Firm Performance and Mechanisms to Control Agency Problems between Managers and Shareholders

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Abstract

This paper examines the use of seven mechanisms to control agency problems between managers and shareholders. These mechanisms are: shareholdings of insiders, institutions, and large blockholders; use of outside directors; debt policy; the managerial labor market; and the market for corporate control. We present direct empirical evidence of interdependence among these mechanisms in a large sample of firms. This finding suggests that cross-sectional OLS regressions of firm performance on single mechanisms may be misleading. Indeed, we find relationships between firm performance and four of the mechanisms when each is included in a separate OLS regression. These are insider shareholdings, outside directors, debt, and corporate control activity. Importantly, the effect of insider shareholdings disappears when all of the mechanisms are included in a single OLS regression, and the effects of debt and corporate control activity also disappear when estimations are made in a simultaneous systems framework. Together, these findings are consistent with optimal use of each control mechanism except outside directors.

I. Introduction

Agency problems arise within a firm whenever managers have incentives to pursue their own interests at shareholder expense. Several mechanisms can reduce these agency problems. An obvious one is managerial shareholdings. In addition, concentrated shareholdings by institutions or by blockholders can increase managerial monitoring and so improve firm performance, as can outsider representation on corporate boards. The use of debt financing can improve performance by inducing monitoring by lenders. The labor market for managers can motivate managers to attend to their reputations among prospective employers and

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so improve performance. Finally, the threat of displacement imposed by the market for corporate control can create a powerful discipline on poorly performing managers.

The effect that these several mechanisms to control manager-shareholder agency problems have on firm performance has been the subject of a number of empirical studies. One strain of empirical work looks at a particular event that alters the extent to which a mechanism is employed, such as the addition of an outside director to the firm's board (Rosenstein and Wyatt (1990)). If the event triggers an unexpected increase in the firm's stock price, this suggests that the mechanism works to improve performance. Other studies in this vein look at the adoption of antitakeover amendments (DeAngelo and Rice (1983), Linn and McConnell (1983), and Jarrell and Poulsen (1987)), poison pills (Malatesta and Walkling (1988), and Ryngaert (1988)), dual-class voting structure for common stock (Partch (1987), and Jarrell and Poulsen (1988)), state antitakeover laws (Karpoff and Malatesta (1989)), executive stock and option plans (Bhagat, Brickley, and Lease (1985), Brickley, Bhagat, and Lease (1985), and DeFusco, Johnson, and Zorn (1990)), and golden parachute contracts (Lambert and Larcker (1985)).

Another strain, and the focus of this paper, searches across firms for relations between performance and greater use of one or several of the control mechanisms. Most noteworthy are a series of papers that examine the effect of more concentrated shareholdings on firm performance. Demsetz and Lehn (1985) find no cross-sectional relation between accounting rates of return and the concentration of shareholdings. In contrast, Morck, Shleifer, and Vishny (1988a) find a nonlinear relation between the fraction of stock held by members of the board and firm performance, as measured by Tobin's Q, and a less significant relation when firm performance is measured by accounting rate of return. At least when the fraction of shares held by the board is small, as is the case for most of their sample, greater board shareholding improves performance. McConnell and Servaes (1990) find a similar nonlinear relation. Hermalin and Weisbach (1991) also note a nonlinear effect of insider shareholdings in the course of an analysis of board composition on firm performance. While these findings are mixed, the latter papers imply that firms perform better when managers own a nontrivial fraction of the firm's shares.

These empirical relations between firm performance and the extent to which the various control mechanisms are used motivate the present paper. We make two simple arguments. First, since alternative control mechanisms exist, greater use of one mechanism need not be positively related to firm performance. Where one specific mechanism is used less, others may be used more, resulting in equally good performance. The existence of alternative control mechanisms and their possible interdependence also make regressions relating the use of any single mechanism to firm performance difficult to interpret. Because such regressions fail to consider interrelations among the control mechanisms, any findings may be spurious.

Second, the extent to which several of the control mechanisms are used is decided within the firm. Examples are insider shareholdings and the proportion of outside directors on the board. Like Demsetz and Lehn, we expect these choices will be made to maximize firm value. Use of a mechanism will be increased until marginal costs and marginal benefits to the firm are just equal. Other mechanisms, such as activity in the market for corporate control, are determined by outside

parties for whom some of the effects of their actions on firm value may be borne by others. Where these external effects exist, mechanisms need not be chosen to maximize firm value. Consequently, a cross-sectional search for the effects of all mechanisms on firm performance that properly accounts for their interdependence should find no effect for the internally chosen mechanisms but may find an effect for those chosen externally.

Our two arguments are not entirely new. Several recent papers have been concerned with the interaction among control mechanisms. Jensen, Solberg, and Zorn (1992) and Moyer, Rao, and Sisneros (1992) consider possible interactions. Jensen, Solberg, and Zorn examine empirically the simultaneous determination of insider ownership, debt policy, and dividend policy. Moyer, Rao, and Sisneros consider substitutability among board composition, insider ownership, institutional shareholding, analyst following, debt policy, and dividend policy, but not in a simultaneous system framework. Papers by Hermalin and Weisbach (1991) and by Holthausen and Larcker (1993) are most similar in approach to our own. Hermalin and Weisbach consider, in a simultaneous equations framework, the interaction between insider ownership and board composition. Their focus, however, is on the effect that these control mechanisms have on firm performance. Likewise, Holthausen and Larcker consider the interrelations among insider ownership, debt policy, and firm performance.

Our work is distinguished by the large and more complete set of control mechanisms that we consider. Our emphasis on the empirical implications of the distinction between internal and external control mechanisms is also novel. Finally, we are the first to address directly the empirical importance of the interdependence among control mechanisms on estimates of the effects that these mechanisms have on firm performance.

