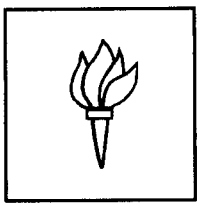

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The Superior Performance of Companies With Small Boards of Directors

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Abstract

This paper evaluates recent proposals in the legal and finance literature for limiting the sizes of boards of directors. After controlling for firm size and industry membership, I find evidence of an inverse association between board sizes and firms' market values in a sample of 792 large U.S. public corporations between 1984 and 1991. Using Tobin's Q as an approximation of market valuation, I find a negative association with board size over the range between four and ten directors, after which the relation levels off. Ratios measuring profitability and operating efficiency have similar associations with board size. More tentative results indicate that CEOs' compensation incentives operate more powerfully when boards are small. The evidence suggests that smaller boards of directors serve as more effective monitors of top managers.

The Superior Performance of Companies with Small Boards of Directors

By David Yermack*

1. Introduction

The structure and effectiveness of corporate governance systems have inspired a growing body of empirical research by financial economists. As discussed by Jensen (1993), the most important insight from this literature is that managers do not necessarily seek to maximize the value of their firms' equity. Instead, the quality of top managers' decisions appears influenced by such organizational mechanisms as executive compensation, corporate control contests, and monitoring by boards of directors.

This paper evaluates a proposal advanced by Lipton and Lorsch (1992) and endorsed by Jensen (1993) for improving the effectiveness of boards of directors. Lipton and Lorsch 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, the authors recommend limiting the sizes of boards to ten people with a preferred size of eight or nine. Their proposal

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amounts to a conjecture that even if boards' capacity for monitoring increases as more directors are added, such benefits are outweighed by the incremental costs of poorer communication and decision-making associated with larger groups.[1]

Results presented herein provide strong support for proposals limiting the sizes of boards. In a study of 792 large U.S. public corporations between 1984-91, I observe a clear inverse relation between firms' market valuations, as represented by Tobin's Q, and the sizes of boards of directors. The results suggest that market values deteriorate steadily over a range of board sizes between four and ten directors, before leveling off for boards with more than ten members. Further results support these findings by showing that various measures of profitability and asset intensity are strongest when boards are small, and that these ratios deteriorate in patterns similar to that observed for Tobin's Q. Weaker evidence suggests that CEOs' incentives from compensation and the threat of dismissal are greater in companies with small boards.

Because about three-fourths of the companies in my sample have boards with more than ten members, this research suggests a possibility for large-scale improvements in corporate governance if the Lipton-Lorsch proposal becomes widely followed.

Both the Lipton-Lorsch and Jensen papers make numerous related proposals about board composition and operation, including requiring most directors to be independent of management and appointing a non-executive chairman or "lead director" to restrict the power of the chief

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[1] For a thorough discussion of boardroom norms, see Lorsch (1989). Jensen (1993) takes up this theme, writing:

> When boards get beyond seven or eight people they are less likely to function effectively and are easier for the CEO to control . . . Research supports the proposition that 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 (See Steiner, 1972, and Hackman, 1990).

executive officer (CEO). Additional results presented herein support separating the chairman the CEO positions but offer only limited evidence in favor of appointing independent directors to the board.

By suggesting the presence of a systematic shortcoming in corporate governance systems, this research challenges prior theories in the finance literature which hold that market-based mechanisms should lead to optimal governance structures across firms. Fama and Jensen (1983) represents the leading exposition of this view. The authors argue that market forces cause the duties and composition of individual boards of directors to arise differently on a company-by-company basis, representing outcomes of "natural selection" among many possible types of governance structures for each company. Similarly, Demsetz (1983) writes that market forces should cause governance structures to gravitate toward an "equilibrium business organization" for each firm.

Empirical investigations of these theories have studied cross-sectional associations between firm performance and such variables as the distribution of equity ownership and the composition of boards (but rarely the board's size[2]), interpreting the absence of significant relations as evidence that companies develop unique governance structures by adjusting board composition and managerial incentives until no marginal impact can be obtained from further changes.

With respect to stock ownership, an influential paper by Demsetz and Lehn (1985)

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[2] An exception is Holthausen and Larcker (1993), who present results indicating a positive association between board size and the value of CEO compensation. In tandem with the results herein suggesting a negative association between board size and market valuation, the Holthausen-Larcker finding is consistent with evidence below that CEO incentives deteriorate as board size increases.

appears to support the "equilibrium business organization" view by finding no significant association between the concentration of equity ownership and firm profitability. However, research by Mørck, Shleifer and Vishny (1988) and Hermalin and Weisbach (1991) comes to the opposite conclusion. These papers find significant, though non-monotonic, associations between different levels of board stock ownership and Tobin's Q, suggesting that some ownership structures have systematic advantages over others. In a similar paper, Bagnani, Milonas, Saunders and Travlos (1994) find that bondholder returns also exhibit a systematic and non-monotonic association with the level of officer and director stock ownership.

Studying board composition, Hermalin and Weisbach (1991) find no significant relation between firm performance and the fraction of the board comprised of outside directors, suggesting that companies have different optimal balances between inside and outside directors. However, this conclusion is not supported by Baysinger and Butler (1985), whose less rigorous analysis finds some evidence that companies perform better if their boards include larger fractions of outsiders.

Other studies have found that boards are more likely to behave in shareholders' interests in specialized situations if they are dominated by outsiders. See Weisbach (1988) (CEO turnover), Byrd and Hickman (1992) (tender offer bids), and Brickley, Coles and Terry (1994) (poison pill adoptions and control-related auctions). Brickley et. al. present a literature review of related research on outside directors. Hermalin and Weisbach (1988) find that the composition of boards shifts toward a greater fraction of outside directors in the aftermath of poor performance. Rosenstein and Wyatt (1990) find small but significant positive abnormal stock returns for firms announcing the appointments of new outside directors.

Related research has evaluated the conjecture of Fama (1980) that an external market for the services of directors provides incentives for them to monitor managers. However, much of this research has been confined to poorly performing firm, and its relevance for most corporations remains unclear. Kaplan and Reishus (1990) find that when companies announce dividend reductions, their top executives receive significantly fewer new outside directorships compared to top managers in a matched control sample. Gilson (1990) finds that directors of financially distressed firms experience unusually high rates of turnover and subsequently serve on fewer boards of other companies. Hermalin and Weisbach (1988) also present results indicating greater turnover of outside directors when firms perform poorly.

