

The Effects of Board Composition and Direct Incentives on Firm Performance

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■ Monitoring by the board of directors is one of several institutions that have developed in modern corporations to resolve the agency problem between top management and shareholders. Yet, the board's effectiveness in fulfilling this monitoring role is not clear. Some (see, for example, ALI [1] and Dunn [10]) believe boards generally fail in their responsibility to monitor management and guide their companies, and have called for regulations requiring that boards be composed of a majority of outsiders. Others, however, argue that market pressures and concern for

reputation will lead directors to fulfill their duty (Fama [11], Fama and Jensen [12]). The extent to which boards oversee management and to which this monitoring depends on the composition of the board are important and unresolved empirical questions.

However, to answer these questions, one must consider the board in a broader perspective, as one of the alternative control devices that limit agency problems between top management and shareholders. In particular, managers receive pecuniary incentives to maximize firm value from stock ownership, stock option plans, and adjustments in salary based on performance. The combination of direct pay for performance and monitoring by the board provide the control system for top management. The question of whether board effectiveness could be improved by changing its composition is really a special case of a more general question. In particular, can we, as outside observers, understand organizations' control systems well

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enough to make any general propositions regarding the optimality of particular governance institutions?

Arguments that certain types of observed governance structures are preferable to other observed types imply that some firms have adopted suboptimal governance structures. This argument is implicit in calls for board regulation, as well as proposals to reform executive pay (Crystal [7], Jensen and Murphy [21] and [22]). Perhaps the most appealing evidence in favor of this suboptimality view comes from Mørck, et al [29], and McConnell and Servaes [28], who find that corporate performance, measured by Tobin's q , rises with ownership at low levels of ownership and then falls with ownership at high levels. This result suggests that there is an optimal governance structure, and that we observe firms deviating from it experiencing lower performance.

An alternative view of this problem is that different governance structures are optimal for different firms, for the simple reason that each firm faces its own management problems, and hence finds its own solution.¹ Applied to the question of board regulation, this argument says that binding regulations would actually hurt shareholders by compelling them to adopt board structures that are suboptimal for their firms. Other authors have applied this argument to the question of the effectiveness of different levels of direct incentives and have concluded that the evidence suggests that there is not an observable relation between levels of incentives and corporate performance (Demsetz and Lehn [9], Holthausen and Larcker [19], and Kole [24]).

This paper attempts to measure differences in firm performance caused by board composition and ownership structure. These two variables are intended to measure the direct incentives and monitoring faced by top management.² We also control for a number of other variables that are likely to be correlated with corporate performance. We do so to improve the precision of our estimates, as well as to eliminate much of the omitted-variable bias that has

undoubtedly affected previous studies of board composition (Baysinger and Butler [2], MacAvoy, et al [26]).

An important improvement of our methods over previous studies is our use of panel data, which allows us to control for possible biases due to the joint endogeneity of our variables. For example, Hermalin and Weisbach [16] find that poor performance leads to changes in board composition, so any cross-sectional regression of performance on board composition will be biased because of changes in board composition resulting merely from past performance. In addition, managerial shareholdings are likely to be related to corporate performance for two reasons: first, managers will exercise their stock options after their stock goes up, but not after it goes down; second, managers with information about good future prospects are likely to buy more stock, while managers with bad information about their own stock are likely to sell. Both of these explanations suggest that we will observe a positive relation between corporate performance and shareholdings that has nothing to do with performance. By using panel data and our instrumental variables approach, we control for these potentially spurious relations between ownership, board composition, and performance.

Section I of the paper reviews the theory behind our empirical work, as well as touching on the important methodological issues. The second section of the paper discusses our data. In the third section, we present our specifications and results. The last section is a short conclusion.

I. Theory and Methods

Underlying any study of managerial incentives and firm performance is the theory of agency (Jensen and Meckling [20]). The formal models that have developed this theory (Holmstrom [17] and Shavell [33]) have focused on the situation where a single owner (or principal) designs the optimal incentive contract and offers it to the manager of his or her firm (his or her agent) on a take-it-or-leave-it basis. Although such models have yielded many important insights into the principal-agent relation, it would be naive to view them as accurate descriptions of what takes place in large corporations. Thousands of shareholders simply cannot coordinate to design and negotiate managerial incentives — free-rider problems, as well as SEC regulations, prevent shareholders from being the active principal that theory supposes them to be. This role must be delegated to the board of directors. Hence, to understand managerial incentives thoroughly, we must understand how the board of directors plays this role.

¹In fact, Hermalin [15] has shown that different governance structures can be optimal even for *identical* firms in the same industry. The reason is that, in his model, the competition is such that not all firms would benefit by providing their managers with strong incentives; but if no firms were to provide incentives, some firms would, then, find it in their interests to provide strong incentives.

²The literature suggests that these two variables do measure what we intend them to measure. Jensen and Murphy [21] show that the vast majority of direct incentives faced by top managers come through stock ownership. Weisbach [37], Brickley, et al [4], Brickley and James [5], Shivdasani [34], Byrd and Hickman [6], and Rosenstein and Wyatt [30] all provide evidence suggesting that board structure is an important determinant of the level of direct monitoring of top management.

However, shareholders do not escape agency problems by leaving them to the board of directors, since the directors are themselves agents, whose interests are not necessarily aligned with the shareholders'. This conflict of interests is clearly true of management (inside) directors, whose careers are tied to the CEO's. It is also true, although possibly to a lesser extent, of nonmanagement (outside) directors. The same free-rider problems that commonly prevent the shareholders from being an active principal also prevent the shareholders from actively choosing the board. In practice, the CEO almost always chooses the board (Mace [27]). Thus, potentially, even outside directors are more aligned to management's interests than to the shareholders'.