We employ a sample of nearly 400 large U.S. firms for which we measure insider shareholding, institutional shareholdings, shareholdings of large blockholders, representation of outsiders on the board of directors, use of debt, use of the external labor market for managers, and takeover activity. We analyze two issues. First, we find evidence of interdependence among the control mechanisms. Second, we examine the empirical relation between the mechanisms and firm performance as measured by Tobin's Q. Examining each mechanism separately, and so ignoring any interdependence among the mechanisms, we find that insider shareholding, outside representation on the board, debt policy, and activity in the corporate control market are all cross-sectionally related to firm performance. Examining all of the mechanisms together, but not within a systems framework, the empirical relation between insider shareholdings and firm performance disappears but those of board composition, debt policy, and corporate control activity remain. Finally, when the interdependence among mechanisms is accounted for in a simultaneous system estimation, only the negative effect of outsiders on the board on firm performance remains. These findings are consistent with control mechanisms being chosen optimally except for board composition. Boards of directors seem to have too many outsiders. Since the composition of the board is determined internally, this finding is puzzling.

The remainder of this paper is organized as follows. Section II discusses the relationships among the alternative control mechanisms and, in turn, their relation-

ship with firm performance. Section III details our empirical approach. Section IV describes the sample and data. Section V presents our empirical findings, and Section VI concludes.

II. Relationships among the Control Mechanisms and with Firm Performance

Four broad mechanisms work to provide incentives to managers and so alleviate the agency problems between managers and shareholders. Three rely on parties outside the firm to monitor managers. These are the use of debt, which relies on capital markets to evaluate a manager's performance; the labor market for managers; and the market for corporate control. The fourth mechanism, monitoring by the firm's own large shareholders and board members, however, creates its own agency problem: Who monitors the monitors? Again, several solutions are possible. More concentrated shareholdings by insiders provide a greater incentive to monitor and reward the chief executive effectively. Similarly, more concentrated shareholdings by outside blockholders or by institutions also provide an incentive for diligent monitoring. Finally, the market for directors serves to motivate outside directors and so, greater use of outside directors can lead to more effective internal monitoring.

In our characterization then, there are seven control mechanisms: the first three broad mechanisms and the four ways to facilitate the fourth broad mechanism. We distinguish these seven control mechanisms by the source of the monitoring that takes place. The use of debt relies on the capital market for monitoring. Similarly, the market for managers relies on prospective employers; the market for corporate control relies on prospective acquirers; insider shareholding relies on inside owners; institutional shareholding relies on institutional owners; blockholding relies on large outside owners; and use of outsiders on the board relies on these board members.

Since all of these control mechanisms are alternative ways to provide incentives to managers, each might plausibly be used instead of another. If so, we would expect use of the mechanisms to be negatively related. But this is not the only possibility. Positive relations might also exist. Consider, for example, the market for corporate control. Since takeover specialists must acquire control of a firm to replace poorly performing managers, greater insider shareholdings might assist the market for corporate control by making insiders less obstructive. The reason is that they gain more from the stock price appreciation. If this effect dominates, insider shareholdings would be positively related to corporate control activity. Similarly, corporate control activity might be positively related to the representation of outsiders on the board since outside directors can facilitate a takeover. Likewise, greater institutional shareholdings might facilitate takeovers as could bigger blocks held by outsiders both because transaction costs may be less and because the size of these holdings would reduce the free-rider problem that could lead small shareholders to refuse to tender. Finally, greater reliance on the external managerial labor market means that a manager has less to fear from displacement. As a consequence, he is less likely to resist a takeover attempt. For each of these mechanisms, then, both positive and negative relations with cor-

porate control activity are plausible. A similar ambiguity exists for the relations between many of the other control mechanisms. Given this ambiguity, we cannot test for particular relations but we do explore these relations empirically and use our results to interpret the forces at work.

Of the seven alternative control mechanisms, the use of four is decided by the firm's internal decision makers and the use of the other three is determined by outside parties. Insider shareholding, outside representation on the board, reliance on debt financing, and reliance on external labor markets are all internal decisions. Institutional shareholdings, outside blockholdings, and activity in the market for corporate control are decisions made by outsiders.

Will decisions about the use of each of these mechanisms be made optimally? That is, greater use of each mechanism yields a benefit by improving managerial incentives but also entails a cost. This cost may be a direct cost; for example, the additional cost of risk bearing due to the loss of portfolio diversification associated with greater insider shareholding. Or, it may be an indirect cost; for example, the greater cost of internal contracting when a more active market for corporate control makes shareholder assurances to managers less credible (Knoeber (1986)). Optimal choices require the use of a mechanism to be increased until marginal benefit just offsets marginal cost. For those mechanisms chosen internally by the firm's decision makers, all of the costs and benefits should be considered. For example, acting independently, a manager might choose to hold too few shares because he bears all of the cost of lost diversification and enjoys only a part of the benefit from better firm performance. But we would expect the extent of insider shareholdings to be negotiated within the firm, rather than being chosen independently by each manager, and so to reflect all of the costs and benefits. Conversely, for those mechanisms chosen by outside parties, part of the costs or benefits may be borne by parties other than those choosing the use of the mechanism. As a consequence, these choices need not maximize firm value. For example, a takeover decision will be made on the basis of the benefit and cost to the acquirer. Gains going to other parties such as the shareholders of the target will be ignored. Likewise, costs incurred by other parties such as the greater cost of internal contracting when takeovers are more likely will be ignored. As a result, it is possible that the extent of takeover activity chosen will be greater than, less than, or equal to that which maximizes firm value.