The remaining sections of this paper are organized as follows. Section 2 presents evidence of an inverse association between boards of directors sizes and firms' market valuations. Section 3 provides support for this finding through analysis of associations between board sizes and various measures of profitability, asset intensity, and CEOs' incentives from compensation and the threat of dismissal. Section 4 extends the paper's basic results by studying the impact upon market valuation of different classes of directors and examining the effects of separating the chairman and CEO positions. Section 5 contains a discussion and conclusions.

2. Board Size and Market Valuation

The main hypothesis of this paper is that firm value depends upon the quality of monitoring by the board of directors:

$$Firm\ Value = f(Monitoring) \qquad (1)$$

While the quality of monitoring might depend upon many characteristics of directors and companies, I conjecture that four are especially important: directors' financial incentives as provided through stock ownership, the size of a company, its industry membership, and the structure of a board itself:

$$Monitoring = g(Stock\ Ownership,\ Firm\ Size,\ Industry,\ Board\ Structure) \quad (2)$$

Below I estimate simple linear models of these relationships. I follow Mørck, Shleifer and Vishny (1988) and Hermalin and Weisbach (1991) by regressing a set of explanatory variables against an estimate of Tobin's Q, which is intended to approximate the market-to-book ratio of firms' invested capital.

Data for the analysis comes from a panel of firms drawn from annual *Forbes 500* lists of the largest U.S. public corporations as measured in sales, assets, market capitalization, and net income. I use data from all firms appearing on any one of the *Forbes* lists at least four years in the eight-year period between 1984 and 1991, attempting to construct a representative sample of the most important public companies in all U.S. industries. I also require each firm to have been publicly traded at for at least four consecutive full fiscal years. Data is included for each full fiscal year between 1984 and 1991 for which a firm existed as a public company, whether or not it qualified for the *Forbes* rankings in every year. The month in which a firm's fiscal year ends determines each observation's placement in a sample-year, so that an observation for a fiscal year running from February 1986 to January 1987 appears as an observation for 1987. The sample design allows for companies to enter and exit the panel due to initial public offerings and mergers and acquisitions. I obtain a final sample of 5,941 observations for 792 companies across

eight years.[3]

The dependent variable for regressions is an approximation of Tobin's Q calculated from data obtained from Compustat:[4]

$$Q = \frac{\textit{Total Assets} + \textit{Common Stock (Market Value)} - \textit{Common Stock (Book Value)}}{\textit{Total Assets}} \qquad (3)$$

This ratio equals average Q, if one ignores differences in the market and book values of debt and preferred stock. I calculate the estimate of Q as of the start of the fiscal year for each company-year observation.

Table 1 presents a tabulation of average values of this estimate of Tobin's Q sorted by board of directors size. The number of directors for each company was obtained from proxy statements or similar documents filed shortly after the start of each fiscal year. In strong agreement with the Lipton-Lorsch and Jensen arguments, average Tobin's Q values decline almost monotonically over the range of board sizes.

To understand this relationship more fully, I estimate a least-squares regression model of Tobin's Q against board size and control variables for company size, industry membership, and board stock ownership. To measure firm size, I use the natural logarithm of net sales as reported

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[3] Fourteen additional observations were dropped because copies of proxy statements or equivalent documents could not be obtained. Two firms meeting the sample selection criteria were dropped because of stock market data problems. Three sample firms began the 1984-91 period as public companies, remained public at least until 1988, were delisted in going-private transactions, and later became public again. In these cases the data set does not include the firms' second incarnations. Twenty-three firms changed the timing of their fiscal years at total of twenty-five times during the sample period; in these cases, "flow" variables such as sales are normalized to twelve-month equivalents for the transition fiscal years which were not twelve months long.

[4] Data was hand-collected for those firms not covered by Compustat (mostly companies which had been dropped from the database due to acquisition in the late 1980s, and some financial companies not large enough to qualify).

by Compustat and adjusted to calendar-year 1991 dollars. Industry membership is represented by two-digit standard industrial classification (SIC) code dummy variables, again obtained from Compustat. Board stock ownership is approximated by the total fraction of equity beneficially owned by officers and directors as reported in proxy statements near the start of each fiscal year.

As noted above, two countervailing effects should influence the association between board size and monitoring quality. First, as the number of directors increases, a board should have more monitoring capacity for evaluating mangers' performance. However, a larger number of directors should also cause problems of coordination, communication, and decision-making, and I expect these process costs to have a negative impact upon monitoring quality. The Lipton-Lorsch hypothesis amounts to a conjecture about which of these two effects operates more strongly for boards of different sizes. If the theory is correct, gains from increased monitoring capacity should exceed the process costs from adding new directors only when board size is small; for boards of approximately ten or more directors, the process costs should dominate the gains from new monitoring capacity when board size increases.

Figure 1 illustrates the results of least-squares estimation of the linear model over the sample of 5,909 company-year observations without missing values (99% of the candidate sample). Vertical bars in the figure represent regression coefficient estimates for dummy variables for each board size between four and twenty-three directors. The line in Figure 1 represents the results of a piecewise linear regression with the slope allowed to change at a board size of ten. The inflection point was set at ten both because it represents the maximum board size recommended by Lipton and Lorsch, and because this choice results in the highest r^2 goodness-of-fit measure. Regression coefficients for the piecewise model appear in Table 2,

with T-statistics calculated from standard errors robust to serial correlation and heteroskedasticity. The table does not report an intercept because the model includes two-digit SIC dummy variables which allow a different intercept for firms in each industry.[5]

I interpret the model's results as striking evidence in support of proposals for limiting board sizes. Investors' valuations of companies appears to decline steadily over a range of board sizes between four and ten. Beyond ten members, essentially no relation appears to exist between board size and market valuation, suggesting that process costs become fully institutionalized once ten people become involved in corporate governance.

As predicted above, an inverse association emerges between company size (measured as the log of sales) and Tobin's Q. This pattern is consistent with directors having more difficulty monitoring a company as its size grows; it may also be due in part to the significantly positive correlation of .129 (p-value ≈ .0001) between the variables of board size and company size. Also as predicted, a positive association emerges between inside stock ownership and Tobin's Q, suggesting that when board members have a greater financial stake in company performance, they monitor managers' performances more effectively.