Although allowing management to choose their own overseers might seem on a par with letting the fox guard the chicken coop, there are, nonetheless, reasons to think that outside directors will exhibit some independence from top management. First, directors have certain legal obligations to the shareholders and they can be held liable for damages if they fail to meet these obligations. Second, directors will have some desire to maintain or establish reputations as good monitors and competent business people (see, e.g. Fama [11] or Fama and Jensen [12]).^{3,4} There is evidence, both anecdotal and statistical, that supports this notion that outside directors exhibit some independence from top management. First of all, Mace [27] reports case-study evidence that exceedingly poor performance or obviously bad proposals will be opposed by outside directors. Weisbach [37] finds that outsider-dominated boards are significantly more likely to respond to poor performance by dismissing the CEO. Finally, Brickley, et al [4] find evidence suggesting that outside directors act in the shareholders' interest in their decisions on the adoption of poison pills.

From these papers, it seems clear that outside directors do a better job of acting in shareholders' interests than insiders when it comes to certain aspects of their jobs. However, there are other facets of directors' jobs where insiders are likely to be preferable. For example, Mace

[27] and Vancil [35] argue that the board is often used for training and evaluation purposes as part of the CEO selection process. Hermalin and Weisbach [16] find empirical evidence consistent with this argument. Inside directors are important because they convey information to top management and the outside directors (Mace [27]). The net effect of different types of boards on performance is an open question, which we address in this paper.

Our discussion so far has ignored the fact that board composition is *endogenously* determined. For instance, Hermalin and Weisbach [16] find that poor performance can result in inside directors being replaced by outside directors. Consequently, a chronically poor-performing firm could have a higher than average proportion of outside directors on the board. If we were to include this sort of firm in a regression of firm performance on board composition, we might find that outside directors "caused" poor firm performance.⁵

It is our attention to the determinants of board composition that distinguishes our analysis from that of previous authors. In particular, MacAvoy, et al [26], which finds no evidence that board composition affects performance, and Baysinger and Butler [2], which finds evidence suggesting that board composition affects performance, fail to control for the determinants of board composition, such as ownership. As a result, it is impossible to tell whether their results are spurious or distorted by the influence of uncontrolled-for factors. For example, as we show in Exhibit 1, firm performance is *decreasing* with top management's stock ownership over certain ranges of ownership. Previous work (Weisbach [37], Hermalin and Weisbach [16]) finds that ownership is inversely correlated with the proportion of outside directors. Thus, the findings of Bays-

³On the other hand, directors could seek to establish a reputation for not rocking-the-boat, which might make them more attractive to other firms, whose managements are looking to avoid scrutiny and interference. Moreover, as Holmstrom [18] has shown, simply because an agent (e.g., a director) is concerned about his reputation does not imply that he will take actions that are in the principal's (the shareholders') interests.

⁴Kaplan and Reishus [23] have examined this reputation idea by studying whether CEOs of poorly performing firms are asked to serve as directors of other companies with the same frequency as CEO of good-performing firms. They find that poor performance — measured as a reduction in dividends — leads to fewer outside directorships for the CEO.

⁵Along these lines, firms vary in many dimensions, and, consequently, the underlying degree of divergence between the shareholders' interest and management's interest will also vary. We would expect that the firms in which the underlying degree of divergence is greatest to be the ones in which the strongest measures for closing this divergence would be most used — their managers would have the strongest pecuniary incentives and the most outside directors on their boards. Even the strongest measures will not fully eliminate this divergence. Indeed, those firms with the greatest degree of divergence could still be the firms with the greatest degree even after all firms adopt measures to reduce this divergence. Optimizing firms will adopt these measures up to the point where their *marginal* benefit equals their *marginal* cost. So, if there are decreasing returns to these measures, as seems plausible, then firms that start with the greatest divergence of interest will still have the greatest *residual* divergence of interest and the worst performance even with the strongest control measures (e.g., the greatest proportion of outside directors). This explanation works against our finding a relation between performance and the proportion of outside directors.

inger and Butler could be due to ownership effects rather than board-composition effects.⁶

The idea that stock ownership by management can reduce the underlying agency problem comes straight out of agency theory: the more stock management owns, the stronger their motivation to work to raise the value of the firm's stock, which is what the other shareholders want. Therefore, there will be less demand for alternative anti-agency measures such as a strong board of outside directors in firms where management owns a large fraction of the stock. On the other hand, we must keep in mind that agency problems need not be monotonically decreasing in stock ownership by top management: large management ownership insulates management from other forces that reduce agency costs such as the threat of takeovers and the discipline of the board (see Demsetz [8] for a discussion). In addition, large management ownership is often a characteristic of family-controlled firms, which are notorious for putting the interests of the family above the interests of the shareholders.⁷ Thus, it is possible that agency costs actually increase with ownership over some region.

Another measure of the underlying agency problem is the length of tenure of the board and top management. If management has been around a long time, this could indicate that agency problems are not too extreme (otherwise managers would have been dismissed by board action, proxy fight, or takeover). Moreover, it could indicate that management has above-average ability, since they have not been fired and they may have even been asked to stay on longer than usual because of their good performance. On the other hand, Vancil [35] reports that there is some consensus among CEOs that a CEO should not serve too long, with ten years commonly cited as the "right" tenure. This could be true because CEOs become set in their ways and lose necessary flexibility over time, or long tenure could reflect a proclivity for dominance on the part of the CEO.⁸ Consequently, we could see firm performance suffer if management stays on for too long.

