variety of tests for alternative explanations. I introduce variables to control for firm size, industry, board composition, inside stock ownership, the presence of growth opportunities, diversification, company age, and different corporate governance structures. None of these modifications changes the conclusion that companies with small boards are valued more highly in the capital markets.

An alternative interpretation of the results is that board size arises from prior company performance, with troubled firms adding directors to increase monitoring capacity. I conduct a range of tests to obtain insight into the direction of causation between board size and firm value. The tests show that while the rate of director turnover increases following poor performance, board size remains quite stable over time with little sensitivity to performance.

The remainder of this paper is organized as follows. Section 2 reviews prior research on board structure and firm performance. Section 3 presents the main result of an inverse association between board size and firm value, and illustrates the result's robustness to controls for firm size, growth opportunities, diversification, board composition, and other variables. Section 4 presents evidence about the direction of causation between board size and firm value. Section 5 provides supporting evidence that smaller boards oversee managers more effectively, showing that financial ratios and CEO incentives are stronger when boards are small and that investors react favorably to large reductions in board size. Section 6 concludes the paper.

2. Prior research on board structure

Criticisms and proposals for the reform of boards of directors have proliferated in recent years. Monks and Minow (1995) present a lengthy summary of this literature, which relies upon a premise that monitoring by the board can improve the quality of managers' decisions. Many commentators urge that boards have a large fraction of outside directors, that directors own large amounts of company stock, that CEOs have only limited power to set board agendas and appoint new directors, and that rigorous CEO performance reviews take place regularly. As noted above, limiting board size has begun appearing on some agendas for reform, although only Lipton and Lorsch (1992) and Jensen (1993) identify board size as a high priority.

Much empirical research has examined whether board structure is related to company performance, but these studies have largely overlooked board size. Instead, investigators have most frequently examined the importance of outside directors and directors' equity ownership.

Studying board composition, Hermalin and Weisbach (1991) find no relation between firm performance and the fraction of outside directors. However, this conclusion is not supported by Baysinger and Butler (1985), who find some evidence that companies perform better if boards include more outsiders. Other studies find that boards dominated by outsiders are more likely to behave in shareholders' interest. See, for example, Weisbach (1988) (CEO turnover), Byrd and Hickman (1992) (tender offer bids), and Brickley, Coles, and Terry (1994) (poison pill adoptions and control auctions). Rosenstein and Wyatt (1990) find positive investor reactions to appointments of outside directors.

With respect to board stock ownership, Mørck, Shleifer, and Vishny (1988) find significant, though nonmonotonic, associations between different levels of director stock ownership and Tobin's Q, suggesting that some levels of board stock ownership have systematic advantages. McConnell and Servaes (1990) and Hermalin and Weisbach (1991) report similar results, while Bagnani, Milonas, Saunders, and Travlos (1994) find that bondholder returns also exhibit a nonmonotonic association with board stock ownership.

Lipton and Lorsch (1992), Jensen (1993), and other advocates of small boards contend that board size affects corporate governance independent of other board attributes. As noted above, their arguments focus on the productivity losses that arise when work groups grow large, an insight borrowed from organizational behavior research such as Steiner (1972) and Hackman (1990). According to Jensen (1993), '. . . as groups increase in size they become less effective because the coordination and process problems overwhelm the advantages from having more people to draw on'.

Empirical research on the importance of board size is thin. Holthausen and Larcker (1993a, b) consider board size among a range of variables that might influence executive compensation and company performance. Holthausen and Larcker (1993a) present results indicating a positive association between board size and the value of CEO compensation. Holthausen and Larcker (1993b) fail to find consistent evidence of an association between board size and company performance.

A clear problem in studying board size is that the number of directors might arise endogenously as a function of other variables, such as company size, performance, or the CEO's preferences. Along these lines, the managerial quality hypothesis of Byrd and Hickman (1992) argues that high-caliber CEOs may '. . . dress up their firms' boards with independent directors' to please shareholders with an illusion of active monitoring; a similar argument could be made about the willingness of good CEOs to surround themselves with small boards. Because many intangible forces of this type might influence board size, we

cannot accept at face value an association between board size and firm value without considering alternative explanations. I investigate many of these possible explanations in Section 3.3, after presenting my main finding of a negative relation between firm value and board size.

3. Board size and firm value

The main hypothesis of this paper is that firm value depends on the quality of monitoring and decision-making by the board of directors, and that the board's size represents an important determinant of its performance. Below I estimate a straightforward model of the relation between firm value and board size. I follow the methods of several recent related studies, such as Mørck, Shleifer, and Vishny (1988), Hermalin and Weisbach (1991), and Lang and Stulz (1994), by regressing a set of explanatory variables against an estimate of Tobin's Q, which measures the ratio of a firm's market value divided by the replacement cost of its assets. I include controls for such variables as firm size, industry membership, board composition, and past company performance. After presenting the main result, I illustrate its robustness to a variety of alternative specifications and evaluate whether alternative theories can account for the observed inverse relation between board size and firm value.

3.1. Data description

My analysis uses a panel of firms drawn from the annual *Forbes* magazine rankings of the 500 largest U.S. public corporations based on sales, total assets, market capitalization, and net income. I use a sample selection rule that requires each company to qualify for any of these *Forbes* lists during at least four years of the eight-year period between 1984 and 1991. I also require each company to have four or more consecutive fiscal years of stock market and financial statement data between 1984 and 1991. The four-year requirement represents an attempt to balance two sampling issues: collecting several observations for each company so that econometric panel data techniques can be used, and limiting survivorship bias by allowing companies to enter and exit the panel over time. I omit utility and financial companies because of concerns that government regulation leads to different, more limited roles for their boards of directors. I obtain a final sample of 3,438 observations for 452 companies across eight years.[1]

[1] Three sample firms began 1984 as public companies, remained public at least until 1988, were delisted in going-private transactions, and became public again by 1991. In these cases, the data set does not include the firms' second incarnations. Approximately 20 firms changed the timing of their fiscal years during the sample period; in these cases, 'flow' variables, such as sales, are normalized to 12-month equivalents for the transition fiscal years which were not 12 months long.

Table 1 presents characteristics of the board of directors for the sample observations, including mean and median values for key variables, and sample correlations of other board attributes with board size. Board sizes range between four and 34 for sample firms, with a mean of 12.25 and a median of 12.