As shown in the right two columns of Table 2, the results are not sensitive to using different measures of firm size in the model. When the model is re-estimated using either the natural log of total assets or the natural log of the market value of equity in place of the natural log of sales, Tobin's Q is still estimated to decline rapidly over the range of board sizes between

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[5] Prior studies (e.g. Baysinger and Butler, 1985) have excluded certain industries from the universe of sample firms because of those industries' different regulatory characteristics. I checked the results reported in Figure 1 and Table 2 by re-estimating the model after excluding utilities (SIC two-digit industry 49) and financial firms (SIC industries 60 through 69). Results for the sub-sample of remaining industries are extremely similar to those reported herein.

four and ten and change very little for board sizes about eleven. Also, coefficient values and significant levels do not depend upon pooling together eight years of data. Individual regressions for each single year invariably estimate a large and significant association between Tobin's Q and the variable counting the number of directors between four to ten, coupled with a small and insignificant estimate for the number of directors above ten (results not displayed)

Further analysis indicates that the vast majority of variation occurs between firms and not within firms over time. When "between" and "within" estimators are calculated from standard panel data techniques, the between coefficients for the piecewise board size specification have far greater magnitude and significance than their within counterparts (results not displayed). This pattern suggests that the inverse association observed between market valuation and board size is not driven by the number of directors who sit on each board per se, but rather by unobserved variables which are correlated with companies' board sizes. As suggested by the Lipton-Lorsch and Jensen papers, these unobserved corporate attributes may be the process costs and stultifying norms of interpersonal behavior which become institutionalized over time in companies with large boards.

3. Further Associations Between Board Size and Company Performance

To buttress the conclusion that directors' monitoring of CEOs suffers as boards grow larger, the following sections analyze several types of relationships between firms' performance and board sizes. First, I investigate how financial ratios measuring profitability and the efficient use of assets change over different ranges of board sizes. Six different ratios are shown to deteriorate rapidly over the range of board sizes between four and ten, and then to deteriorate less

quickly (or improve slowly) over the rage of board sizes of eleven and higher. Second, I analyze the interaction between board sizes and CEO incentives from compensation and the threat of dismissal. Weak evidence emerges that these incentives operate more strongly when companies have small boards.

3.1. Profitability

If companies supervised by smaller boards of directors are valued more highly by investors, the reason must lie in some pattern of superior operating performance. To check for the presence of such a pattern, I investigate four common financial ratios used to measure profitability: return on sales; return on assets; selling, general and administrative expenses divided by sales; and cost of goods sold divided by sales. All data is obtained from Compustat, which reported missing values for COGS for about 10% of all observations and for SGA for slightly more than 25%. I define ROS as net income over sales and ROA as net income over start-of-year total assets and compound both ratios continuously. I regress all four ratios as dependent variables in the same linear regression model used above for Tobin's Q. When sales is used as an input to one of the ratios, I measure company size by the natural log of total assets instead of the natural log of sales. I expect to observe declines in the values of ROS and ROA over the range of board sizes between four and ten and increases in both SGA/sales and COGS/sales over this range. For the range of board sizes beyond eleven I expect to observe much smaller associations, if any.

Table 3 presents regression results for these four models. Although not every estimate is statistically significant, the predicted pattern of coefficients appears in all four models. ROS and

ROA decline over the range of board sizes between four and ten while both cost ratios increase. Associations of far smaller magnitude are estimated for board sizes of eleven and above for three of the four variables. Only the estimates for ROS provide some cause for question; ROS is estimated to decline by 0.20 percentage points for each director between four and ten and to rise by 0.16 percentage points for each director above ten, and only the second estimate is significant.

3.2. Efficient Use of Assets

I repeat the analysis performed on profitability ratios for two additional ratios meant to capture the efficient use of physical and human assets: Sales over assets, and sales per employee. Again I obtain data from Compustat and note that missing values occurred for employees for slightly more than 10% of all observations. If companies with smaller boards operate more efficiently, I expect both sales/assets and sales per employee to decline as board size increases, with a pronounced effect over the rage between four and ten directors.

Results displayed in the last two lines of Table 3 conform very closely to this pattern. Both measures of operating efficiency have inverse associations with board size, and the association is far greater over the range between four and ten directors.

3.3. Incentive Compensation

One explanation for the inverse association between board of directors size and corporate performance may be that larger boards have less success in establishing performance incentives for top managers. To investigate this relationship, I use the analytical framework of Jensen and Murphy (1990), who study the "pay-performance sensitivity" of CEO compensation contracts.

The authors define pay-performance sensitivity as the dollar change in CEO compensation per dollar change in shareholder wealth. Following their approach, I estimate a linear regression with the dependent variable equal to the one-year change in CEOs' salary and bonus payments and the main explanatory variable equal to the change in common stockholders' wealth during the fiscal year (all dollar values are adjusted for inflation).[6] Because much research on executive compensation indicates that firm size is at least as important as stock returns in determining pay levels, I also include in the model the one-year change in the natural log of sales. I expect positive coefficient estimates for each variable.

To isolate the role of board size in the compensation process, I use two types of interaction terms. First, I multiply the main explanatory variables by board size. If incentives deteriorate as board size increases, I expect negative estimates for these interaction terms. Secondly, I multiply each of the four variables by binary (0, 1) variables indicating whether the board of directors has four to ten members, or eleven or more. If incentives are stronger for smaller boards, and if the decline in incentives is especially pronounced over the range of board sizes between four and ten directors, I expect estimates of greater magnitude for all coefficients associated with smaller boards. I therefore estimate a model with eight explanatory variables: two main variables, each interacted with board size, and the four resulting variables multiplied by the (0, 1) indicators for whether a board has more or less than ten members. I also include two-digit SIC dummy variables in the regression.

Table 4 presents the results. As expected, changes in CEO compensation have stronger

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[6] 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 together the change in values of all series.

estimated associations with both changes in firm size and changes in shareholder wealth for observations associated with smaller boards. However, only one of these four coefficients is statistically significant, and neither of the two pairs of coefficients exhibits a significant inter-pair difference. Also as expected, all four interaction terms involving board size are negative, indicating a deterioration of incentives as board size increases. Moreover, those interaction terms for observations associated with smaller boards are estimated to have far greater magnitudes than their counterparts. However, none of these estimates is individually significant, and again neither of the pairs of interaction terms exhibits a significant inter-pair difference.

A likelihood ratio test for the hypothesis that all four coefficients (the two performance variables, and their interaction terms with board size) have the same magnitudes within the two sub-groups partitioned by board size yields a chi-squared test statistic of 10.0, large enough rejects this hypothesis at the 5% level. When the test is limited to the shareholder wealth variable and its interaction with board size, the chi-squared test statistic is 8.2, again large enough to reject the null hypothesis at the 5% level. Since all four variables have greater magnitudes within the sub-group of observations with smaller boards, I interpret these tests as evidence that CEOs receive stronger performance incentives when boards are small.

3.4. CEO Dismissal Incentives

To analyze CEO incentives related to the likelihood of dismissal, I estimate binary probit models of CEO departures, again partitioning the sample with indicator dummy variables for boards with four to ten and eleven or more members. The dependent variable is set equal to one if a CEO leaves his position after serving at least six months of the current fiscal year or before

serving at least six months of the subsequent fiscal year. CEO turnover due to deaths and mergers and acquisitions is excluded.