From the preceding discussion, it would clearly be a mistake to use a specification that constrained ownership or tenure to affect performance monotonically. Following Mørck, et al [29], we adopt a piecewise linear specifica-

tion in these variables. Since the impact of outside directors on overall board behavior need not be linear in the proportion of outside directors, we also use a nonlinear specification of this variable.

As discussed above, there is an issue of simultaneity regarding board composition, so we instrument for board composition in our statistical analysis. Ownership is also likely to be a jointly endogenous variable — to the extent management has better information than the market, we must be concerned with managers buying in anticipation of good performance and selling in anticipation of bad performance. In addition, managers have a tax-based incentive to realize capital gains when the stock has been doing badly, but not when it is doing well.

II. Data

One measure of profitability is average Tobin's q : the ratio of the firm's market value to the replacement cost of its assets. In the absence of market power, a divergence of q from one represents the value of the assets *not* included in the denominator of q , such as the value of the internal organization or the value of expected agency costs. A q above one indicates that the market views the firm's internal organization as exceptionally good or the expected agency costs as particularly small.⁹

Our estimates of q are taken from Schaller [32]. To compute the numerator of q , the market value of the firm, we sum the market values of the firm's equity and debt. The market value of the firm's common stock is equal to the number of common shares outstanding times the price per share at the end of the year. We add to this an estimate of the value of the preferred stock, which we derive by dividing the preferred stock dividends by the Standard and Poor's preferred stock yield. The market value of the firm's debt is equal to the sum of the values of the short-term debt and the long-term debt. We assume that the market value of short-term debt is equal to its book value. To estimate the market value of the firm's long-term debt, we use the procedure developed by Brainard, Shoven, and Weiss [3]. We assume that all new issues of long-term debt have a maturity of 20 years, the coupon rate is the prevailing BAA rate, and that the maturity distribution for each firm is proportional to the maturity distribution of aggre-

⁶An alternative approach to this problem would be to analyze the change in the stock price around the *additions* of outside directors. Rosenstein and Wyatt [30] use this approach and find that stock prices rise around the announcement of new outside directors, which is consistent with the monitoring hypothesis.

⁷Examples of this include reserving top management positions or board seats for family members, creating foundations to honor family members, and the use of company resources for family members.

⁸See "CEO Disease," *Business Week*, April 1, 1991, pp. 52-60.

⁹Tobin's q has been used as a measure of profitability by a number of studies (see, for example, Mørck, Shleifer, and Vishny [29], McConnell and Servaes [28], or Lindenberg and Ross [25]).

gate outstanding issues. Given these assumptions, we can calculate the market value of the long-term debt.¹⁰

The denominator of q , the replacement value of the firm's assets, has three main components: the market value of the capital stock, the market value of inventories, and other assets. To compute the market value of the capital stock, we adjust the book values for inflation and depreciation, assuming that economic depreciation is exponential.¹¹ For inventory methods other than LIFO, we assume the book value of inventories equals their market value. If LIFO was used, we make an adjustment based on an estimate of the proportion of the firm's inventories which were LIFO. Other assets are intangibles and shares held in other firms. Their market value is assumed equal to its book value.

We control for factors affecting q which are due to time effects and the nature of the firm's industry, and not related to managerial performance. We do this by computing q for all firms on the annual COMPUSTAT industrial file each year in our sample. For each firm in our sample, we then subtract from its q the mean q for all firms in its two-digit SIC code, including those not in our sample. This procedure reduces the variation in q due to industry-specific factors.

Our sample consists of 142 NYSE firms for which we gathered data on board composition and ownership from corporate proxy statements available in Harvard's Baker Library. We classified each director according to his principal occupation. Employees and former employees of the firm were classified as insiders. Nonemployee directors were classified as outsiders. Directors whose status is questionable, such as family members of employees, lawyers, bankers, and investment bankers, were classified as grey directors.¹²

We collected the shareholdings of each director from the sample proxies. The shareholding figures recorded for each director included all shares over which the director

had voting power.¹³ Although for most directors this was a straightforward calculation, for many directors determining the shares over which they had voting power was a matter of interpreting lengthy footnotes or making judicious decisions when more than one director held voting power over a set of stock.¹⁴

For those directors who were also their companies' CEOs, we determined their tenures as CEO. For the years within our sample period, we calculated CEO tenure by locating the exact date of any CEO change in the *Wall Street Journal* Index (the proxies allowed us to detect CEO changes within a given year). We obtained the starting year for CEOs who started before 1971 from the

¹³For most directors, this number was identical to the number of shares beneficially owned. However, for a number of directors, the two were considerably different. The most common reason was family holdings. Often, a director will deny beneficial ownership of shares held by another member of his family (typically a wife or minor children). Even if the director does not exercise direct voting power of such shares, it would seem likely that they would be voted as he suggested, and so we attributed them to the director.

Another frequent reason for differences between beneficial and voting ownership was trusts and foundations. Often a director would be a trustee of a trust or foundation in which he had no beneficial interest, but in which he controlled that trust or foundation's voting rights. In such cases we tended to include the holdings of the trust or foundation with the holdings of the director. In cases where the director's control of the voting rights was felt to be minimal or unclear (for example, when director A was a trustee of director B's family trust), we did not add in the trust's shares, but rather noted the association and the size of the trust's holdings.