Demsetz and Lehn (1985) make a similar argument. They characterize a firm's ownership structure as being cooperatively decided by shareholders and so leading to firm value maximization. Our own approach is only partly consistent with this characterization. Like Demsetz and Lehn, we treat the division of shares between insiders and outsiders, insider shareholding, as chosen internally and so leading to firm value maximization. Unlike Demsetz and Lehn, however, we treat each outside shareholder as making an independent choice of the size of his shareholdings. So, we characterize the concentration of outside shareholdings by institutions and blockholders as chosen externally and, as a consequence, not necessarily consistent with firm value maximization.

If the four internal mechanisms are selected optimally, a carefully specified cross-sectional regression should find no relation between firm performance and the use of these mechanisms. This is not to say that the mechanisms are ineffective.

If a firm altered the use of one of these mechanisms, this would likely lead to a change in managerial behavior and so to a change in the firm's performance. But if these mechanisms are chosen optimally, any cross-sectional variation in their use reflects differences in firms' underlying environments, *not* mistaken choices. If these differences are controlled for, or if mechanism use is unrelated to the environment, then there should be no cross-sectional relation between the extent to which these mechanisms are used and firm performance. In contrast, variation across firms in the use of the three external mechanisms may reflect both differences in firms' environments *and* nonvalue maximizing choices. So, even a carefully specified regression might yield a cross-sectional relation between firm performance and the extent to which the three external mechanisms are used. We test this hypothesis.

III. Empirical Approach

The choice of any of the seven control mechanisms may depend upon choices of the other six, but these choices will depend on other factors as well. These other factors are largely related to the technology of production, the markets in which the firm operates, and characteristics of the CEO. We treat these other factors as exogenous both for tractability and to keep our focus on the endogeneity of the control mechanisms.

Consider first insider shareholdings, which we measure as the percentage of shares owned by officers and directors and denote POD. We expect POD to depend not only on choices of the other control mechanisms but also to be less where the cost of such shareholding is greater. This cost arises from holding an undiversified portfolio. We use the standard deviation of stock returns, σ_s, and firm size, ASSET, as indicators of this cost. ASSET is defined as the book value of total assets. In addition, Demsetz and Lehn (1985) argue that regulation may restrict the options open to a manager and so reduce the need for any incentive mechanism. We measure regulation using a dummy variable, REG, that equals one for regulated firms and zero otherwise. Following Demsetz and Lehn, REG should be negatively related to POD. Also, longer serving CEOs are likely to hold more shares. The longer time as CEO permits greater accumulation of shares, and it takes the firm closer to the CEO's final year. Dechow and Sloan (1991) argue that CEO shareholdings are most important to provide incentives in this final year. We denote years as CEO by TENURE and expect this to be positively related to POD. Founding CEOs may maintain larger shareholdings either to keep control over the firm or to avoid capital gains taxes. If so, there should be a positive relation between POD and the presence of a founding CEO. We use a dummy variable, FOUNDER, to indicate the presence of a founding CEO. Finally, POD should be positively related to the number of officers and directors, denoted NOD. The reason is that the cost of insider shareholdings, resulting from under-diversified portfolios, will be less when these shares are divided among a larger number of insiders. Assuming that these and all subsequent relations are linear, and denoting

M_j as the mechanism on the left-hand side and $M_{i\neq j}$ as the other six mechanisms, we have

$$(1)\quad \text{POD} = b_o + \sum_{i\neq j} b_i M_i + b_7\sigma_s + b_8\text{ASSET} + b_9\text{REG} + b_{10}\text{TENURE} + b_{11}\text{FOUNDER} + b_{12}\text{NOD}.$$

Similarly, we expect that shareholdings by outside blockholders will be related negatively to σ_s, ASSET, and REG. We measure outside blockholdings as the percentage of shares held by owners of 5 percent or more of the equity and denote this variable as PFIVE. Additionally, Zeckhauser and Pound (1990) argue that as the industry average research and development (R&D) to asset ratio rises, technology becomes more firm-specific, making outside monitoring less effective. We denote the industry R&D to asset ratio as RDAI and expect this variable to be negatively related to PFIVE. Summarizing,

$$(2)\quad \text{PFIVE} = b_o + \sum_{i\neq j} b_i M_i + b_7\sigma_s + b_8\text{ASSET} + b_9\text{REG} + b_{10}\text{RDAI}.$$

As with insider shareholdings and outside blockholdings, institutional shareholdings should be less in regulated firms since regulation acts to reduce agency problems between managers and shareholders. We measure institutional shareholdings as the percentage of shares held by institutions, PINST, and expect a negative relation between PINST and REG. Unlike insider shareholdings and outside blockholdings, though, we do not expect PINST to be related to σ_s. The reason is the large scale of institutional portfolios. PINST should, however, depend upon the attractiveness of firms to institutions. We expect larger firms and those listed on the New York Stock Exchange (NYSE) to be more attractive to institutions. So, PINST should be positively related to ASSET and NYSE, where the latter is a dummy variable indicating listing on the NYSE. An additional measure of attractiveness to institutions is the average number of institutional shareholders for firms in the industry, which we denote NINSTI. Again, we expect a positive relation between PINST and NINSTI,

$$(3)\quad \text{PINST} = b_o + \sum_{i\neq j} b_i M_i + b_7\text{ASSET} + b_8\text{REG} + b_9\text{NINSTI} + b_{10}\text{NYSE}.$$

We measure the extent of outsider membership on the board as OBOARD, the percentage of board seats held by nonofficers. OBOARD should be negatively related to REG. Presuming that founders are autocratic, OBOARD should also be negatively related to FOUNDER. The greater visibility of large firms may induce more board seats devoted to representatives of the public, for example consumer or environmental interests. If so, OBOARD will depend positively on ASSET. Additionally, as a firm is more diversified, outsiders each with knowledge of a particular line of business may comprise a larger share of the board seats. We measure diversification by LOB3, the number of different lines of business at the 3-digit SIC level in which a firm is engaged. We expect a positive relation between LOB3 and OBOARD,

$$(4)\quad \text{OBOARD} = b_o + \sum_{i \neq j} b_i M_i + b_7\text{ASSET} + b_8\text{REG} + b_9\text{FOUNDER} + b_{10}\text{LOB3}.$$