The model's main explanatory variables are CEO age, including dummy variables for each age 63 through 67 and over 67; the fraction of board members who are "outside," defined as non-officers and those with no personal or business relationships with the company (see detailed analysis in section 4); the fraction of equity owned directly by the CEO; and the abnormal return to common stockholders above that predicted by the capital asset pricing model (assumptions for the CAPM calculation are given in Table 5). I expect a positive association between CEO age and the probability of turnover; a positive association between the percentage of outside directors and the probability of turnover (Weisbach, 1988); a negative association between abnormal stock returns and turnover, and a negative association between CEO stock ownership and turnover. If smaller boards monitor CEOs more effectively, I should find a more negative performance-turnover relationship for the sub-sample of observations with smaller boards. Further, I expect the interaction terms between board size and firm performance to have positive signs, indicating less powerful performance-dismissal associations as the number of directors increases.

Table 5 presents the probit estimates. The coefficients all have the predicted signs although not all are statistically significant. Of the three pairs of variables partitioned by board size, only the inter-pair difference in the association between CEO stock ownership and turnover is significant. This difference suggests that CEOs' power associated with large stock ownership positions serves as less of an obstacle to dismissal when boards are small. The coefficients related to stock performance both have larger magnitudes within the observations associated with smaller boards. However, the performance variable estimates have no significant differences

across the two sub-samples, and the interaction terms are not significant either individually or jointly. I conclude that only very tentative evidence supports an assertion that smaller boards tie CEO turnover more closely to performance.

4. Board Composition and Market Valuation

The Lipton-Lorsch (1992) and Jensen (1993) proposals for limiting the size of boards of directors are accompanied by a range of related ideas, many of them familiar to financial economists. Among other proposals, Lipton and Lorsch recommend that at least two-thirds of a board be comprised of outside ("independent") directors and that a "lead director" be selected from this group to consult with the CEO about the board's agenda, membership, and operation. Jensen pushes these proposals further, arguing that all directors except the CEO should come from outside a company, and that the CEO should be prohibited from serving as chairman of the board. Using the analytical framework developed above, I attempt in the following sections to evaluate the potential of these further proposals for improving boards' performance.

4.1. Inside, Outside, and Grey Directors

The conjecture that independent, outside directors have the best qualifications for monitoring top managers has inspired numerous investigations about the association between board composition and company performance; many of these studies are cited in Section 1 above. Given the main finding of this paper that larger boards are most commonly found in companies with low market valuations, I turn to the question of whether this pattern holds similarly for all types of directors.

In assembling data about the membership of sample companies' boards, I segment directors into three categories: inside, outside, and "grey." This categorization follows the framework introduced by Baysinger and Butler (1985) and used by many subsequent authors. Inside directors include current or former officers of the company. Grey directors are relatives of present or former corporate officers, and persons having substantial business relationships with the company. Thus, grey board members include lawyers, bankers, suppliers, customers, and directors who receive personal consulting contracts; in most cases, members of this group will have financial stakes in the survival of the current management team. Outside directors include all board members who are neither inside nor grey. Figure 2 shows that within the sample of company-year observations for this study, the average fraction of outside directors increases gradually with board size. Outside directors comprise between 60% and 70% of boards' membership over the majority of the range of board sizes, which suggests that a large number of firms approximately follow the Lipton-Lorsch recommendation that two-thirds of the board consist of outsiders.[7]

To assess the relation between firms' market valuations and the presence on the board of inside, outside, and grey directors, I repeat the least-squares regression analysis introduced in Section 2. I first regress the dependent variable of Tobin's Q against dummy variables for each

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[7] Sample means across all company-year observations are 59% outside directors, 9% grey, and 32% inside. I find fewer grey directors, and correspondingly more outsiders, than other studies. See Brickley et. al. (1994), Byrd and Hickman (1992), and Baysinger and Butler (1985). All three of these studies have either explicit or implicit limitations on firm size, firm characteristics and industry membership which do not agree with those for my sample. Further, I exclude a significant number of directors from the grey category if relationships disclosed in proxy statements are disclaimed with such phrases as "arising in the ordinary course of business." I do not follow the methodology of some prior investigators who unilaterally assign grey status to directors even without disclosure of potential conflicts of interest in proxy statements (for example, Baysinger and Butler, 1985, consult industrial input-output tables to infer business relationships between their sample companies and the firms employing certain non-employee directors.

quantity of inside, outside, and grey directors. I also include the controls used earlier for firm size, board stock ownership (in its piecewise specification) and two-digit SIC industries. Figure 3 presents the results of this regression. Estimated coefficients for the dummy variables are arranged in a separate panel for each type of director, although all dummy variables are included in one regression simultaneously. To increase the clarity of the results, I re-estimate the model as a piecewise linear regression, selecting inflection points based upon visual inspection of the dummy variable coefficients. The results are displayed as the dark lines overlaid on the panels of Figure 3. Table 6 presents the piecewise results in detail in the right column; the left column reproduces the basic results from Table 2 for comparison purposes. The analysis permits considerable insight into the interaction between the presence of inside, grey, and outside directors, and firms' market valuations.

Inside directors present the most straightforward case. Though the regression line in the bottom right panel of Figure 3 has a negative slope, its magnitude is close to zero and not statistically significant. Thus firms' market valuations appear largely unaffected by the number of inside directors who sit on the board. Because these directors may frequently defer to their CEOs on issues arising in boardrooms, it is possible that they play only passive roles in the governance process, neither advancing nor hindering the work of other directors.

For grey directors, the evidence is far less benign. The association between the number of grey directors and firms' market valuations exhibits a monotonically negative pattern, which becomes pronounced for companies with more than four grey directors. Thus grey directors appear to create substantial problems in corporate governance, a finding which is unsurprising because they by definition have interests in the survival of their firms' management teams.

Family relationships and personal financial interests can be expected to raise numerous conflicts for these board members, making them ineffective monitors of managerial performance.

Outside directors exhibit the most complex relation with their firms' market valuations. The presence of a small number of outside directors appears to have little effect on market valuation. Over a range of four to nine outside directors, however, a strongly inverse association emerges. Beyond nine outside directors, the association becomes positive, though not statistically significant and not large enough to reverse the costs which arise with the addition of the first ten outsiders.

These results seem to challenge the commonly held belief that outside directors contribute to improved corporate governance. However, they are not necessarily inconsistent with Rosenstein and Wyatt (1990), who find small but significant positive abnormal stock returns for firms announcing the appointments of new outside directors. It is possible that many outside directors are appointed by firms which already have a large number of outsiders; while 69% of the sample firms have nine or fewer outside directors, 50% of all outside directors in the sample serve on boards with ten or more outsiders. A further possibility is that some outside directors take the place of exiting grey directors, a type of change which would generally be associated with increased valuation of a firm according to the results above.