¹⁴To standardize our attribution of shareholdings, we established a set of guidelines which covered most of the cases we encountered. The goals of the guidelines were: (1) to attribute shares to the director who was likely to have the greatest say in how they were voted; (2) to avoid double counting; and (3) to establish a way to note that directors were associated with a set of stock when it was either unlikely they had absolute control over the set, or when disentangling control was impossible given the information on the proxy. As part of meeting goals (1) and (2), when two (or more) directors clearly controlled a set of stock, we attributed the stock to the employee director, when one director was a full-time employee of the firm, while the other was not; or to the director who was a member of top management, when one director was top management, while the other was not; or to the senior family member, when the directors were related.

Goal (3) was met by recording the set of stock in question and noting which directors were connected with it. For example, in 1980, Bendix owned roughly 20% of Asarco, and consequently two members of Bendix' board served as directors of Asarco. Bendix' holdings were recorded separately and it was noted that the two directors in question were connected with those holdings. Other examples are firms dominated by a single family where the family's shareholdings are in complex trusts and holding companies. For three companies, Carnation, Winn-Dixie Stores, and Zayre, we chose to record only the sum of the family holdings and note the family directors associated with those holdings rather than attempt to disentangle complicated family ownership.

¹⁰For more detail on the estimation of the market value of long-term debt, as well as the rest of the construction of q , see Salinger and Summers [31].

¹¹One might object that this assumption could bias the results, because true depreciation is not exponential and deviations of true depreciations from estimated depreciations could be correlated with the independent variables. To test the importance of this objection, we recomputed q under the assumption that the firm's reported depreciation was the actual depreciation. The q 's were very similar to the q 's used below; the correlation coefficient between the two sets of q 's was 0.995. When the equations were reestimated using the q 's with the firm's depreciation, the results were almost identical to those reported.

¹²For a detailed discussion of how the sample was constructed and how the directors were classified, see Hermalin and Weisbach [16].

Forbes compensation surveys or from *Who's Who in Finance and Industry*.¹⁵

III. Empirical Specification and Results

To examine the effects of the control structure of the corporation on profitability, we regress q , our measure of profitability, on measures of the control structure, as well as other variables which should affect q . We first consider the effects of board composition on q . We estimate piecewise linear equations using board composition. We chose to break our sample at 40% and 60% outsiders, following Weisbach [37].¹⁶

We also control for variables ("controls") other than those in the control structure which might affect q . We include expenditures on research and development and advertising, each of which we normalize by size, into the equation. We also include the log of the replacement value of the firm's assets as a direct measure of size.

The OLS equation (pooling years of observations and suppressing the control variables) with the composition variables representing the marginal change in q resulting from more outsiders is as follows (t -statistics are in parentheses):

$$q = \text{controls} - 0.02 \text{ COMPL40} - 0.12 \text{ COMP4060} \\ (0.06) \quad (0.23) \\ - 0.18 \text{ COMPG60}, \\ (0.26)$$

where the coefficient on COMPL40 is the estimated q with respect to the proportion of outsiders when the proportion is less than 40%, the coefficient on COMP4060 is the estimated derivative when the proportion is between 40% and 60%, and the coefficient on COMPG60 is the estimated derivative when the proportion is greater than 60%. There is basically no effect of board composition on

q . Treating board composition as endogenous using an instrumental-variables approach or estimating on just one year of data makes no meaningful difference to the results.

To estimate the effects of ownership on profitability, we follow Mørck, et al [29] and use a specification that is piecewise linear in ownership levels. Because the marginal effect of additional ownership on profitability may be different in different regions, we divide the ownership levels into four regions: less than one percent, between one percent and five percent, between five percent and 20%, and greater than 20%.¹⁷ Using time-series data on ownership, we are able to control for possible simultaneity between ownership and q . As top management is likely to have inside information about the firm's future prospects, they have an incentive to adjust their portfolios based on their estimate of future performance. Thus, cross-sectional regressions of q on ownership may be misleading as well as statistically incorrect because the results are contaminated by the effect of q on ownership.

The results are shown in Exhibit 1. In the first column, we estimate the equation using ordinary least squares for all five years pooled. At levels of ownership less than one percent, q increases with ownership. This result suggests that there is a noticeable reduction in agency costs resulting from increasing ownership concentration at low levels of ownership. At levels greater than 20%, q decreases with ownership. This result suggests that increases in ownership above 20% cause management to become more entrenched, and less interested in the welfare of their shareholders. The marginal effect of additional ownership at moderate levels of ownership (between one percent and 20%) on q seems to be negative at lower levels and positive at higher levels, although neither of these effects is significantly different from zero. Expenditures on both advertising and research and development raise q . Finally, smaller firms seem to have higher q 's.

In the second column of Exhibit 1, we reestimate the equations treating the shareholdings variables as endogenous, using their lagged values as instruments. The relation between shareholdings and q becomes larger when we use this technique. The signs on the ownership variables are all the same as with ordinary least squares, but the sizes of the coefficients and the t -statistics are all larger. This larger effect is potentially because of the elimination of the simultaneity problem discussed previously. A specification test (Hausman [14]) to determine

¹⁵Occasionally, precise starting and finishing dates were reported in the proxies as part of the director's biography. For those CEOs beginning prior to 1971, and for whom we only knew the starting year, we assumed they began July 1st of that year to minimize bias when carrying out certain calculations.

¹⁶We understand that the proportion of outside directors is likely to be a crude proxy for the "effectiveness" of the board. We use it because of two reasons: first, it is the measure of independence most commonly discussed in both the academic and institutional presses; second, it is the most relevant for proposals about board regulation. An alternative measure used successfully by Shivdasani [34] is the number of additional directorships held by each outside director, which is a measure of the value of the reputation of each director which should affect his incentives to uphold his reputation. See Weisbach [38] for more discussion.