The sample correlations between board size and other variables do not give a consistent indication of whether smaller boards should be expected to monitor top managers more effectively than larger boards. While numerous studies have found positive links between firm performance and the presence of independent or expert board members, these types of directors are less likely to appear on small boards. Board size is negatively correlated with the fraction of directors who are corporate insiders or who have conflicts-of-interest due to their 'gray' status (signifying directors who are relatives of company officers and those who benefit from personal business ties to the firm), and positively correlated with the fraction of directors who serve as CEOs of other firms. Further, smaller boards are more likely to have CEOs who either founded the company or belong to the founding family, a quality that Johnson et al. (1985) found was associated with low firm value. However, directors on small boards tend to have greater levels of stock ownership and are more likely to receive performance-based director fees in the form of stock options. Each of these characteristics suggests that small boards may have better incentives to monitor, though Mørck, Shleifer, and Vishny (1988) and others have found that board equity ownership has ambiguous associations with firm value. Small boards are also likelier to include active monitors in the form of major stockholder-directors and non-CEO chairmen. Smaller boards have lower rates of director turnover than other boards, probably due to the better performance of companies with small boards documented herein.

From the evidence in Table 1, I conclude that number of directors is but one of many board attributes that might contribute to firm value, and that the complex associations between board size and other variables do not suggest clearly whether firms with small boards should have high or low market values.

3.2. *Regression analysis*

To investigate whether board size has a significant association with firm value, I estimate least-squares regressions, using Tobin's Q as the dependent variable and board size as one of many explanatory variables. The dependent variable, measured for each company at the close of each fiscal year ending in calendar 1984 through 1991, is defined as

$$Tobin's\ Q = \frac{Market\ value\ of\ assets}{Replacement\ cost\ of\ assets}. \tag{1}$$

Table 1
Board of directors characteristics

Descriptive statistics for characteristics of boards of directors. The sample consists of 3,438 annual observations for 452 companies between 1984 and 1991. Companies are included in the sample if they are ranked by *Forbes* magazine as one of the 500 largest U.S. public corporations at least four times during the eight-year sample period. Utility and financial companies are excluded. The table presents the mean, median, and standard deviation for each variable, as well as Pearson sample correlation coefficients between the board-size variable and all others.

Board size represents the number of members of the board of directors as of the annual meeting date during each fiscal year. The percentage of inside directors is the fraction of board members who are current or former officers of each company. Gray directors are those who have substantial business relationships with the company, either personally or through their main employers, and also relatives of corporate officers. Outside directors are those who have neither inside nor gray status. Director fees include annual retainers and fees paid for regular and special board meetings during the fiscal year. The dummy variable for director stock option plan equals one if the company has a plan in place for awarding stock options to outside directors. Director turnover is the fraction of board members who leave before the next annual meeting. The CEO-from-founding-family dummy variable equals 1 if the CEO is from a family which either founded the company or acquired control during a takeover. The dummy variable for 5% stockholder-directors equals 1 if one or more members of the board beneficially own at least 5% of the common stock or serve as representatives of an outside 5% holder (not including employee stock ownership plans).

	Mean	Median	Std. dev.	Correlation with board size
Board size	12.25	12	0.43	1.00
Board composition				
Inside directors	0.36	0.33	0.16	−0.09
Gray directors	0.10	0.08	0.12	−0.16
Outside directors	0.54	0.56	0.19	0.17
Directors who are CEOs of other firms	0.14	0.13	0.12	0.14
Compensation and turnover				
Director fees (1991 dollars)	$29,539	$29,601	$10,657	0.33
Director stock option plan (dummy variable)	0.09	0	0.29	−0.09
Director turnover (% of board per year)	8.3%	7.1%	10.2%	0.15
Governance structure and stock ownership				
CEO from founding family (dummy variable)	0.24	0	0.42	−0.26
Non-CEO chairman of board (dummy variable)	0.17	0	0.38	−0.06
Presence of 5% stockholder-director (dummy variable)	0.24	0	0.43	−0.14
Director and officer stock ownership (% of common)	9.1%	2.8%	14.3%	−0.27

Last column: All correlations with board size are significant at the 1% level.

I estimate the market value of assets by adding together estimated values of the components of total liabilities and stockholders' equity. The market value of common stock is obtained directly from the CRSP database. I estimate the market value of preferred stock by taking the ratio of preferred dividends over the prevailing yield on Moody's index of high-grade industrial preferred stocks. The market value of long-term debt is estimated from a recursive algorithm that infers the maturity structure of each firm's debt and takes account of changes in the prevailing yield on Moody's index of A-rated industrial bonds. I assume other liabilities have market value equal to book value. The replacement costs of inventories and fixed assets are estimated by recursive algorithms that take account of inflation, real depreciation rates, capital expenditures, and the method of inventory valuation used by each company. Other assets are assumed to have market value equal to book value. The recursive methods for valuing debt, inventory, and fixed assets closely follow those of Perfect and Wiles (1994) in their q_{PW} estimator of Tobin's Q.[2]

Fig. 1 illustrates mean and median values of Tobin's Q for companies sorted by board size. The number of directors for each company was obtained from proxy statements for firms' annual meetings, which usually occur in the fifth or sixth month of each fiscal year. Mean and median Tobin's Q values decline almost monotonically over the range of board sizes. For companies with between four and eight directors, mean Q values range between 1.5 and 2, while the mean Q value falls to slightly above 1 for companies with 20 or more directors.

In addition to board size, my regressions include controls for other variables that I expect either to affect Tobin's Q directly or to affect each board's incentives and ability to monitor managers.

A company's profitability has a significant impact upon its market value, so I include return on assets (ROA) in the regression model as an explanatory variable. I calculate ROA as operating income divided by total assets (measured at the start of each year) and compound the ratio continuously. The regression model includes ROA for the most recent year and two years of lagged values.

In addition to current and past profitability, many theorists including Myers (1977) and Smith and Watts (1992) argue that firm value depends on future investment opportunities. Like others, I use the ratio of capital expenditures over sales as a proxy for investment opportunities. Below, I consider whether other possible measures of investment opportunities lead to differences in the model's estimates.