This analysis provides only limited support for the Lipton-Lorsch and Jensen proposals favoring a predominance of independent directors. The evidence clearly favors reducing the number of grey directors, whose personal and business relationships with their companies may compromise their independent judgment.

4.2. Non-Executive Chairmen

To balance the power of CEOs in the governance of their firms, many scholars and investors have advocated separating the chairman and CEO and/or president and CEO positions. I assess these proposals by re-estimating the basic regression model of firms' market valuations and including dummy variables to account for the presence on boards of non-executive chairmen and non-CEO presidents. Table 7 presents the results in the right column. The strongly positive and significant estimate for the chairman coefficient gives good support for the proposal that CEOs be prohibited from also serving as chairmen of the board. Separating the president and CEO positions also appears to contribute positively toward firms' market valuations, though the effect is not significant and far smaller than that for non-CEO chairmen.

5. Summary and Conclusions

This paper evaluates recent proposals in the corporate finance literature for improving the effectiveness of boards of directors.

Applying a linear regression model to data from 792 large public corporations between 1984 and 1991, I find an inverse association between board sizes and firms' market valuations over a range between four and ten directors, with the relation leveling off for boards with eleven or more members. An assortment of financial ratios related to profitability and operating efficiency also appear to reach their peak levels when boards are small. CEOs appear to receive stronger performance incentives from compensation when boards are small. All of these results support proposals by Lipton and Lorsch (1992) and Jensen (1993) for limiting board sizes to ten or fewer directors. Similar evidence offers support for separating the positions of CEO and

chairman of the board and for excluding from the board "grey" directors whose independence may be compromised by their interests in the survival of current managers. However, very little evidence supports the conjecture that boards work most effectively when largely comprised of independent, outside directors.

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TABLE 1

Board Size and Tobin's Q: Sample Means

The table presents sample means of Tobin's Q for different sizes of boards of directors. The sample is drawn from annual data for 792 firms between 1984 and 1991. Companies are included in the sample if they rank as one of the 500 largest U.S. public corporations according to Forbes magazine at least four times during the eight-year sample period. 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 start of each year as:

$$\frac{\text{Total Assets + Common Stock (Market Value) - Common Stock (Book Value)}}{\text{Total Assets}}$$

Board Size	Obs.	Average Tobin's Q	Board Size	Obs.	Average Tobin's Q
4	13	1.97	17	256	1.27
5	74	2.06	18	191	1.18
6	99	1.84	19	126	1.20
7	169	1.86	20	114	1.04
8	205	1.70	21	92	1.11
9	444	1.51	22	75	1.08
10	485	1.51	23	62	1.04
11	622	1.37	24	44	1.01
12	669	1.33	25	48	1.01
13	589	1.35	26	25	1.02
14	538	1.30	27	12	1.05
15	558	1.29	28	16	0.99
16	353	1.30	29 or more	62	1.02

5,941

FIGURE 1

Association Between Board Size and Market Valuation

The figure displays coefficient estimates for least squares regressions of an estimate of Tobin's Q against the quantity of directors sitting on a company's board. The sample consists of 5,941 annual observations for 792 firms during the 1984-91 period. Vertical bars represent estimates for dummy variables associated with each board size. The dark line represents estimates from a piecewise linear regression with the slope allowed to change at a board size of ten. Both models include additional variables of firm size (the natural log of sales), officer and director stock ownership, two-digit SIC industry dummies, and year dummies. A more complete presentation of the piecewise regression results appears in Table 2.