¹⁷Mørck, et al [29] use a slightly different division. Since we have data on very low levels of ownership by top management, while Mørck, et al do not, we chose our divisions to make use of this data. The results using their divisions are similar, though less pronounced.

Exhibit 1. Piecewise Linear Regressions Predicting Tobin's Q Using Ownership of Top Management^a

Sample: 134 NYSE firms in 1971, 1974, 1977, 1980, and 1983				
Variable	Coefficient	Coefficient	Coefficient	Coefficient
Constant	0.227 (0.94)	0.105 (0.52)	-0.198 (0.628)	-0.287 (0.851)
OWNL1 ^b	19.20 (1.66)	34.20 (2.92)	31.72 (2.38)	38.79 (2.18)
OWN15 ^c	-6.55 (1.56)	-12.53 (2.82)	-14.50 (2.63)	-21.85 (2.47)
OWN520 ^d	1.72 (1.40)	2.74 (2.19)	2.52 (1.57)	5.23 (2.09)
OWNG20 ^e	-1.01 (2.03)	-1.12 (2.51)	-0.82 (1.28)	-1.35 (1.66)
ADV ^f	4.53 (4.16)	3.66 (4.59)	4.60 (3.69)	4.58 (3.61)
R & D ^g	5.00 (4.61)	3.85 (4.45)	4.46 (3.08)	5.05 (3.21)
ln(Assets) ^h	-0.067 (2.23)	-0.050 (2.10)	0.001 (0.03)	0.009 (0.225)
Estimation method	OLS	IV	OLS	IV
Years used	All years pooled	All years pooled	1977	1977
R ²	0.081	—	0.177	—
Number of observations	644	504	134	134

Notes:^a*t*-statistics are in parentheses.^bThe dependent variable is an estimate of Tobin's q minus the equally weighted average of Tobin's q for all firms on COMPUSTAT in the sample firm's two-digit SIC code.^cOWNL1 is the fraction of the company's stock held by the present CEO and all former CEOs still on the board if this number is less than 0.01, and 0.01 otherwise.^dIf the fraction of the company's stock held by the present CEO and all former CEOs still on the board is both greater than 0.01 and less than 0.05, OWN15 equals this number minus 0.01. If it is less than 0.01, OWN15 equals 0, and if it is greater than 0.05, OWN15 equals 0.04.^eIf the fraction of the company's stock held by the present CEO and all former CEOs still on the board is both greater than 0.05 and less than 0.20, OWN520 equals this number minus 0.05. If it is less than 0.05, OWN520 equals 0, and if it is greater than 0.20, OWN520 equals 0.15.^fIf the fraction of the company's stock held by the present CEO and all former CEOs still on the board is greater than 0.20, OWNG20 equals this number minus 0.2. Otherwise, OWNG20 equals 0.^gThe variable ADV is the company's expenditures on advertising weighted by an estimate of the replacement value of the firm's assets.^hThe variable R & D is the company's expenditures on research and development weighted by an estimate of the replacement value of the firm's assets.ⁱThe variable ln(Assets) is the natural logarithm of an estimate of the replacement value of the firm's assets.

whether ordinary least squares (OLS) or instrumental variables (IV) is the correct specification rejects the hypothesis that there is no simultaneity at the five percent level (chi-square statistic = 10.47).

One objection to these results might be that q 's for the same firm in different years may not be independent observations. One solution to this problem would be to include firm-specific dummy variables into the equation. This approach, however, would eliminate all between-firm variation from the data. Since we believe that the primary force driving our results is between-firm variation, we do not adopt this approach. We do, however, reestimate the equation using just one year of data to determine the extent of the potential bias due to nonindependent observations. We choose the year 1977 because it is the central year of our sample.

The results for 1977 are shown in the third column of Exhibit 1 using ordinary least-squares and in the fourth column of Exhibit 1 using instrumental variables. The pattern of the signs is the same for 1977 as it is for the entire sample. Once again, treating the ownership variables as endogenous increases the size of the coefficients. However, using just one year of data, we do not reject the hypothesis that there is no endogeneity problem with a specification test.

In Exhibit 2, we reestimate the q equations using both management ownership and board composition as explanatory variables. In addition, we also control for a number of factors likely to be correlated with managerial entrenchment and the control structure of the firm. Since we expect that one way for a CEO to become entrenched is by being a CEO for a long time, we control for CEO

Exhibit 2. Piecewise Linear Regressions Predicting Tobin's Q Using Management Ownership, Board Composition, and CEO Tenure^a