During the 1984–91 period of this study, diversified firms were valued less highly in the capital markets than stand-alone businesses, as shown by Lang and

[2] The lone difference between my methodology and the q_{PW} estimator of Perfect and Wiles (1994) is that my estimate of the replacement cost of property, plant, and equipment uses a slightly different method for estimating real rates of economic depreciation and cost-reducing technical progress.

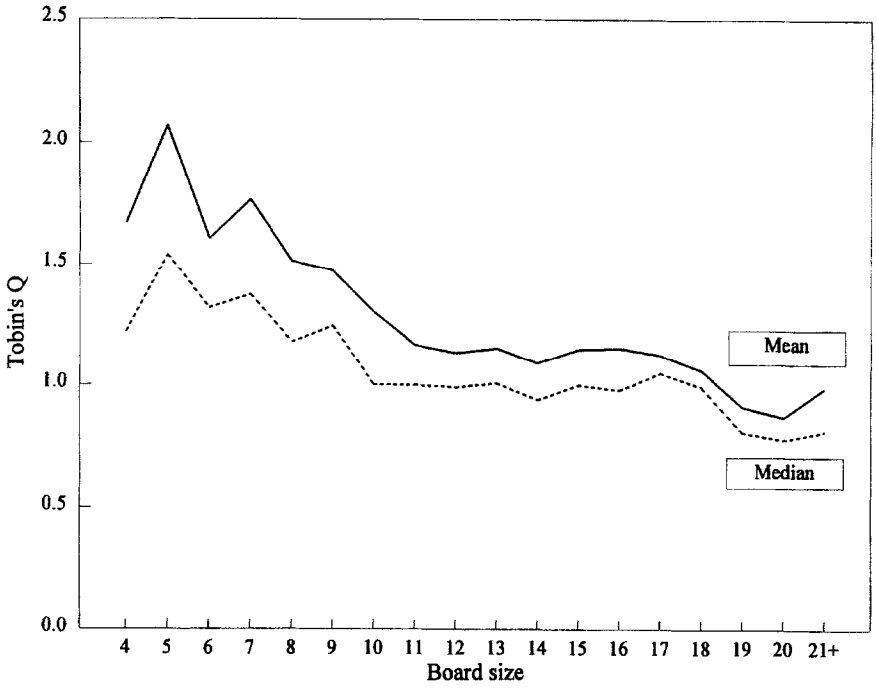

Fig. 1. Board size and Tobin's Q: Sample means and medians.

Sample means and medians of Tobin's Q for different sizes of boards of directors. The sample consists of 3,438 annual observations for 452 firms between 1984 and 1991. Companies are included in the sample if they are ranked by *Forbes* magazine as one of the 500 largest U.S. public corporations at least four times during the eight-year sample period. Utility and financial companies are excluded. Data for board size is gathered from proxy statements filed by companies near the start of each fiscal year. Tobin's Q is estimated at the end of each fiscal year as *Market value of assets/Replacement cost of assets*. The estimation of Q follows the q_{PW} specification of Perfect and Wiles (1994), which is described more fully in the text.

Stulz (1994) and Berger and Ofek (1995). Moreover, diversified companies are likely to have larger boards, because many boards grow in size when companies make acquisitions and because boards of conglomerates may seek outside expertise for a greater number of industries. To control for diversification, I include a variable that counts the number of business segments for which firms report audited financial statement data in each fiscal year's annual report.

As discussed in Section 2, many investigators have suggested that boards with high stock ownership and a majority of outside directors monitor managers more effectively. I include measures of these two variables in the regression model: the percentage of common stock owned by directors and officers and the percentage of outside directors on each company's board. Outside directors exclude current and former officers of the firm, and nonemployee directors who

have personal or business relationships with the company. These directors, often referred to as 'gray', include such groups as lawyers, bankers, consultants, major suppliers, and relatives of corporate officers.

I control for firm size with the log of total capital, measured in millions of 1991 dollars. Total capital equals the market value of equity at the end of the year, plus the estimated values of long-term debt and preferred stock, calculated as described above. Below, I consider alternative measures of company size in Section 3.3.2.

Finally, I include in the regressions dummy variables for individual years and two-digit SIC industries. I use a log specification for the board-size variable, based upon the convex association between board size and market value suggested by Fig. 1. I obtained the financial statement data used in regressions from Compustat, except for a handful of observations for which data were hand-collected. Data for board size, board composition, and inside stock ownership were obtained from annual meeting proxy statements.

Because unobservable characteristics are likely to affect each company's market value, I estimate both ordinary least squares (OLS) regressions and fixed-effects models. The OLS model includes two-digit SIC dummy variables that allow a different intercept for firms in each industry, while the fixed-effects estimator assigns a unique intercept to each company. Hausman and Taylor (1981) state that the fixed-effects framework represents a common, unbiased method of controlling for omitted variables in a panel data set. Table 2 presents coefficient estimates for the OLS and fixed-effects models, with White (1980) robust standard errors accompanying the OLS estimates.

The regression estimates for both models show an inverse and significant association between firm value and board size. This downward slope is consistent with an interpretation that coordination, communication, and decision-making problems increasingly hinder board performance when the number of directors increases. Further, the convex relation implied by the log form of the board-size variable suggests that costs accumulate at a decreasing rate as board size grows. A convex relation also emerges from estimates of different functional forms, including piecewise linear models and regressions of Tobin's Q against board size and board size squared. For clarity, in the remainder of the paper, I concentrate on results using the board-size log, and I generally report fixed-effects estimates to control for unobservable company characteristics.

The fixed-effects estimate for the board-size log coefficient of -0.337 implies that Tobin's Q falls by about 0.23 if board size doubles and by about 0.13 if board size rises 50%. Expanding an eight-person board by one member implies a reduction in Q of about 0.04, while adding one director to a 15-person board implies a fall in Q of about 0.02. These changes in value are economically significant. Since the median firm in my sample has a market value of just under \$2.6 billion (equity and long-term debt, in 1991 dollars), and since most firms' values of Tobin's Q are close to one (see Fig. 1), a change

Table 2
Regression coefficient estimates: Board size and market valuation

Regression coefficient estimates of the association between Tobin's Q and the number of directors sitting on company boards. The sample consists of 3,438 annual observations for 452 firms between 1984 and 1991. Companies are included in the sample if they are ranked by *Forbes* magazine as one of the 500 largest U.S. public corporations at least four times during the eight-year sample period. Utility and financial companies are excluded. The dependent variable is an estimate of Tobin's Q at the end of each fiscal year. The log of board size is the natural log of the number of directors sitting on each company's board as of the annual meeting date each year, as reported in company proxy statements. The first column presents OLS estimates with White (1980) robust standard errors. The second column presents estimates from a fixed-effects model, which assigns a unique intercept to each company.