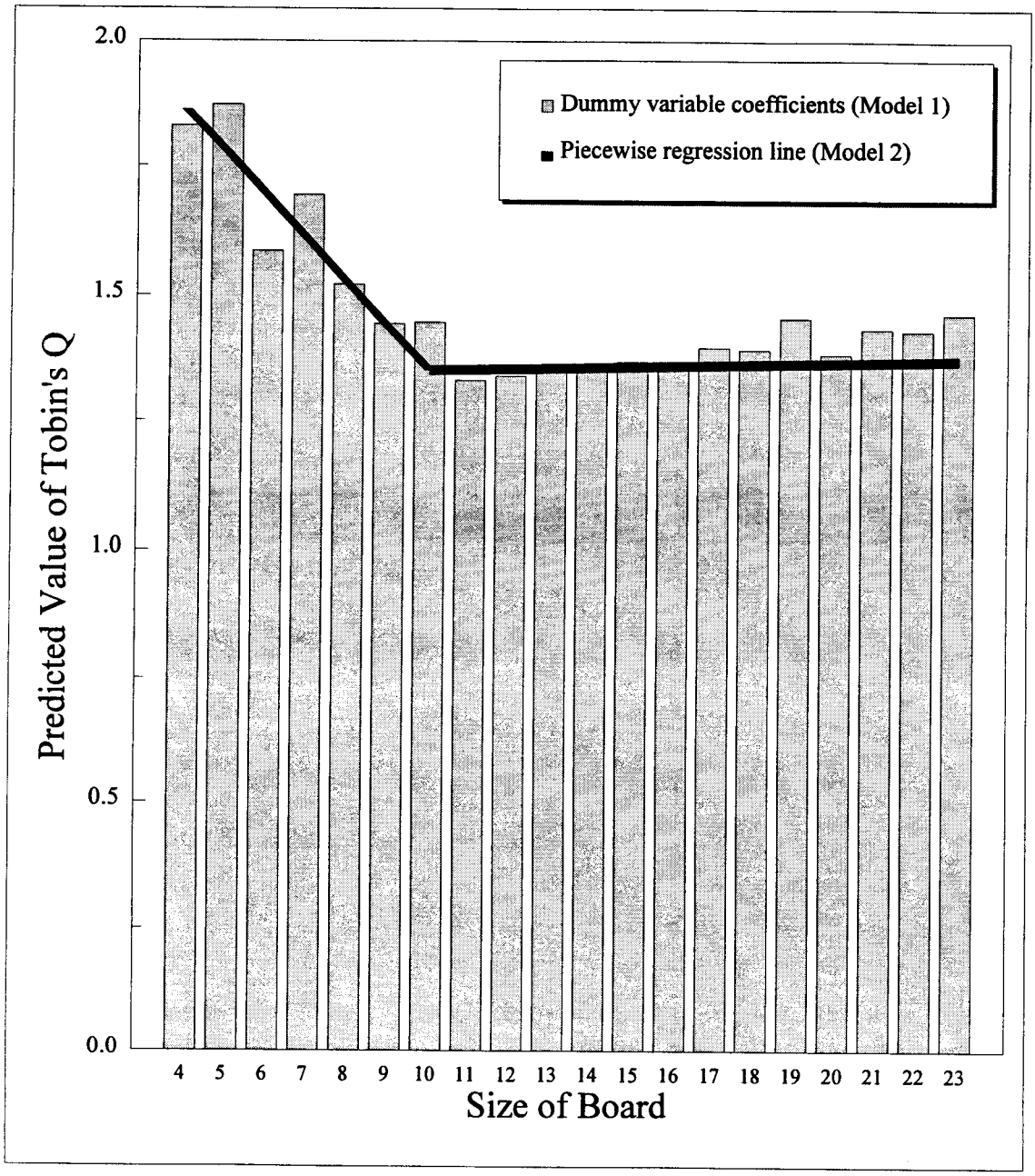


TABLE 2

Association Between Board Size and Market Valuation

The table presents results of a least-squares regression. Each coefficient estimate appears with a T-statistic robust to serial correlation and heterokedasticity.

The sample consists of 5,941 annual observations for 792 firms during the 1984-91 time period. The dependent variable is an estimate of Tobin's Q at the start of each fiscal year. The two variables measuring board size count the number of directors near the start of each fiscal year in a piecewise specification. The stock ownership variable represents the fraction of common stock beneficially owned by officers and directors near the start of the fiscal year, again in a piecewise specification. The natural log of sales is normalized to constant 1991 dollars. The regression includes two-digit SIC industry dummy variables as well as year dummies.

Variable	Estimate	Estimate	Estimate
Number of directors: 4 to 10	-0.0848 ***	-0.0742 ***	-0.1082 ***
	(6.19)	(5.71)	(8.14)
Number of directors above 10	0.0016	0.0074 ***	-0.0188 ***
	(0.99)	(4.43)	(9.09)
Director/officer stock ownership (%)	0.3021 ***	0.1882 **	0.6717 ***
	(3.15)	(2.05)	(6.63)
Firm size (log of sales)	-0.0846 ***		
	(8.76)		
Firm size (log of total assets)		-0.1451 ***	
		(14.37)	
Firm size (log of market value of common equity)			-0.1504 ***
			(17.61)
Sample Size	5,909	5,921	5,921
R-Squared	0.3319	0.3540	0.3615

*** Significant at 1% level

** Significant at 5% level

TABLE 3
Associations Between Board Size and Financial Ratios

The table presents coefficient estimates for eight least-squares regressions. Each coefficient estimate appears with a T-statistic robust to serial correlation and heteroskedasticity. The first row of the table replicates the results displayed in Table 2. The remaining rows show estimates for the same model with different dependent variables.

The sample consists of 5,941 annual observations for 792 firms during the 1984-91 period. Missing values occur in some regressions when values for the dependent variable are not available from Compustat. Descriptions of the explanatory variables appear in Table 2 as well as the text. All regressions include two-digit SIC industry dummy variables and also year dummies.

Dependent Variable	No. of Directors: 4 to 10	No. of Directors above 10	Inside Stock Ownership (%)	Firm Size: log(Sales)	Firm Size: log(Assets)	Sample Size	R-Squared
Tobin's Q	-0.0848 ***	0.0016	0.3021 ***	-0.0846 ***		5,909	0.3319
	(6.19)	(0.99)	(3.15)	(8.76)			
Return on Assets (continuous)	-0.0064 ***	0.0002	0.0159 *	-0.0032 ***		5,909	0.2811
	(5.23)	(1.04)	(1.89)	(4.04)			
Return on Sales (continuous)	-0.0020	0.0016 **	-0.0426		-0.0098 ***	5,902	0.0463
	(0.58)	(2.19)	(1.18)		(6.56)		
SGA / Sales	0.0043 **	0.0005	-0.0490 ***		-0.0377 ***	4,305	0.3325
	(2.07)	(1.25)	(3.55)		(19.15)		
COGS / Sales	0.0040	-0.0011 **	0.0255		0.0127 ***	5,322	0.3450
	(1.57)	(2.10)	(1.50)		(5.87)		
Sales / Assets	-0.0261	-0.0109 ***	0.0658			5,909	0.6592
	(1.57)	(6.38)	(0.60)				
Sales / Employee (1991 $000)	-13.54 ***	-4.90 ***	41.00		41.03 ***	5,297	0.3438
	(4.65)	(5.38)	(1.39)		(4.72)		

*** Significant at 1% level
** Significant at 5% level
* Significant at 10% level

TABLE 4

Estimates of CEO Pay-Performance Sensitivity

The table presents least-squares coefficient estimates for a model of CEO pay-performance sensitivites. Each estimate appears with a T-statistic robust to serial correlation and heteroskedasticity. The sample is drawn from a panel of annual observations for 792 companies during the 1984-91 period. The dependent variable is the one-year change in salary and bonus. The main explanatory variables are the one-year change in firm size (measured by the natural log of sales) and the one-year change in shareholder wealth (calculated as the return to common stockholders times market capitalization at the start of the year). Each explanatory variable is multiplied by dummy variables indicating whether the board of directors has more or less than ten members. Interaction terms between the performance variables and board size are included to indicate how incentives change as board size increases. The model includes dummy variables for two-digit SIC industries. Observations are dropped for CEOs who do not serve 12-month years.

Dependent variable: Change in CEO's salary and bonus

Variable	Estimate
Dummy variable for board sizes 4 to 10, times:	
Change in shareholder wealth (1991 $000)	$0.109
	1.17
Change in shareholder wealth times board size	(0.0145)
	-0.95
Change in natural log of Sales (1991 $000)	$480,018 *
	1.81
Change in natural log of Sales times board size	(41,075)
	-1.30
Dummy variable for board sizes 11 and above, times:	
Change in shareholder wealth (1991 $000)	$0.031
	1.27
Change in shareholder wealth times board size	(0.00004)
	-0.03
Change in natural log of Sales (1991 $000)	$204,889
	1.25
Change in natural log of Sales times board size	(4,341)
	-0.68
Sample Size	4,137
R-squared	0.0320

* Significant at 10% level

TABLE 5

Estimates of CEO Turnover Sensitivity to Performance

The table presents probit coefficient estimtaes. Each estimate appears with a T-statistic robust to serial correlation and heteroskedasticity. The sample is drawn from a panel of annual observations for 792 companies during the 1984-91 period. The dependent variable for CEO turnover equals one if a CEO leaves his position after serving more than half but less than all of the current fiscal year, or before serving less than half of the subsequent fiscal year. Observations are excluded if turnover occurs due to a CEO's death or acquisition of the company. Board size, board composition, CEO age and stock ownership are obtained from proxy statements filed near the start of each fiscal year. Stock ownership excludes shares held indirectly or contingently. Abnormal stock returns are calculated from the capital asset pricing model, with Beta estimated over the last 120 trading days of the prior fiscal year and the CRSP value-weighted index used as the market portfoloio. Interaction terms between the stock return variable and board size are included to indicate how dismissal incentives change as board size increases. The explanatory variables for CEO stock ownership, abnormal stock return, and the interaction term are multiplied by dummy variables indicating whether the board of directors has more or less than ten members. The model includes dummy variables for CEO ages 63 and above as well as 1-digit SIC industries.