Sample: 134 NYSE firms in 1971, 1974, 1977, 1980, and 1983				
Variable	Coefficient	Coefficient	Coefficient	Coefficient
Constant	-0.106 (0.36)	-0.042 (0.14)	-0.316 (0.71)	-0.933 (1.56)
OWNL1 ^b	16.00 (1.35)	37.97 (3.02)	30.51 (2.16)	34.77 (1.80)
OWN15 ^c	-7.73 (1.77)	-14.52 (3.07)	-14.66 (2.42)	-16.04 (1.57)
OWN520 ^d	0.99 (0.77)	2.48 (1.85)	3.30 (1.71)	5.15 (1.62)
OWNG20 ^e	-0.77 (1.48)	-0.77 (1.53)	-0.99 (1.28)	-1.71 (1.56)
COMPL40 ^f	-0.04 (0.09)	-0.21 (0.36)	-0.06 (0.10)	0.78 (0.75)
COMP4060 ^g	-0.18 (0.34)	0.005 (0.007)	0.32 (0.50)	-0.25 (0.23)
COMPG60 ^h	-0.31 (0.45)	-0.29 (0.34)	-0.32 (0.33)	0.03 (0.03)
CEOL5 ⁱ	0.33 (1.18)	-0.024 (1.18)	-0.02 (0.65)	-0.021 (0.58)
CEO59 ^j	-0.022 (1.02)	0.012 (0.76)	-0.002 (0.08)	-0.0038 (0.15)
CEO1014 ^k	0.021 (0.81)	0.025 (1.28)	0.05 (1.43)	0.042 (1.19)
CEOG15 ^l	-0.015 (1.44)	-0.018 (2.18)	-0.03 (2.29)	-0.034 (2.68)
MEDIN ^m	0.011 (1.77)	-0.0009 (0.13)	0.0002 (0.02)	0.008 (0.59)
MEDOUT ⁿ	0.015 (1.88)	0.025 (1.91)	0.009 (0.89)	0.018 (0.99)
FAMILY COMPANY ^o	0.32 (2.48)	0.17 (1.68)	-0.005 (0.03)	-0.13 (0.64)
ADV ^p	4.37 (3.95)	3.78 (4.49)	5.00 (3.82)	5.13 (3.70)
R & D ^q	5.55 (5.00)	4.28 (4.67)	4.64 (3.10)	4.54 (2.71)
ln(Assets) ^r	-0.05 (1.73)	-0.036 (1.38)	0.02 (0.39)	0.05 (0.92)
Estimation method	OLS	IV	OLS	IV
Years used	All years pooled	All years pooled	1977	1977
R ²	0.107	—	0.225	—
Number of observations	644	504	134	134

Notes:

^a t -statistics are in parentheses.

^bThe dependent variable is an estimate of Tobin's q minus the equally weighted average of Tobin's q for all firms on COMPUSTAT in the sample firm's two-digit SIC code.

^cOWNL1 is the fraction of the company's stock held by the present CEO and all former CEOs still on the board if this number is less than 0.01, and 0.01 otherwise.

^dIf the fraction of the company's stock held by the present CEO and all former CEOs still on the board is both greater than 0.01 and less than 0.05, OWN15 equals this number minus 0.01. If it is less than 0.01, OWN15 equals 0, and if it is greater than 0.05, OWN15 equals 0.04.

^eIf the fraction of the company's stock held by the present CEO and all former CEOs still on the board is both greater than 0.05 and less than 0.20, OWN520 equals this number minus 0.05. If it is less than 0.05, OWN520 equals 0, and if it is greater than 0.20, OWN520 equals 0.15.

^fIf the fraction of the company's stock held by the present CEO and all former CEOs still on the board is greater than 0.20, OWNG20 equals this number minus 0.20. Otherwise, OWNG20 equals 0.

^gCOMPL40 is the fraction of the company's directors who are outsiders if this number is less than 0.40, and 0.40 otherwise.

^hIf the fraction of the company's directors who are outsiders is greater than 0.40 and less than 0.60, COMP4060 equals this number minus 0.01. If it is less than 0.01, OWN15 equals 0, and if it is greater than 0.05, OWN15 equals 0.04.

ⁱCOMPG60 is the fraction of the company's directors who are outsiders minus 0.60 if this number is greater than 0.60, and 0 otherwise.

^jThe variable CEOL5 is the tenure of the CEO if it is no more than 4.5 years and 4.5 otherwise.

^kThe variable CEO59 is the tenure of the CEO minus 4.5, if the CEO's tenure is greater than 4.5 years and less than 10 years. If the CEO's tenure is less than 4.5 years, CEO59 equals 0, and if the CEO's tenure is greater than 10 years, CEO59 equals 5.5.

Exhibit 2. — Continued

^kThe variable CEO1014 is the tenure of the CEO minus 10, if the CEO's tenure is greater than 10 years and less than 15 years. If the CEO's tenure is less than 10 years, CEO1014 equals 0, and if the CEO's tenure is greater than 15 years, CEO59 equals 5.

^lThe variable CEO15 is the tenure of the CEO minus 15, if the CEO's tenure is greater than 15 years. If the CEO's tenure is less than 15 years, CEO15 equals 0.

^mMEDIN is the median tenure of the inside directors on the board.

ⁿMEDOUT is the median tenure of the outside directors on the board.

^oFAMILY COMPANY is a dummy variable which takes the value one if any two directors are related.

^pThe variable ADV is the company's expenditures on advertising weighted by an estimate of the replacement value of the firm's assets.

^qThe variable R & D is the company's expenditures on research and development weighted by an estimate of the replacement value of the firm's assets.

^rThe variable log(Assets) is the natural logarithm of an estimate of the replacement value of the firm's assets.

tenure in our q equations.¹⁸ We also control for the median tenure of the directors. A board which does not turn over rapidly is potentially a symptom of an entrenched management. Conversely, longer director tenures might simply signal that directors in the firm invest in firm-specific human capital to make them more proficient directors. Finally, we include a dummy variable which takes the value one if two or more of the directors are related in any of the years of our sample. We include this variable because family companies are sometimes believed to be fundamentally different from other companies (Mace [27]), and we wished to control for this difference.

The results of these equations are similar to those discussed above for both shareholdings and composition. Shareholdings still seem to affect q . The effects once again are larger when we treat the shareholdings variables as endogenous. There does not appear to be a relation between board composition and q , even treating board composition as endogenous using lagged composition as instruments.