The model includes control variables for company performance (return on assets in the current year and two lags), firm size (the log of total capital, in 1991 dollars), growth opportunities (capital expenditures over sales), diversification (the number of business segments for which financial statement data is reported), board composition (the percentage of outside directors on the board), and inside stock ownership (director and officer beneficial ownership, in percent). *ROA* equals operating income over total assets (start of year) and is compounded continuously. Total capital equals the market value of common stock at the end of the year, plus estimates of the market values of long-term debt and preferred stock. Both models include dummy variables for years, and the OLS model includes two-digit SIC industry dummy variables.

Dependent variable: *Tobin's Q*		
Variable	OLS estimates	Fixed-effects estimates
Log of board size	−0.428***	−0.337***
	(0.043)	(0.056)
Return on assets (current year)	3.856***	2.048***
	(0.403)	(0.147)
Return on assets (prior year)	0.502	−0.093
	(0.536)	(0.151)
Return on assets (two years prior)	1.039**	0.450***
	(0.451)	(0.130)
Firm size (log of total capital)	0.119***	0.413***
	(0.012)	(0.020)
Capital expenditures/Sales	−0.116	0.176
	(0.209)	(0.123)
Number of business segments	−0.042***	−0.049***
	(0.006)	(0.009)
Board composition (% outside directors)	−0.213***	0.172*
	(0.067)	(0.088)
Officer and director stock ownership (%)	0.279***	0.310***
	(0.096)	(0.108)
Sample size	3,400	3,400
F-statistic	68.1	2.7
(P-value)	(0.00)	(0.00)
R-squared	0.5459	0.3021

Significant at 1% (***), 5% (**), and 10% (*) levels.

in Q of 0.01 reduces firm value by about 1%, or approximately $25 million for the median firm.

While the results suggest a monotonic relation between smaller board size and higher firm value, we should be cautious about concluding that the association holds at very small levels of board size. This conjecture is difficult to test, since few companies in my sample have board size below six (only 87 observations out of 3,438), and every board has at least four members. Fig. 1's display of mean and median values of Tobin's Q suggests that no consistent association between board size and firm value exists over the lowest range of board sizes, as the values of Q decline steadily only after board size grows beyond seven. Re-estimating Table 2's OLS regression for the subset of observations with board size of seven or less yields a negative but insignificant estimate for the board-size log coefficient.

Coefficient estimates for other variables in Table 2 are generally significant in the expected direction. Current and past levels of profitability, measured by return on assets, have positive associations with Tobin's Q. Diversified firms appear to be valued less highly than other companies. Board stock ownership has a positive association with firm value. The effect of the board composition variable is ambiguous and appears sensitive to the inclusion of firm effects in the model. Capital expenditures over sales, the variable I use to measure investment opportunities, does not have significant coefficient estimates, though in the fixed-effects model the estimate is positive as expected, with a p-value of 0.15. Firm size, when measured by the log of the market value of total capital, is positively associated by construction with Tobin's Q. Other measures of firm size are discussed below.

The finding of an inverse association between board size and firm value appears insensitive to the method of estimation. A between-firms estimator, which considers only cross-sectional averages of the variables across companies, produces an estimate of -0.396 for the board-size log (significant at the 1% level). A random-effects model, which represents a minimum-variance weighted average of the within- and between-firms estimators (Hausman and Taylor, 1981), yields an estimate of -0.450 for the board-size coefficient (p-value below 1%). An OLS estimate based on first differences of the variables produces an estimate of -0.239 for the board-size log (p-value below 5%). Year-by-year cross-sectional estimates of the OLS model in Table 2 yield negative and significant coefficients for the board-size log variable in every year. While the estimate is closest to zero in 1990 and 1991, it is difficult to spot a time trend, as the two most negative estimates occur for 1987 and 1989.

3.3. *Further controls*

Several plausible explanations could account for the negative association between board size and firm value. Regression results in Table 2 are consistent

with the hypotheses of Lipton and Lorsch (1992) and Jensen (1993), that small boards operate more effectively, but board size could be associated with other corporate attributes that affect firm value. Moreover, my results imply, somewhat counterintuitively, that many companies have bypassed a simple, inexpensive way of improving corporate performance. For these reasons, I conduct additional tests of the robustness of my basic finding and discuss the results in the following sections.

3.3.1. Growth opportunities

Tobin's Q is an ambiguous measure of value-added by management, since the Q- ratio can also capture the value of future investment opportunities. While the model controls for growth opportunities by using capital expenditures over sales, Smith and Watts (1992) and other authors have used additional proxies, including research and development (R&D) expense over sales, depreciation expense over sales, the earnings–price ratio, and the variance of common stock returns. I re-estimate the fixed-effects model of Table 2 with each of these growth opportunity measures substituted for capital expenditures over sales, but the key coefficient on the board-size log exhibits virtually no change. Board size itself does not appear to have any systematic association with the presence of growth opportunities; regressions of the five growth-opportunity variables against the board-size log yield only one statistically significant estimate and no consistent pattern of signs.

3.3.2. Firm size

Company size, board size, and firm value can be correlated in complicated ways, so I check the robustness of my results to different definitions and functional forms of the firm size variable. I estimate a total of 12 fixed-effects models, based upon three different measures of size: total capital (market value of equity and long-term debt), total assets (book value), and net sales during the prior fiscal year. I use four different specifications for each size variable: log terms, linear terms, linear and squared terms, and linear, squared, and cubed terms. The estimated coefficient for the board-size log is negative and significant in every specification (nine estimates have p-values below 1%, two have p-values of 3%, and one has a p-value of 8%).

3.3.3. Active monitors

The correlations in Table 1 suggest that small boards have a higher incidence of active monitors. I re-estimate the model after adding dummy variables for the presence of a non-CEO chairman, a non-CEO company president who also sits on the board, and a 5% stockholder-director. The fixed-effects estimate for the board-size log remains virtually unchanged. Of the new variables, only the dummy for non-CEO chairman has an interesting estimate: The coefficient is

0.039 and significant at the 11% level, implying that firms are valued more highly when the CEO and chairman positions are separated. Numerous alternative specifications of the stockholder-director variable do not change the main conclusion.