We measure a firm's reliance on the external labor market for managers inversely by the CEO's firm-specific human capital. We use the length of time the CEO has been employed by the firm as an indicator of his firm-specific human capital and denote this FSHC. We expect FSHC to depend positively on the age of the CEO, denoted AGE, since the number of years that a CEO *can* be employed by a firm rises with age. It should also depend positively on REG since regulation reduces agency problems and FSHC is an inverse measure of reliance on the market for managers. The effect of FOUNDER on FSHC is ambiguous. Founders have been with their firms longer than nonfounders, but their firms are likely to be younger. In addition, FSHC should be negatively related to the number of outside job opportunities available to a manager. We measure the latter as JOBS3, the number of other NYSE firms in the same primary 3-digit SIC industry as the firm,

$$(5)\quad \text{FSHC} = b_o + \sum_{i \neq j} b_i M_i + b_7\text{FOUNDER} + b_8\text{AGE} + b_9\text{REG} + b_{10}\text{JOBS3}.$$

We measure a firm's use of debt as D/V, the ratio of book value of debt to firm value. D/V should depend positively upon firm size, ASSET, as the expected bankruptcy costs of debt should be smaller for larger firms. D/V should also depend negatively on REG since regulation reduces agency problems. It should also depend negatively on the firm's cash flow return, denoted CR, since the availability of internal funds provides an alternative to debt financing,[1]

$$(6)\quad \text{D/V} = b_o + \sum_{i \neq j} b_i M_i + b_7\text{ASSET} + b_8\text{REG} + b_9\text{CR}.$$

Finally, we measure corporate control activity by the fraction of firms acquired over the preceding seven years within a firm's two-digit SIC industry. We denote this as PACQ and include it as one of the other mechanisms in equations (1)–(6), but since it is an industry measure, we do not seek to explain PACQ itself.

Each of the control mechanisms depends upon all of the others as specified in equations (1)–(6). To estimate these relationships empirically, we adopt a simultaneous equations framework and employ the two-stage least squares (2SLS) procedure. There are 13 exogenous variables in the six equations. Because PACQ is also endogenous, at least five of the exogenous variables must be excluded from any single equation to identify the system. Our development of equations (1)–(6) is motivated partially by the need for these exclusion restrictions to be met. Many of

[1]Following Bradley, Jarrell, and Kim (1984) and Titman and Wessels (1988), we also added other explanatory variables to (6). These included the collateral value of assets, growth opportunities, nondebt tax shields, and the volatility of cash flow. We found these additional variables to be statistically insignificant. Since they seemed primarily to add noise to the system, we adopted the more spare specification given in (6).

the exclusion restrictions seem noncontroversial. For example, a manager's tenure as CEO is unlikely to be related to PFIVE, PINST, OBOARD, or D/V. TENURE ought to be excluded from each of these equations. Excluding TENURE from the FSHC equation, as we do, is more problematic. Three other problematic choices are our decisions to exclude RDAI from the PINST equation, NINSTI from the PFIVE equation, and LOB3 from the D/V equation. The argument for including RDAI in the PFIVE equation may apply to PINST as well. Similarly, as NINSTI increases, PFIVE may decrease; and LOB3 may affect D/V.

In addition to the interrelations among the control mechanisms, we also examine the cross-sectional relation between the mechanisms and firm performance, measured by Tobin's Q. Following Morck, Shleifer, and Vishny (1988a), we control for expenditure on R&D and expenditure on advertising, each measured relative to ASSET. We denote these variables as RDA and ADVA. Both should indicate growth opportunities and so should be positively related to Q. Finally, we control for firm size, measured by ASSET, since growth opportunities and Q should be lower for larger firms,

$$(7) \qquad Q = b_o + \sum_{i=1}^{7} b_i M_i + b_8 \text{RDA} + b_9 \text{ADVA} + b_{10} \text{ASSET}.$$

We estimate (7) two ways. First, we use OLS. This allows us to examine the effect of all the control mechanisms together, but treats each as exogenous. Second, we include (7) along with (1)–(6) in a simultaneous system, adding Q as an independent variable in (1)–(6), and use two-stage least squares (2SLS) to estimate the system. This treats Q as endogenous along with the control mechanisms, allowing each of the mechanisms to affect Q but also allowing Q to affect the choice of each mechanism.

IV. Sample and Data

The starting point of our sample is the set of Forbes 800 firms in 1987. These are firms that appear in any of the four lists, made by Forbes magazine in 1988, of the 500 largest U.S. firms as measured by sales, total assets, market value of equity, or profits. About 800 firms make it into one or more of these lists. For each of these firms, we obtain the following data for 1987 (the end of 1987 in the case of stock items) from Forbes magazine's annual survey of top executive compensation: the CEO's age (AGE), tenure as CEO (TENURE), number of years with the firm (FSHC), and whether or not he founded the firm (FOUNDER). Data on the ownership structure of each firm are obtained from DISCLOSURE CD-ROM. These include the percentages of outstanding equity owned by officers and directors (POD), by 5 percent owners (PFIVE), and by institutions (PINST) as well as the number of officers and directors (NOD) and the number of institutional owners.[2] NINSTI is the average number of institutional owners for the 3-digit SIC industry of a firm.