Dependent variable: CEO leaves position (0, 1)

Variable	**Estimate**
CEO age	0.019 ***
	(2.98)
Board composition (% outside directors)	0.116
	(0.75)
Dummy for Board Sizes 4 to 10, times:	
CEO stock ownership	-2.250 ***
	(2.81)
Abnormal stock return	-1.496
	(1.14)
Abnormal stock return times board size	0.090
	(0.59)
Dummy for Board Sizes 11 and above, times:	
CEO stock ownership	-6.559 ***
	(4.42)
Abnormal stock return	-0.791 *
	(1.66)
Abnormal stock return times board size	0.012
	(0.41)
Sample size	5,807
Turnover frequency	10.3%

*** Significant at 1% level
** Significant at 5% level
* Significant at 10% level

FIGURE 2

Board Composition as a Function of Board Size

The figure shows averages across company-year observations of the percentage of members of the board of directors who fall into the categories of inside, grey, and outside. Sample means are reported for all observations associated with each total board size. The sample is drawn from a panel of 5,941 annual observations for 792 companies during the 1984-91 period.

Inside directors include current and former officers of the company. Grey directors are relatives of current or former officers and persons having substantial business relationships with the company (usually as lawyers, bankers, consultants, suppliers, or customers). Information about directors is obtained from proxy statements filed by companies near the start of each fiscal year.

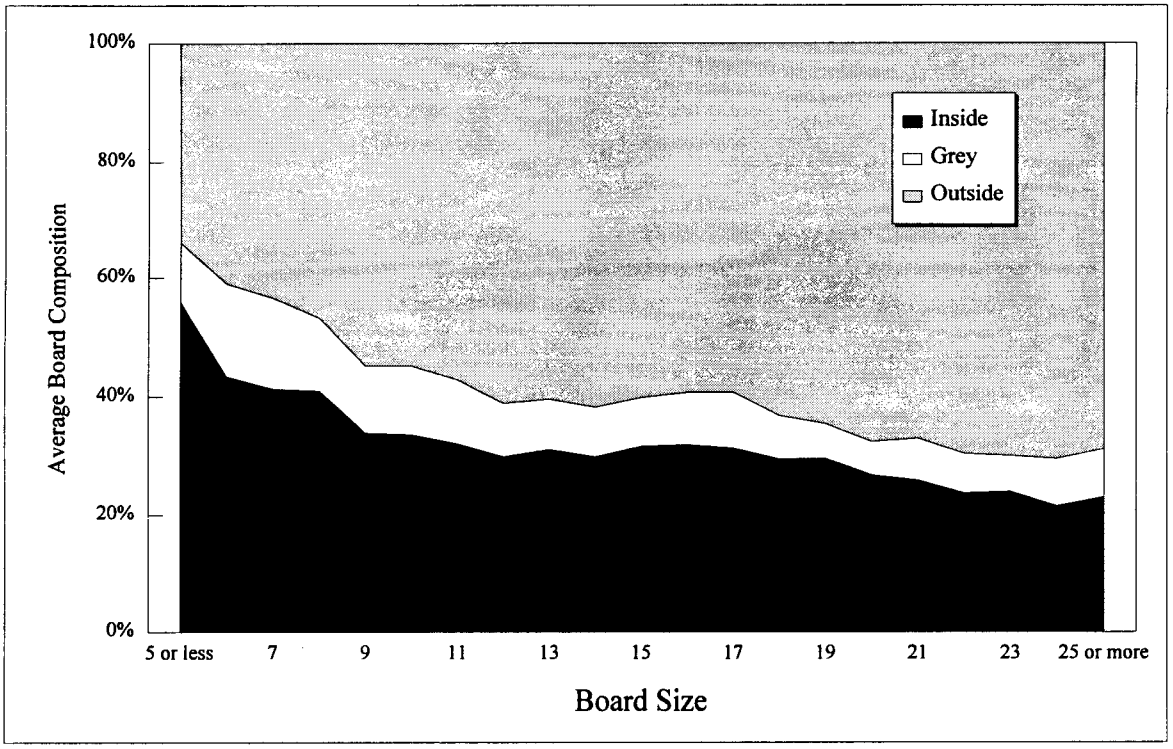
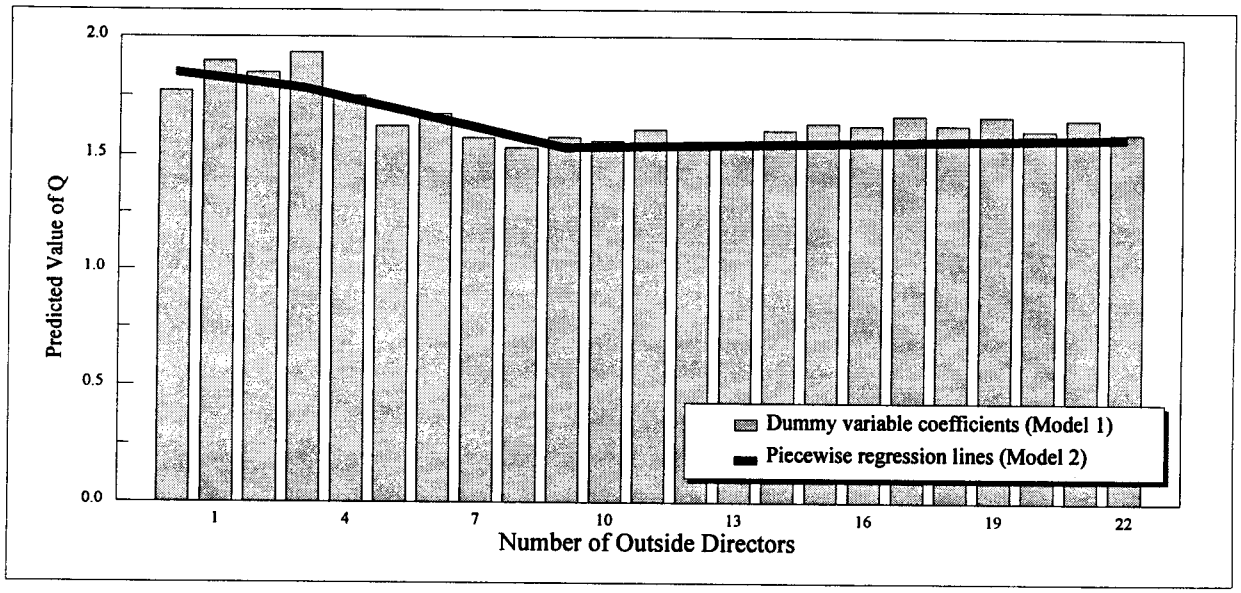