3.3.4. Close ownership structures

Table 1 suggests that small boards are more common in companies controlled by founding families. These firms could have tighter ownership structures and turn over assets more slowly, leading to low book values of assets, which imply high values of Tobin's Q. I add to the model a dummy variable equal to one if the CEO belongs to the company's founding family, but the fixed-effects estimate for the board-size log exhibits little change. The founding-family variable has a negative and significant estimate of -0.11, suggesting that firm value increases once the founding family surrenders control. Company age could also be closely associated with ownership structure, since firms probably become more widely held over time. I re-estimate the model with a variable equal to the number of years since each firm's original incorporation; again, the board-size estimate remains nearly the same as in Table 2.

4. Past performance and current board size

The analysis above shows that companies with small boards of directors attain higher values in the capital markets than do their counterparts with large boards. However, we might interpret these findings in two ways: Small boards could contribute to better performance, or companies might adjust board size in response to past performance. If companies expand their boards in the aftermath of poor performance, the causation of the board size-firm value relation may run in the opposite direction from the Lipton–Lorsch (1992) and Jensen (1993) hypotheses.

Prior studies by Hermalin and Weisbach (1988) and Gilson (1990) examine the interplay between company performance and changes in boards of directors. Hermalin and Weisbach (1988) find that poor performance leads to both more departures of board members and more appointments to the board. While Hermalin and Weisbach are silent on the net effect of these two forces, they estimate similar magnitudes for each, suggesting that director turnover increases after poor performance, but board size does not. Gilson (1990), in a study limited to financially distressed companies, also finds that board turnover increases after poor performance; moreover, Gilson finds that firms reduce board sizes during distressed periods. If this pattern held for all companies, one would observe smaller boards in low-valued companies, contrary to the findings of this paper. However, it is not clear that Gilson's results apply to the majority of companies, since the median firm in his sample is small and performs very poorly.

I examine the question of causation by estimating regression models of the association between past performance and changes in board size. Following Hermalin and Weisbach (1988), I estimate maximum-likelihood Poisson models of the number of directors leaving and joining each company's board each year.

Table 3
Regression coefficient estimates: Effect of company performance on director appointments, departures, and changes in board size

Coefficient estimates for regression models of changes in board size. The first two columns present maximum-likelihood Poisson models of the number of directors joining and leaving each company's board. The third column presents OLS estimates of the net change in board size, equal to director additions minus director departures. All variables are measured annually, based upon the membership of companies' boards as reported in proxy statements for annual shareholder meetings.

The sample consists of 3,438 annual observations for 452 firms between 1984 and 1991. Companies are included in the sample if they are ranked by *Forbes* magazine as one of the 500 largest U.S. public corporations at least four times during the eight-year sample period. Utility and financial companies are excluded. The key explanatory variable for all three-models is the firm's abnormal stock return during the fiscal year, defined as the raw return minus the return predicted by the CAPM. Other explanatory variables are similar to those used by Hermalin and Weisbach (1988). CEO at retirement age is a dummy variable equal to one if the company's CEO is between the ages of 62 and 66. New CEO is a dummy equal to one if the CEO has four years of tenure or less. All models include two-digit SIC industry dummy variables. The text discusses assumptions used in calculating abnormal stock returns. Each coefficient estimate appears with robust standard errors.

Dependent variable	Director appointments	Director departures	Change in board size
Estimation	Poisson ML	Poisson ML	OLS
	Estimate	Estimate	Estimate
Abnormal stock return (fiscal year)	−0.238** (0.093)	−0.238*** (0.084)	−0.005 (0.106)
Abnormal stock return (prior fiscal year)	−0.087 (0.088)	−0.126 (0.084)	0.039 (0.091)
Change in firm size [log(sales)]	0.419*** (0.163)	−0.347* (0.185)	0.770*** (0.198)
CEO at retirement age (dummy for ages 62 to 66)	0.129** (0.054)	0.133** (0.055)	−0.015 (0.062)
New CEO (dummy for 4 years' tenure or less)	0.148*** (0.048)	0.273*** (0.050)	−0.156*** (0.055)
SIC industry dummies	2-digit	2-digit	2-digit
Sample size	2,943	2,943	2,943
F-statistic			1.9
(*P*-value)			(0.00)
R-squared			0.0313

Significant at 1% (***), 5% (**), and 10% (*) levels.

As a further check, I estimate a least squares model in which the dependent variable is equal to the total annual change in board size (director additions minus departures). Key explanatory variables for all models are abnormal stock returns, the change in company size (measured by the log of net sales), and dummy variables for whether the company's CEO is nearing retirement (between the ages of 62 and 66) or new (appointed within the last four years). Abnormal stock returns equal the firm's raw stock return during the fiscal year, minus the return predicted by the capital asset pricing model (CAPM). The CAPM calculations use β estimates calculated over the last 120 trading days of the prior fiscal year, and risk-free rates equal to the yield on ten-year U.S. Treasury bonds.

Table 3 displays the results. The models provide no evidence that boards either expand or contract in response to performance. Like Hermalin and Weisbach, I find that poor performance is associated with higher levels of both director appointments and departures. The effects are similar, suggesting that more directors are replaced when companies perform poorly, but that total board size does not change. The same conclusion emerges from the OLS model of the net annual change in board size. I obtain qualitatively similar results from re-estimating all three equations, using seven-year aggregate totals of all variables between 1984 and 1991 for each company. The OLS model does show that boards tend to grow larger in response to changes in company size, as opposed to performance, but the effect appears weak; a firm almost needs to quadruple in size before it can be expected to add one director.

I conduct additional tests of whether the link between board size and firm value can be attributed to adjustments in board size due to past performance. I re-estimate the basic model of firm value and board size in an instrumental variables framework, using lagged values of the board-size log as instruments for the current value. The new estimates are virtually indistinguishable from the original model's OLS estimate in Table 2. I also regress Tobin's Q against long lags of board size and compare the results with regressions of current levels of board size against long lags of Tobin's Q. I use a fixed-effects framework similar to that in Table 2. I find that up to three years' lagged values of board size have significant associations with subsequent values of Tobin's Q, while no corresponding association exists between lagged values of Tobin's Q and subsequent values of board size. I conclude that the evidence supports the interpretation that past board size influences current firm value, rather than the opposite – that past performance influences current choices of board size.