[2]Unfortunately, DISCLOSURE does not report the number of officers and directors. We approximate this number as the number of officers, directors, and 10-percent owners minus the number of 5-percent owners, both of which are reported by DISCLOSURE. Thus, our measure of the number of officers and directors is an underestimate. However, the magnitude of this bias is not large. The

We obtain the following data from Standard & Poor's Register of Corporations, Directors, and Executives: the number of members of the board of directors, the number of nonemployee directors, and the number of different lines of business in which a firm operates (LOB3). OBOARD is the percentage of nonemployee directors on a firm's board. From COMPUSTAT annual files (Industrial, Industrial Research, OTC, and OTC Research) we obtain: total assets (ASSET), Tobin's Q, cash flow return (CR), and the ratios of debt to firm value (D/V), R&D expenses to total assets (RDA), and advertising expenses to total assets (ADVA). RDAI is the average RDA for a firm's 3-digit SIC industry. Tobin's Q is defined as the simple Q measure, Qs, in Perfect and Wiles (1994),

$$Q = \frac{\text{V}}{\text{ASSET}}$$

where

V	=	EQUITY + LTD + STD + PFD + CV,
EQUITY	=	Market value of equity,
LTD	=	Book value of long-term debt,
STD	=	Book value of short-term debt,
PFD	=	Preferred stock at liquidating value,
CV	=	Book value of convertible debt and convertible preferred stock,
ASSET	=	Book value of total assets.[3]

Perfect and Wiles report that this measure of Q has a correlation of 0.93 with that estimated using the Lindenberg and Ross (1981) approach. We adopt the simple measure of Q because of this high correlation, its ease of computation, and to maximize the availability of data.

Following Healy, Palepu, and Ruback (1992), we define the operating cash flow return on firm value as

$$\text{CR} = \frac{\text{OCF}}{\text{V}},$$

and the debt to firm value ratio as

$$\text{D/V} = \frac{\text{LTD} + \text{STD} + \text{PFD} - \text{CASHS}}{\text{V}},$$

where

OCF	=	Sales − Cost of goods sold − Selling and administrative expenses + Depreciation,
CASHS	=	Cash and marketable securities.

number of owners who hold between 5 percent and 10 percent of equity is small in our sample, given that the median number of owners of 5 percent or more of equity is 1 (first quartile = 0, third quartile = 3).

[3]If a COMPUSTAT variable is missing for a firm but that firm's ASSET is reported, we replace the missing variable with the firm's ASSET multiplied by the average ratio of that variable to ASSET for all firms on COMPUSTAT files in the 3-digit SIC industry of the firm. For a few variables in a few industries, where an average ratio for a certain variable cannot be computed at the 3-digit level, we compute it at the 2-digit level. This approach is borrowed from Morck, Shleifer, and Vishny ((1988a), fn. 6).

We calculate the standard deviation of stock returns (σ_s) for each firm using the 60 monthly observations on rate of return from January 1983 to December 1987 from CRSP files. Where some observations are missing, we require a minimum of five return observations to compute σ_s. We measure the probability of acquisition for a firm (PACQ) as the relative frequency of acquisitions of NYSE firms in the firm's 2-digit SIC industry over the seven-year period preceding December 31, 1987. This procedure is based on Palepu's (1986) evidence that a firm's industry is an important determinant of its probability of acquisition. The exact procedure that we use is as follows: we obtain a list of all firms that were listed on the NYSE as of December 31, 1980, from CRSP files. From this set, we identify all firms that were delisted over the next seven years due to a merger or reorganization. We then compute an industry-specific probability of acquisition over this period using 2-digit SIC codes. We calculate job opportunities for a CEO (JOBS3) as the number of NYSE firms in the same 3-digit SIC industry. Finally, we define a firm to be regulated (REG = 1) if its primary SIC code indicates that it is a railroad, public utility, banking, finance, or insurance firm (2-digit SICs 40, 48, 49, 60, 61, or 63). For other firms, REG = 0.

Complete data are available for 383 firms. This is the sample that we use in the subsequent empirical work. For this sample, the average equity ownership of officers and directors is 6.3 percent (median = 1.7 percent). Institutions and 5-percent owners have median holdings of 50.9 percent and 9.6 percent of the outstanding equity, respectively. The median firm in our sample has 19 officers and directors and 164 institutional owners.

The CEO of the median firm is 58 years old, has been with his firm for a total of 28 years, and has served as CEO for the last six years. About 7.8 percent of the CEOs are also founders of their firms. Three-fourths of the board members of the typical firm are outsiders. About 27 percent of the NYSE firms in the 2-digit SIC industry of the typical firm were acquired over the seven-year period 1981–1987. The median firm in our sample operates three lines of business. About 19 percent are in a single line of business, about 28 percent are in seven or more businesses.

The average firm in our sample had assets totaling \$5.8 billion (median = \$2.8 billion) at the end of 1987. Average Tobin's Q of our sample firms is 1.14 (median = 0.93). The median cash flow return is 15 percent and the median financial leverage (D/V) ratio is 19 percent. The median firm annually spends about 0.7 percent of its assets on R&D and 0.6 percent on advertising. The standard deviation of monthly stock returns of the typical (median) firm is 8.9 percent. The typical firm in our sample is in an industry with 11 NYSE firms. About 96 percent of the sample firms are themselves listed on the NYSE, and about 23 percent are in regulated industries.[4]

V. Empirical Findings

This section presents our empirical results. We first examine the relationships among the control mechanisms. Then we investigate the relationship between firm performance and the control mechanisms.

[4]Complete summary statistics are available from the authors.