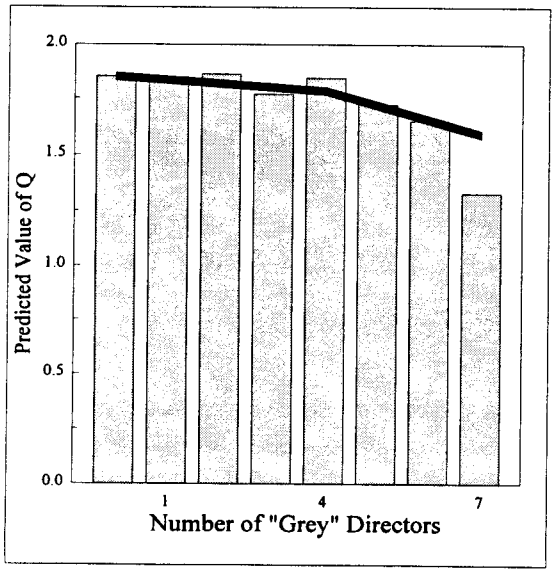
FIGURE 3

Market Valuation and Inside, Outside and Grey Directors

The figure illustrates associations between an estimate of Tobin's Q and the number of inside, outside, and grey directors sitting on a board. Estimates are obtained from least-squares resgressions of an estimate of Tobin's Q against variables counting the number of directors in each class, as well as control variables for firm size and officer and director stock ownership and dummy variables for years and two-digit SIC industries. Vertical bars represent regression coefficient estimates for dummy variables associated with each quantity of inside, outside, and grey directors. Dark lines represent estimates from piecewise linear regressions. The specification of the regressions includes all three types of directors simultaneously.

The sample is drawn from 5,941 annual observations for a panel of 792 companies during the 1984-91 period. Inside directors include current or former officers of the company. Grey directors include relatives of current or former officers and individuals who have substantial business relationships with a firm, either personally or through companies employing them. A more complete presentation of the piecewise regression results appears in Table 6.





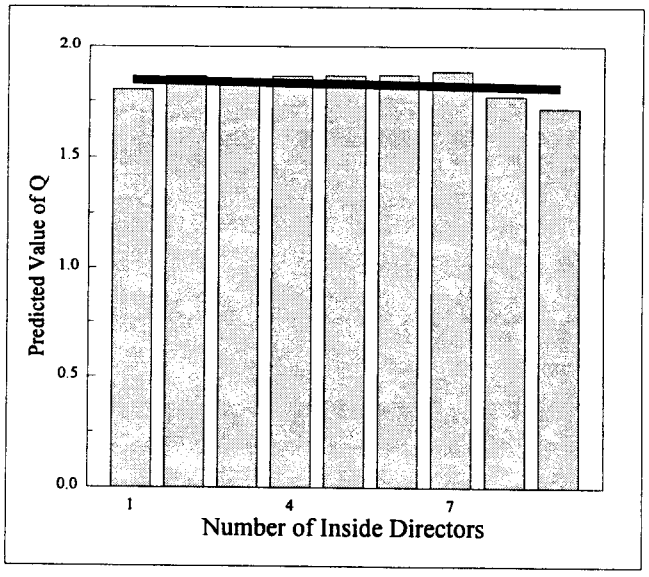


TABLE 6

Market Valuation and Inside, Outside and Grey Directors

The table presents results of least-squares regressions. The sample is drawn from 5,941 annual observations for a panel of 792 companies during the 1984-91 period. The dependent variable is an estimate of Tobin's Q described in Table 1. Below each coefficient estimate are T-statistics robust to serial correlation and heteroskedasticity.

The left column of coefficients replciates the results presented in Table 2. The right column disaggregates the variable for board size into the categories of inside, outside, and grey directors. Inside directors include current or former officers of a company. Grey directors include relatives of current or former officers and individuals who have substantial business relationships with a firm, either personally or through other companies they represent. The remainder of the specification is identical to that for the model in Table 2.

Variable	Estimate	Estimate
Number of directors: 4 to 10	-0.0848 (6.19)***	
Number of directors above 10	0.0016 (0.99)	
Inside directors		-0.0041 (1.14)
Grey directors: 0 to 4		-0.0165 (2.31)**
Grey directors above 4		-0.0639 (1.19)
Outside directors: 0 to 3		-0.0228 (0.64)
Outside directors above 3 and up to 9		-0.0412 (6.88)***
Outside directors above 9		0.0033 (0.19)
Firm size (log of sales)	-0.0846 (8.76)***	-0.0732 (7.94)***
Director/officer stock ownership (%)	0.3021 (3.15)***	0.2485 (2.50)**
Sample Size	5,909	5,909
R-Squared	0.3319	0.3237

*** Significant at 1% level
** Significant at 5% level

TABLE 7

Market Valuation and Monitors

The table presents results of least-squares regressions. The sample is drawn from 5,941 annual observations for a panel of 792 companies during the 1984-91 period. The dependent variable is an estimate of Tobin's Q described in Table 2. Below each coefficient estimate are T-statistics robust to serial correlation and heteroskedasticity.

The left column of coefficients replciates the results presented in Table 2. The right column presents the same model with additional explanatory variables related to the presence of monitors. The non-executive chairman dummy variable equals one if the CEO does not serve as chairman of the board. Similarly, the president dummy variable equals one if someone other than the CEO serves as president.

Variable	Estimate	Estimate
Number of directors: 4 to 10	-0.0848	-0.0858
	(6.19)***	(6.27)**
Number of directors above 10	0.0016	-0.0000
	(0.99)	(0.00)
Non-executive chairman		0.0742
		(2.55)***
President dummy variable		0.0156
		(1.00)
Firm size (log of sales)	-0.0846	-0.0765
	(8.76)***	(8.10)***
Director/officer stock ownership (%)	0.3021	0.2964
	(3.15)***	(3.11)***
Sample Size	5,909	5,908
R-Squared	0.3319	0.3258

*** Significant at 1% level