5. Additional evidence of small boards' effectiveness

Further evidence about the performance of small boards is reflected in patterns of company operating performance, CEO turnover, and executive

compensation, as well as shareholder reactions to board size changes. The analysis in the following sections illustrates that key financial ratios exhibit an inverse association with board size, and that CEO incentives – from compensation and the threat of dismissal – diminish in strength as board size increases. I also identify six sample companies that announce significant reductions in board size for corporate governance reasons. These firms realize positive abnormal stock returns around the announcement date, while a parallel sample of four companies announcing large expansions in board size realize negative abnormal returns.

5.1. Board size and financial ratios

If corporate governance becomes less effective as board size increases, I expect lower profitability in companies with large boards, and I also expect less efficient use of assets. I estimate fixed-effects models of board size and three key financial ratios: sales over assets, return on assets, and return on sales. I define return on assets as operating income over total assets at the start of the year, and return on sales as operating income over net sales, and compound both ratios continuously. I regress all three variables against the board-size log and control variables similar to those in the model for Tobin's Q: firm size (the log of total capital), board stock ownership, board composition, the number of business segments, and dummy variables for individual years. I do not include controls for investment opportunities, since it is not obvious why their presence should influence current operating performance.

Table 4 presents the fixed-effects estimates. Consistent with the finding for Tobin's Q, all three dependent variables have negative and significant associations with the board-size log. Companies with large boards appear to use assets less efficiently and earn lower profits.

However, the favorable evidence of an association between board size and financial ratios does not extend to models using less aggregate measures of profitability and efficiency. I estimate three further regressions that have dependent variables equal to sales per employee; the cost of goods sold over sales; and selling, general, and administrative expenses over sales. The board-size log coefficient is not significant in any of these models when they are estimated in a fixed-effects framework.

5.2. Board size and CEO turnover

Selecting, evaluating, and dismissing a company's top managers represents a central responsibility of boards of directors. If large board size contributes to behavioral norms that inhibit candid discussions of managerial performance, as argued by Lipton and Lorsch (1992) and Jensen (1993), we should expect weaker links between performance and turnover for CEOs in companies with large boards.

Table 4
Fixed-effects estimates: Board size and financial ratios

Coefficient estimates for fixed-effects regression models of financial ratios. Standard errors appears below each estimate. The sample consists of 3,438 annual observations for 452 firms between 1984 and 1991. Companies are included in the sample if they are ranked by *Forbes* magazine as one of the 500 largest U.S. public corporations at least four times during the eight-year sample period. Utility and financial companies are excluded.

The dependent variables are three standard measures of operating efficiency and profitability. *ROS* and *ROA* are based on operating income and are compounded continuously. The main explanatory variable for each model is the natural log of board size, which represents the number of directors sitting on each company's board as of the annual meeting for each fiscal year. In addition to the other controls listed, each model includes dummy variables for individual years.

Dependent variable	Sale/ assets	Return on assets	Return on sales
	Estimate	Estimate	Estimate
Log of board size	−0.163**	−0.037***	−0.025***
	(0.079)	(0.008)	(0.006)
Board composition (% outside directors)	−0.187	0.005	−0.009
	(0.126)	(0.012)	(0.009)
Officer and director stock ownership (%)	0.287*	0.022	−0.029***
	(0.153)	(0.015)	(0.011)
Number of business segments	0.006	−0.0026**	−0.0020**
	(0.013)	(0.0013)	(0.0009)
Firm size (log of total capital)	0.083***	0.045***	0.031***
	(0.026)	(0.003)	(0.002)
Sample size	3,428	3,425	3,425
F-statistic	23.6	66.3	44.3
(*P*-value)	(0.00)	(0.00)	(0.00)
R-squared	0.0647	0.1627	0.1148

Significant at 1% (***), 5% (**), and 10% (*) levels.

I estimate a probit model of CEO turnover, similar to the model of Warner, Watts, and Wruck (1988). The (0, 1) dependent variable equals one if the CEO leaves his position before the end of the current fiscal year or during the first half of the subsequent fiscal year. The main explanatory variable is the firm's cumulative abnormal stock return over the current fiscal year and two prior years. The use of a relatively long interval for the abnormal stock return is consistent with other studies. For example, Warner et al. (1988) use four years of performance data in their turnover model. I construct the abnormal stock returns described in Section 4. I include controls for CEO age (which should be positively related to turnover) and CEO stock ownership (which should affect turnover negatively, if high stock ownership represents a form of CEO entrenchment). I also include dummy variables for industries and CEO ages 64, 65, and

Table 5
Probit coefficient estimates: Board size and CEO dismissal incentives

Regression coefficient estimates for a binary probit model of CEO turnover. The dependent variable equals one if a CEO leaves his position during the second half of the current fiscal year or the first half of the subsequent fiscal year. The main explanatory variable is the firm's cumulative abnormal stock return for the current year and two prior years. The abnormal stock return is defined as the raw stock return minus the return predicted by the CAPM. The sample consists of 3,438 annual observations for 452 firms between 1984 and 1991. Companies are included in the sample if they are ranked by *Forbes* magazine as one of the 500 largest U.S. public corporations at least four times during the eight-year sample period. Utility and financial companies are excluded. Coefficient estimates appear with White (1982) robust standard errors. Missing values occur for companies that do not have a three-year history of common stock returns.

To illustrate how CEO incentives from the threat of dismissal are affected by different characteristics of boards of directors, the second column presents estimates for a model that includes an interaction term between the abnormal stock return and the log of board size. Both models also include variables for the fraction of common stock owned by the CEO, CEO age, dummy variables for CEO ages 64, 65, and 66, and dummies for one-digit SIC industries.

Dependent variable: *CEO leaves position (0, 1)*	Estimate	Estimate
CEO age	0.043***	0.043***
	(0.006)	(0.006)
CEO stock ownership (%)	− 2.022***	− 2.027***
	(0.755)	(0.746)
Cumulative abnormal stock return	− 0.358***	− 1.496***
(current year and two prior years)	(0.071)	(0.581)
Interaction term:		0.471**
Abnormal stock return × log (board size)		(0.239)
Sample size	3,305	3,305

Significant at 1% (***), 5% (**), and 10% (*) levels.