A. Relationships among the Control Mechanisms

To examine the relationships among the control mechanisms, we estimate (1)–(6) as a system of linear equations using 2SLS. Except for corporate control activity for which we do not have firm level data, each of the control mechanisms

TABLE 1

Coefficient Estimates from Two-Stage Least Squares (2SLS) Regressions of Control Mechanisms

	Dependent Variable					
Independent Variables	POD (Insider Shareholding)	PINST (Inst. Shareholding)	PFIVE (Blockholding)	OBOARD (Board Outsiders)	FSHC (CEO Human Capital)	D/V (Leverage)
Constant	−3.11 (−0.05)	10.99 (0.22)	36.19 (0 57)	75.33* (6.07)	45.87 (0.68)	−1.38** (−2.17)
POD (Insider Shareholding)		0.21 (0.34)	0.23 (0.28)	−0 06 (−0.15)	0.92 (1.32)	0.02*** (1.88)
PINST (Inst. Shareholding)	0.32 (0.52)		−1.20* (−3.34)	−0.02 (−0.06)	−0.85*** (1.80)	−0.006 (−0.78)
PFIVE (Blockholding)	0.50 (0.82)	−0.32*** (−1.73)		−0.11 (−0.55)	−0.90** (−2 50)	0.0002 (0.04)
OBOARD (Board Outsiders)	−0.04 (−0.06)	0.12 (0.19)	0.14 (0.18)		−0.68 (−0.76)	0.02** (2.47)
FSHC (CEO Human Capital)	−0.26 (−0.89)	−0.03 (−0.18)	0.13 (0.45)	−0.12 (−0.88)		−0.003 (−1.00)
D/V (Leverage)	−6.09 (−0.28)	13.07 (0.67)	18.83 (0.62)	7.95 (0 62)	25.75 (1 16)	
PACQ (Acquisition Prob.)	−38.65 (−0.58)	98.93* (3.59)	122.92* (2.93)	−11.06 (−0.37)	89.81 (1.25)	−0.33 (−0.45)
σ_S (Return Variability)	−39.74 (−0.37)		159.49 (1.60)			
LASSET (Log Firm Size)	0.58 (0.28)	−1.21 (−0.74)	−3.08 (−1.21)	0.42 (0.34)		0.07* (3.10)
REG (Regulated Firm)	2.58 (0.32)	−7.07 (−1.61)	−11.94*** (−1.69)	0.38 (0 10)	−13.29*** (−1.89)	0.03 (0.31)
TENURE (CEO Tenure)	0.41*** (1.87)					
FOUNDER (CEO Founder)	3.46 (0.53)			−7.87*** (−1.82)	−13.95 (−1.38)	
NOD (Number of Insiders)	0.03 (0.22)					
NYSE (Listed on NYSE)		12.76*** (1.70)				
NINSTI (Industry Inst. Owners)		0 02 (0 92)				
RDAI (Industry R&D)			−9 67 (−0.12)			
LOB3 (Diversification)				0.31 (1.45)		
AGE (CEO Age)					0.90* (4.32)	
JOBS3 (CEO Job Alternatives)					0.10 (0 45)	
CR (Cash Flow Return)						−0.52** (−2.40)
Adjusted R^2	0.11	0.13	0.08	0.05	0.05	0.12
p-value of F-test	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

*Significant at 0.01 level; **significant at 0.05 level; and ***significant at 0.10 level.
The sample consists of 383 Forbes 800 firms in 1987. Variables are defined in the Appendix.

appears on the left-hand side of one equation and the right-hand side of each of the others. Results of the 2SLS estimation are presented in Table 1.[5,6]

In Table 1, the coefficients on the exogenous variables generally have the predicted sign but are often statistically insignificant. As a result, coefficient estimates for the endogenous control mechanism variables may be imprecise. Nevertheless, there is an interesting pattern of interdependence among several of these control mechanisms. A more active market for corporate control, PACQ, is associated with greater shareholding by blockholders, PFIVE, and by institutions, PINST, suggesting a complementarity between large outside shareholders and the market for corporate control. Since we cannot include an equation with PACQ on the left-hand side in our estimation, we cannot analyze which way this effect runs. A more active market for corporate control may induce greater outsider shareholdings or the reverse. Shareholdings by blockholders and by institutions appear to be alternative avenues for outsider activism since more of either leads to less of the other. Firm-specific human capital of the CEO, FSHC, affects none of the other mechanisms, but is itself reduced by outside blockholdings and by institutional shareholdings. Apparently, active outside shareholders create pressure to rely more on the labor market to evaluate managers. Finally, none of the other mechanisms affect either insider shareholding, POD, or the use of outsiders on the board of directors, OBOARD, but an increase in each of these leads to greater use of debt, D/V. This suggests that the discipline implied by lender monitoring is most effective when coupled with greater internal monitoring either by inside shareholders or by outside members of the board.

B. Firm Performance and the Control Mechanisms

We turn now to the relationships between firm performance and use of the control mechanisms. Before allowing for the interrelations among the control mechanisms, we first estimate regressions where firm performance depends upon only a single control mechanism. Variants of these estimations are typical in the literature and ignore alternative mechanisms to improve performance and the possible endogeneity of these mechanisms.

Table 2 presents results from these OLS estimations where Q is regressed on individual control mechanisms along with the other determinants of performance described in (7). We also include a binary variable, FIN, which takes the value one for financial firms. Our rationale is that the definition of assets for financial firms causes their Q to be systematically different from that for other firms.[7] The first seven columns in Table 2 display our results for each of the seven control mechanisms. The last column allows for the nonlinear effect of insider shareholding on firm performance first documented by Morck, Shleifer, and Vishny (1988a).

[5] As noted earlier, identification of the system of equations requires exclusion restrictions. These restrictions appear to hold in the data. Using Basmann's (1960) test, we find that the null hypothesis of overidentification cannot be rejected at the 5-percent level for any of the equations.

[6] In these and all subsequent estimates, we normalize the distribution of firm size (ASSET) by using its natural log, LASSET.

[7] Demsetz and Lehn (1985) include a dummy variable for such firms. McConnell and Servaes (1990) exclude financial firms from their sample. Our sample contains only 18 financial firms. Excluding them has little qualitative effect on the results.