CEO tenure does not seem to affect profitability at low levels of tenure. However, for CEOs who have been on the job more than 15 years, each additional year reduces profitability. When we treat the other variables in the equation as endogenous (the second column), this effect is significant at the five percent level. This suggests that CEOs who remain on the job for too long become entrenched and reduce corporate performance.

Boards with longer median tenures tend to have higher q 's. However, when we treat these variables as endogenous, the effect goes away for the inside directors, but not

for outside directors. This result is consistent with the notion that the acquisition of firm-specific knowledge over time by outside directors improves firm performance.

One potential objection to these results is that they are not generated by relations between the control structure and corporate performance. Rather, they may be generated by some spurious correlation between our variables and our measure of q . We test this objection by rerunning our regressions using an earnings-based measure of profitability. While accounting numbers are imperfect measures of economic profits, (Fisher and McGowan [13]), we nonetheless feel that accounting measures of profitability can provide an independent check of the results using q .

The accounting measure of profitability we use is earnings before interest and taxes.¹⁹ This measure is a particularly good one for our purposes because it is not sensitive to changes in capital structure or special tax treatments. We normalize this number by our estimate of the replacement cost of the firms assets.

Piecewise linear equations predicting earnings levels are shown in Exhibit 3. The pattern of the signs is similar to those in Exhibit 2. Profitability still increases at very small ownership levels (less than one percent) and declines at moderate ownership levels (one percent to five percent). Once again these effects are larger and more significant when instrumental variables are used to control for the endogeneity of the shareholdings.

The one variable which is significant in the pooled ordinary least-squares earnings equation which is not significant in the analogous q equation is the fraction of outsiders between 40% and 60%. However, the effect goes away completely when we treat it as endogenous (the second column). Therefore, this correlation is most likely due to firms who perform poorly adding outsiders (Her-

¹⁸From Warner, et al [36] and Weisbach [37], we know that CEO tenure is jointly endogenous, as these papers find a relation between poor performance and CEO turnover. That effect, however, is sufficiently small so that we do not expect it to create any serious biases. We have estimated our equations treating CEO tenure as both exogenous and endogenous, and have obtained nearly identical results. For the sake of space, only the results treating CEO tenure as exogenous are shown here.

¹⁹This variable is constructed by adding data items 15, 16, 18, and 49 on the annual COMPUSTAT industrial tape.

Exhibit 3. Piecewise Linear Regressions Predicting Earnings Levels Using Management Ownership, Board Composition, and CEO Tenure^a

Sample: 134 NYSE firms in 1971, 1974, 1977, 1980, and 1983				
Variable	Coefficient	Coefficient	Coefficient	Coefficient
Constant	0.094 (3.86)	0.100 (2.51)	0.110 (2.01)	0.085 (1.15)
OWNL1 ^b	1.60 (1.64)	5.55 (3.27)	3.36 (1.94)	5.08 (2.10)
OWN15 ^c	-0.92 (2.55)	-2.24 (3.52)	-2.19 (2.94)	-3.75 (2.93)
OWN520 ^d	0.08 (0.78)	0.28 (1.52)	0.53 (2.23)	0.96 (2.41)
OWNG20 ^e	0.03 (0.60)	0.016 (0.22)	-0.023 (0.24)	-0.01 (1.0)
COMPL40 ^f	-0.011 (0.31)	-0.12 (1.57)	-0.039 (0.52)	-0.027 (0.21)
COMP4060 ^g	-0.099 (2.29)	0.02 (0.18)	-0.055 (0.69)	-0.038 (0.27)
COMPG60 ^h	-0.036 (0.63)	-0.04 (0.34)	-0.083 (0.71)	0.006 (0.04)
CEOL5 ⁱ	0.0025 (1.10)	0.002 (0.80)	0.00004 (0.01)	0.0006 (0.12)
CEO59 ^j	-0.0004 (0.23)	0.0007 (0.33)	-0.002 (0.42)	-0.0010 (0.30)
CEO1014 ^k	0.0016 (0.75)	0.0015 (0.58)	0.008 (1.93)	0.008 (1.83)
CEOG15 ^l	-0.0010 (1.14)	-0.0008 (0.77)	-0.003 (1.75)	-0.0025 (1.65)
MEDIN ^m	0.0003 (0.53)	-0.0002 (0.19)	-0.0006 (0.57)	-0.0009 (0.50)
MEDOUT ⁿ	0.0007 (1.03)	0.0011 (0.62)	0.011 (0.93)	0.0026 (1.18)
FAMILY COMPANY ^o	0.025 (2.32)	0.026 (1.86)	-0.014 (0.69)	-0.025 (1.00)
ADV ^p	0.468 (5.10)	0.503 (4.44)	0.50 (3.12)	0.486 (2.81)
R & D ^q	0.401 (4.36)	0.576 (4.68)	0.54 (2.96)	0.646 (3.09)
ln(Assets) ^r	-0.0006 (0.26)	0.0009 (0.25)	-0.001 (0.22)	0.0006 (0.08)
Estimation method	OLS	IV	OLS	IV
Years used	All years pooled	All years pooled	1977	1977
R ²	0.105	—	0.206	—
Number of observations	644	504	134	134

Notes:

^at-statistics are in parentheses.

^bThe dependent variable is the level of earnings before interest and taxes for the firm in a given year weighted by an estimate of the replacement value of the firm's assets.

^cOWNL1 is the fraction of the company's stock held by the present CEO and all former CEOs still on the board if this number is less than 0.01, and 0.01 otherwise.