66, since much of the CEO turnover at these ages represents regular planned retirements. Table 5 presents coefficient estimates with White (1982) robust standard errors. In the first column, variables for abnormal stock performance, CEO age, and CEO stock ownership all have expected signs with high significance.

To test for the importance of board size in the link between performance and CEO turnover, I add to the model an interaction term equal to the abnormal stock return times the board-size log. As shown in the second column of Table 5, the augmented model has a more negative estimated association between performance and turnover, coupled with a positive and significant estimate for the interaction term. I interpret these estimates as evidence that smaller boards are more likely to dismiss CEOs for poor performance, and that this threat of dismissal declines as board size increases.

A sampling issue arises when considering whether to exclude CEOs who have served less than three years, since the main explanatory variable is a three-year abnormal stock return. Even if part of this return occurred under a prior CEO, it is likely that boards will hold new CEOs responsible for several years of past performance, since most are promoted from within the firm. Deleting from the sample CEOs in their first and second years (19% of the observations) only enhances the strength of the conclusions. The estimates change little, and the t-statistics increase for both the abnormal stock return and its interaction with the board-size log (results not reported).

The analysis of CEO turnover in Weisbach (1988) shows that boards dominated by outside directors are more likely to dismiss CEOs for underperformance. I control for this effect by adding an interaction term between the abnormal stock return and the fraction of outside directors on each board. This variable's estimate is insignificant. I obtain similar results for an interaction term between board stock ownership (excluding the CEO's shares) and the abnormal stock return. When all three interaction terms appear in the same model, only board size has a significant association with the strength of CEO dismissal incentives; when board size is dropped and the other two interaction terms remain in the model, neither is significant. I conclude that CEO dismissal incentives weaken as board size increases, and I am unable to reach similar conclusions about the importance of the other board attributes.

5.3. *Board size and CEO compensation incentives*

Establishing managerial incentives through compensation contracts represents another important board responsibility. I study the interplay between CEOs' compensation incentives and board size to see whether small boards perform this task more effectively. I use Jensen and Murphy's (1990) model for studying the pay–performance sensitivity of CEO compensation. The authors define pay–performance sensitivity as the dollar change in CEO compensation per dollar change in stockholder wealth; they estimate this coefficient with linear regressions, using first differences of annual variables. Following their approach, I regress one-year changes in CEO salary plus bonus (obtained from corporate proxy statements) against one-year changes in stockholder wealth for each firm-year in the sample.[3] To capture the importance of board size in the pay–performance relation, I repeat the approach followed in my model of CEO

[3] All dollar values are adjusted for inflation. The change in stockholder wealth is calculated as the return to common stockholders during the fiscal year times market capitalization at the start of the year, all as reported by CRSP. For firms with more than one class of common stock, I add changes in the value of all classes. The analysis omits CEOs who do not serve 12-month fiscal years. Missing values occur during CEO transition periods, since first differences cannot be calculated.

Table 6
OLS estimates: Board size and CEO compensation incentives

OLS estimates for a model of CEO performance incentives from compensation. The dependent variable is the annual change in the CEO's salary and bonus. The main explanatory variable is the annual change in stockholder wealth. To illustrate how performance incentives are affected as board size increases, the model in the right column includes an interaction term between the change in stockholder wealth and the log of board size.

The sample consists of 3,438 annual observations for 452 firms between 1984 and 1991. Companies are included in the sample if they are ranked by *Forbes* magazine as one of the 500 largest U.S. public corporations at least four times during the eight-year sample period. Utility and financial companies are excluded. Coefficient estimates appear with White (1980) robust standard errors. A large number of missing values occur due to the first-differencing framework (which eliminates one year of data) and episodes of CEO turnover (each of which eliminate two first-difference observations).

Dependent variable: *Change in CEO's salary + bonus*	Estimate	Estimate
Constant	39,348***	35,668***
	(11,842)	(12,750)
Change in stockholder wealth (per $1,000)	0.015**	0.139**
	(0.007)	(0.065)
Interaction term:		−0.045**
Change in stockholder wealth × log (board size)		(0.023)
Sample size	2,412	2,412
F-statistic	8.0	6.6
(*P*-value)	(0.00)	(0.00)
R-squared	0.0033	0.0055

Significant at 1% (***), 5% (**), and 10% (*) levels.

turnover, adding to the model interaction terms between board size and the change in stockholder wealth.

Table 6 presents the results. In the first column, I estimate the pay–performance sensitivity of CEO salaries and bonuses as $0.015 per $1,000 change in stockholder wealth, which is quite close to Jensen and Murphy's (1990) estimate. The second column in Table 5 presents estimates for a model that includes an interaction term between the change in stockholder wealth and the board-size log. The negative and significant coefficient for this interaction term, coupled with the increased estimate for the stockholder wealth coefficient, suggests that CEOs receive stronger compensation incentives in companies with smaller boards. The results change little when the analysis is repeated using abnormal changes in stockholder wealth, calculated with the CAPM assumptions used above.

I add to the model interaction terms between the change in stockholder wealth/percentage of outside directors and the change in stockholder

Table 7
Reactions to announcements of significant board size changes

Investor reactions to announcements by ten sample companies of significant changes in board size. Companies were identified by searches of the Nexis database and the Wall Street Journal Index. The analysis includes firms that announced changes in board size of at least four members on an event date in 1984 or later. Events are excluded if board size changes were related to mergers, CEO transitions, or corporate control contests.

Abnormal stock returns around the announcement dates are calculated by three methods: raw returns minus market returns, raw returns minus market model expected returns, and excess returns extracted from the CRSP database. The market return used in calculations is the CRSP value-weighted index, and market model parameters are estimated from one year of daily trading data prior to the event period. *T*-statistics for market model abnormal returns are based on standardized prediction errors (Dodd and Warner, 1983).