Greater outside representation on the board of directors, more debt financing, and more corporate control activity all lead to poorer firm performance. Greater insider shareholding leads to better firm performance, at least when nonlinear effects are allowed, although our evidence is weaker than that found by others.[8]

TABLE 2

Coefficient Estimates from Ordinary Least Squares (OLS) Regressions of Firm Performance (Tobin's *Q*) on Individual Control Mechanisms

	Dependent Variable = *Q* (*t*-statistics)							
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	2.86* (10.98)	3.03* (11.56)	2.94* (11.27)	3.37* (12.14)	2.97* (12.05)	2.97* (12.27)	3.19* (12.41)	2.77* (10.36)
POD (Insider Shareholding)	0.004 (1.50)							0.012*** (1.89)
POD^2								−0.0001 (−1.35)
PINST (Inst. Shareholding)		−0.0008 (−0.42)						
PFIVE (Blockholding)			0.0008 (0.55)					
OBOARD (Board Outsiders)				−0.007* (−2.87)				
FSHC (CEO Human Capital)					0.003 (0.93)			
D/V (Leverage)						−0.55* (−3.76)		
PACQ (Acquisition Prob.)							−0.64** (−2.51)	
RDA (Firm R&D)	5.09* (5.18)	5.14* (5.02)	5.08* (5.13)	4 88* (5.00)	5 05* (5.13)	3.80* (3.72)	5.35* (5.42)	5.02* (5.10)
ADVA (Firm Advertising)	4.26* (5.16)	4.29* (5.19)	4.25* (5.11)	4.32* (5.27)	4.24* (5.12)	3.68* (4.45)	4.53* (5.48)	4.27* (5.18)
LASSET (Log Firm Size)	−0.24* (−7.75)	−0.26* (−8.47)	−0.25* (−8.07)	−0.24* (−8.02)	−0.26* (−8.48)	−0.23* (−7.74)	−0.26* (−8.67)	−0.23* (−7.37)
FIN (Financial Firm)	−0.29*** (−1.84)	−0.26*** (−1.65)	−0.27*** (−1.72)	−0.27*** (−1.75)	−0.23 (−1.45)	−0.23 (−1.50)	−0.22 (−1.43)	−0.32** (−2.00)
Adjusted R^2	0.31	0.30	0.30	0.32	0.31	0.33	0.32	0.31
p-value of *F*-test	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

*Significant at 0.01 level; **significant at 0.05 level; and ***significant at 0.10 level.
The sample consists of 383 Forbes 800 firms in 1987. Variables are defined in the Appendix.

The results in Table 2 are consistent with greater insider shareholdings, fewer outside directors, less corporate debt, and a less active market for corporate control all leading to improved firm performance. But these results are also consistent with causality running the other way. Better firm performance may lead to greater insider shareholdings, fewer outsiders on the board, less debt, and fewer takeovers. The 2SLS estimations that follow permit us to address the issue of which way the relation runs in each case except that for firm performance and corporate control activity, PACQ. Since PACQ is an industry variable, we cannot include an equation explaining it in our system estimation. Evidence in Morck, Shleifer, and Vishny (1988b) that hostile takeovers are more likely in poorly performing industries and

[8]McConnell and Servaes (1990) calculate turning points where increased insider shareholdings cease to improve firm performance and begin to reduce it. The range of their turning points is 35 percent to 70 percent. Based on column eight of Table 2, the turning point in our sample is 60 percent.

similar evidence at the firm level in Asquith (1983) and Palepu (1986), however, suggest that the most plausible interpretation of the negative relation between PACQ and Q is that poor performance leads to greater corporate control activity.

To provide a sense of the magnitude of the effects in Table 2, consider a firm with performance equal to the sample mean employing a control mechanism at the level of the first quartile. If use of the control mechanism is increased to the level of the third quartile, what effect will this have on performance? For insider shareholding, this change would increase performance by about 9 percent. For either outsider representation on the board or activity in the market for corporate control, performance would decline by 10 percent. For firm debt, performance would decline by 22 percent. These results seem to suggest that insider shareholding, outside representation on the board, firm debt, and corporate control activity have not been chosen to maximize firm performance. Insider shareholding tends to be too small, and outsider representation on the board, debt financing, and corporate control activity all tend to be too large.

But each of these inferences ignores the existence of the other control mechanisms and the interdependence among the mechanisms and so may be misleading. To explore this possibility, the first column in Table 3 presents results for an OLS regression similar to those in Table 2 except that here, firm performance is regressed on all of the control mechanisms together. This regression does not allow for any interdependence in the choices of control mechanisms, but it does allow for the availability of alternative control mechanisms. Compared to the regression in column 8 of Table 2, the effect of insider shareholdings is much weaker in this regression. Not only is the coefficient on POD smaller but it is now statistically insignificant. However, the other effects identified in Table 2 persist. More outsiders on the board of directors, more debt financing, and a more active market for corporate control all are negatively related to firm performance. The coefficients on OBOARD, D/V, and PACQ have values and significance levels very similar to those in Table 2.

The regression reported in the second column of Table 3 not only allows for the availability of alternative control mechanisms but also for their interdependence. This regression is estimated using 2SLS within a simultaneous system like that in Table 1 but expanded to include not only equations (1)–(6), which explain the control mechanisms, but also (7), which explains firm performance. Here, Q is added as an independent variable to equations (1)–(6). We also add FIN to (7) and an interaction variable $Q * \text{FIN}$ to (1)–(6) for the same reason that we added FIN to the regressions reported in Table 2: the definition of assets makes Q systematically different for financial firms.[9] This system treats firm performance as well as use of the control mechanisms as endogenous and allows each to affect the others. Comparing this 2SLS estimate with the OLS estimate in the first column, the coefficient on insider shareholding becomes negative but is still statistically insignificant. Similarly, the coefficient on firm debt becomes positive and loses statistical significance. The negative coefficient on corporate

[9]We do not show a separate table for the control mechanism equations similar to those in Table 1. Results for the system that includes Q are very similar to those reported in Table 1. Introducing Q on the right-hand side of the control mechanism regressions matters only for firm debt. Greater Q reduces D/V.