^dIf the fraction of the company's stock held by the present CEO and all former CEOs still on the board is both greater than 0.01 and less than 0.05, OWN15 equals this number minus 0.01. If it is less than 0.01, OWN15 equals 0, and if it is greater than 0.05, OWN15 equals 0.04.

^eIf the fraction of the company's stock held by the present CEO and all former CEOs still on the board is both greater than 0.05 and less than 0.20, OWN520 equals this number minus 0.05. If it is less than 0.05, OWN520 equals 0, and if it is greater than 0.20, OWN520 equals 0.15.

^fIf the fraction of the company's stock held by the present CEO and all former CEOs still on the board is greater than 0.20, OWNG20 equals this number minus 0.20. Otherwise, OWNG20 equals 0.

^gCOMPL40 is the fraction of the company's directors who are outsiders if this number is less than 0.40, and 0.40 otherwise.

^hIf the fraction of the company's directors who are outsiders is greater than 0.40 and less than 0.60, COMP4060 equals this number minus 0.01. If it is less than 0.01, OWN15 equals 0, and if it is greater than 0.05, OWN15 equals 0.04.

ⁱCOMPG60 is the fraction of the company's directors who are outsiders minus 0.60 if this number is greater than 0.60, and 0 otherwise.

^jThe variable CEOL5 is the tenure of the CEO if it is no more than 4.5 years, and 4.5 otherwise.

^kThe variable CEO59 is the tenure of the CEO minus 4.5 if the CEO's tenure is greater than 4.5 years and less than 10 years. If the CEO's tenure is less than 4.5 years, CEO59 equals 0, and if the CEO's tenure is greater than 10 years, CEO59 equals 5.5.

Exhibit 3. — Continued

^kThe variable CEO1014 is the tenure of the CEO minus 10 if the CEO's tenure is greater than 10 years and less than 15 years. If the CEO's tenure is less than 10 years, CEO1014 equals 0, and if the CEO's tenure is greater than 15 years, CEO59 equals 5.

^lThe variable CEO15 is the tenure of the CEO minus 15 if the CEO's tenure is greater than 15 years. If the CEO's tenure is less than 15 years, CEO15 equals 0.

^mMEDIN is the median tenure of the inside directors on the board.

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^oFAMILY COMPANY is a dummy variable which takes the value one if any two directors are related.

^pThe variable ADV is the company's expenditures on advertising weighted by an estimate of the replacement value of the firm's assets.

^qThe variable R & D is the company's expenditures on research and development weighted by an estimate of the replacement value of the firm's assets.

^rThe variable log(Assets) is the natural logarithm of an estimate of the replacement value of the firm's assets.

malin and Weisbach [16]) rather than firms with outsiders on their board performing poorly.

IV. Discussion and Conclusions

The analysis of the previous sections reveals some interesting results. The most striking is that there appears to be no relation between board composition and performance. Admittedly, this could simply be due to insufficiently powerful tests. On the other hand, our results do suggest that even if such a relation does exist, it is small, with little *economic* significance. Although a “negative” result, it is important to consider the reasons behind it and their implications for our understanding of corporate governance and incentive theory.

One obvious explanation for this result is that board composition simply does not matter. Inside and outside directors are equally bad (or, possibly, good) at representing the shareholders' interests. This explanation is certainly consistent with top management's control of the board-selection process.

Yet, it is less consistent with the growing literature suggesting that outside directors play an important role in monitoring management (Weisbach [37], Brickley, et al [4], and Shivdasani [34]). A way to reconcile these other papers with ours is to recognize that there are good reasons to have inside directors. Mace [27] and Vancil [35] have argued that inside directors on the board facilitate the succession process. In addition, Mace [27] has suggested that inside directors help CEOs maximize value by providing both advice and knowledge about the day-to-day operations of the company. If each board is optimally weighted between insiders and outsiders, we would not expect to find a cross-sectional relation between board composition and performance in equilibrium. Moreover, the outside-director-as-monitor literature has focused on extraordinary events such as unusually bad performance or adoption of poison pills, from which it is difficult to

ascertain the value of day-to-day monitoring by outside directors.

A third explanation for our negative result is that firms, despite any variation in the severity of their underlying agency problems, reduce their agency problems to approximately the same level of residual agency. Since their residual agency problems — which are all that matter for performance — are the same, variation in performance will be uncorrelated with actions taken to reduce *underlying* agency problems such as board composition. This explanation would suggest that although a strong outsider-dominated board reduces agency costs, it is impossible to find evidence for this by regressing performance on board composition.

The results concerning stock ownership by top management and CEO tenure are consistent with the arguments presented above. At low levels of ownership (less than one percent), corporate performance improves with increases in ownership. At these levels, management's interests are increasingly aligned with the shareholders'; but with less than one percent of the stock, management does not own enough stock to insulate it from other disciplinary devices such as the takeover market. Beyond one percent, corporate performance declines with ownership, possibly because the increasing insulation from disciplinary devices more than offsets the increased alignment of interests. These results, which were obtained using an econometric technique that controls for the endogeneity of managerial shareholdings, serve to confirm the findings of other authors (Mørck, et al [29] and McConnell and Servaes [28]) and to suggest that the results of this prior research were not driven by its assumption of exogenous shareholdings.

Much work remains to be done in this area. First, stronger tests should be developed to discern whether board composition has any effect on firm performance. Second, the relation between board composition and incentive contracts should be investigated — in particular,

are these controls complements or substitutes. Finally, more work is needed on the extent to which firm performance is determined by the incentives provided to managers.

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