Companies decreasing board size	Number of directors		% outside directors		Abnormal stock returns 1 day before to 1 day after announcement		
	Before	After	Before	After	Net-of-market	Market model	CRSP excess return
Chrysler (1991)	20	13	70%	77%	5.1%	5.4%	5.5%
Control Data (1985)	18	14	61%	36%	5.9%	7.2%	6.4%
Adolph Coors (1988)	10	5	0%	0%	0.6%	0.7%	n.a.
W.R. Grace (1991)	33	26	36%	54%	−0.7%	−1.8%	0.3%
Perkin–Elmer (1991)	13	9	85%	89%	2.1%	2.1%	1.6%
Time Warner (1992)	21	15	48%	67%	0.7%	0.2%	0.5%
Mean					2.3%*	2.3%	2.9%*
T-statistic					2.10	1.67	2.24
P-value					0.09	0.17	0.09

Companies increasing board size	Number of directors		% outside directors		Net-of-market	Market model	CRSP excess return
	Before	After	Before	After			
Cummins Engine (1985)	14	18	50%	50%	− 1.1%	− 0.7%	− 1.2%
Lafarge (1985)	10	16	30%	50%	− 7.9%	− 7.5%	− 7.0%
Squibb (1984)	17	22	35%	45%	− 0.5%	− 0.3%	− 1.2%
Xerox (1987)	14	18	50%	50%	− 1.5%	− 1.3%	− 1.7%
Mean					− 2.8%	− 2.5%	− 2.8%
T-statistic					− 1.59	− 1.44	− 1.94
P-value					0.21	0.25	0.15
Difference in means					5.0%**	4.8%*	5.6%**
T-statistic					2.46	2.17	2.95
P-value					0.04	0.06	0.02
					Abnormal stock returns 10 days before to 10 days after announcement		
Difference in means					17.6%***	17.7%***	14.9%**
T-statistic					3.77	3.41	3.31
P-value					0.01	0.01	0.01

Significant at 1% (***), 5% (**), and 10% (*) levels.

wealth/level of board stock ownership. The additional interaction terms allow me to check whether these board attributes also affect the level of CEO incentives. Neither variable has a statistically significant estimate, and a likelihood ratio test shows that they do not have joint significance.

5.4. *Reactions to significant changes in board size*

Investor reactions to changes in board size should provide additional evidence of links between board size and market valuation. Within my 452 firms, I analyze those companies that have changed board size by at least four directors at one time since 1984. I base my choice (changes of four or more as the cutoff point) upon the relative lack of observations for greater changes and my subjective judgment that board-size changes of two or three members are not substantial. From my candidate sample of 195 board-size changes of four or more, I eliminate those changes occurring gradually during the fiscal year and those for which no event date could be identified in press reports or proxy statements. I also exclude changes made in the aftermath of mergers and acquisitions and changes that occur around CEO transitions or as tactical moves in a corporate control contest. The resulting sample for analysis, listed in Table 7, includes ten cases of companies changing board size by four or more on one date, explicitly or apparently for corporate governance reasons.[4] Six of these companies reduced board size by four or more members, while four companies increased board size by at least four.

I study company stock returns around announcement dates of board-size changes. I obtain abnormal stock returns by three methods: subtracting the return for the CRSP market-wide index, subtracting market model expected returns (with α and β parameters estimated from one year of trading data prior to the event period), and extracting excess daily returns from CRSP's NYSE/AMEX file. I use CRSP's value-weighted, dividend-inclusive market index as the market return. Table 7 presents the abnormal stock return in the three right-hand columns, covering an event period beginning one day before each announcement and ending one day after.

Investors appear to welcome decreases in board size and to disapprove of board expansions. Abnormal stock returns are positive around five of six

[4] For two of the ten companies, simultaneous announcements of other news might contaminate the events for purposes of study. When Chrysler reduced the size of its board in 1991, the change attracted attention because of the exclusion from the new board of United Auto Workers President Owen Bieber. Time Warner's 1992 reduction in board size occurred within days of the death of co-CEO Steven Ross. In both cases, the companies denied any connection between the reductions in board size and the other news. It is not clear that either event should have affected the firms' market values, as Bieber's role in Chrysler was described as marginal and Ross's illness had led to a well-publicized withdrawal from day-to-day management six months before.

announcements of board-size reductions and negative around all four announcements of board-size increases. The average magnitude of each effect is approximately 2.5%. The difference in means between the two subgroups, which equals approximately 5%, has statistical significance at levels between 2% and 6%, depending on which type of abnormal return is analyzed.

Inspection of the data suggests that some information leakage takes place before public announcement dates, as abnormal daily returns cumulate gradually for approximately two weeks prior to announcements. If the event window is widened to encompass ten trading days before until ten trading days after each announcement, the results become dramatic, with a difference in mean abnormal returns of approximately 15% (p-value below 1%).

Though this analysis involves a small sample, the ten observations show that investors react favorably to significant reductions in board size and react unfavorably to board expansions. It is not likely that the results reflect changes in board composition; Table 7 shows that although three of the sample companies that reduced their boards simultaneously increased the role of outside directors (including Adolph Coors, according to its announcement), one company did the opposite, and the remaining two essentially left board composition unchanged. Two of four companies expanding their boards increased the fraction of outside directors, but nevertheless experienced negative abnormal returns.

Despite shareholders' apparently favorable reactions to announcements of smaller board size, subsequent changes in firm value over long periods do not provide further support for the hypothesis that smaller boards manage companies better. I calculate average changes in the value of Tobin's Q over one, two, and three year periods following the announcements of board size changes shown in Table 7. Average Q values exhibit a slight upward pattern for both the six companies reducing their boards and the four firms that added directors. Differences between the two groups are not statistically significant.

6. Summary and conclusions

This paper evaluates a recent proposal in the legal and finance literature for reducing the size of corporate boards of directors. Lipton and Lorsch (1992) and Jensen (1993) have criticized the performance of large boards, stating that problems of poor communication and decision-making overwhelm the effectiveness of such groups. I find evidence consistent with this theory. Using a variety of regression models with data from 1984–91 for 452 large public corporations, I find an inverse association between board size and firm value. The association appears to have a convex shape, suggesting that the largest fraction of lost value occurs as boards grow from small to medium size.

The basic result proves robust to a variety of controls for company size, the presence of growth opportunities, and alternative corporate governance and

ownership structures. No evidence is consistent with conjectures that companies change board size as a result of past performance.

A range of supporting evidence is consistent with the main finding of an inverse association between board size and firm value. Financial ratios related to profitability and operating efficiency appear to decline as board size grows. CEO performance incentives provided by the board through compensation and the threat of dismissal operate less strongly as board size increases. A small group of sample companies that announce significant reductions in board size realize substantial excess stock returns around the announcement dates, while the opposite occurs for companies that announce board expansions.

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