TABLE 3

Coefficient Estimates from Ordinary Least Squares (OLS) and Two-Stage Least Squares (2SLS) Regressions of Firm Performance (Tobin's *Q*) on Control Mechanisms

Independent Variables	OLS Estimates (1)	2SLS Estimates (2)
CONSTANT	3.40*	10.14*
	(9.99)	(3.07)
POD	0.007	−0.04
(Insider Shareholding)	(1.05)	(−0.65)
POD^2	−0.00009	−0.0005
	(−0.84)	(−0.28)
PINST	−0.0001	0.02
(Inst. Shareholding)	(−0.07)	(0.71)
PFIVE	0.0003	−0.006
(Blockholding)	(0.20)	(−0.24)
OBOARD	−0.006**	−0.10**
(Board Outsiders)	(−2.32)	(−2.35)
FSHC	0.0008	0.007
(CEO Human Capital)	(0.29)	(0.49)
D/V	−0.54*	2.21
(Leverage)	(−3.60)	(1.46)
PACQ	−0.79*	−0.98
(Acquisition Prob.)	(−3.06)	(−0.23)
RDA	4.13*	3.31
(Firm R&D)	(3.98)	(0.81)
ADVA	3.98*	8.09*
(Firm Advertising)	(4.81)	(2.81)
LASSET	−0.22*	−0.38*
(Log Firm Size)	(−6.69)	(−2.85)
FIN	−0.23	0.10
(Financial Firm)	(−1.44)	(0.20)
Adjusted R^2	0.35	0.05
p-value of *F*-test	<0.001	<0.001

*Significant at 0.01 level; **significant at 0.05 level; and ***significant at 0.10 level
The sample consists of 383 Forbes 800 firms in 1987. Variables are defined in the Appendix.

control activity is slightly larger in magnitude in the 2SLS estimate but no longer statistically significant. Finally, the negative coefficient on outsiders on the board increases in magnitude without any reduction in statistical significance.[10]

A potential explanation for the results in Tables 2 and 3 is that industry patterns exist in the use of control mechanisms, and that this along with an industry pattern in *Q*, is responsible for the empirical regularities that we find. To evaluate this possibility, we first sorted firms into 20 industries using the classification in Song and Walkling (1993) and then looked for industry patterns in the use of control mechanisms. Except for corporate control activity, PACQ, which is itself an industry measure, we found little evidence of such patterns. Typically, the unweighted mean of the within-industry standard deviations for an individual control mechanism is about 90 percent of the standard deviation across all firms.

[10]Again, the null hypothesis of overidentification cannot be rejected at the 5-percent level using Basmann's (1960) test.

Similarly, while the mean (of absolute values) within-industry correlation coefficient between mechanisms is typically larger than the correlation coefficient for all firms, few within-industry correlation coefficients are statistically significant. The within-industry correlation between insider shareholding, POD, and outside blockholding, PFIVE, is significant at the 5-percent level in eight of the 19 industries for which we could perform the calculation. No other correlation is significant in more than five industries. Most are significant in fewer than three industries. This suggests little role for industry effects in our results.

Nevertheless, we reestimated the regressions in Tables 2 and 3 with industry dummy variables added (and omitting the other industry-level variables: PACQ, REG, and FIN). Including these industry variables had little effect on the magnitude, sign, or statistical significance of the coefficients on the control mechanism variables in the OLS regressions. Coefficients on the remaining variables were also little affected, and only four of the industry dummy variables are individually significant at even the 10-percent level. Similarly, adding industry variables to the 2SLS estimation had little effect. For the firm performance regression shown, the percentage of outsiders on the board, OBOARD, remains the only control mechanism that attains statistical significance. Further, its coefficient and statistical significance are nearly the same as that shown in Table 3. Coefficients on the other variables are little affected, and only one industry variable is significant at even the 10-percent level. Industry effects are unlikely to explain our findings, except perhaps for the relationship between firm performance and corporate control activity, PACQ. Since our data on PACQ is at the industry-level, we are unable to shed light on possible industry effects in this last relation.

The evidence in Table 3 is consistent with optimal choice of all of the control mechanisms except for board composition. The persistent effect of board composition on firm performance presents a puzzle. The fraction of outsiders on the board of directors is an internal decision, and so we expect it to be made to maximize firm value. Our results indicate otherwise. The negative effect of outsiders on the board on firm performance suggests that firms tend to have too many outside directors. We do not have a ready explanation for this finding. One possibility is suggested by Hermalin and Weisbach (1989) who find that outsiders are added to the boards of poorly performing firms. The negative relation between OBOARD and Q in the OLS regression in the first column of Table 3, then, may reflect reverse causality, low Q leading to high OBOARD. But this cannot explain the 2SLS result in the second column, since this regression was estimated as part of a system that also includes an equation with OBOARD as the dependent variable and Q as an independent variable. In this latter equation, Q does enter negatively, but is statistically insignificant. So the negative relation runs from OBOARD to Q, not the reverse. More outsiders on the board reduce firm performance. Another possible explanation is that outsiders are sometimes added to boards for political reasons (examples include politicians, environmentalists, and consumer activists) and that these outsiders either directly reduce firm performance or proxy for the performance reducing political constraints that led to their receiving board seats.

VI. Conclusions

Alternative mechanisms can be used to control the agency problems between managers and shareholders. We have examined seven control mechanisms: insider shareholdings, institutional shareholdings, shareholdings by blockholders, the use of outsiders on the board of directors, debt financing, the external labor market for managers, and the market for corporate control. Because alternatives exist, the use of one mechanism may depend upon the use of others. As a consequence, empirical estimates of the effect that single control mechanisms have on firm performance will likely be misleading.

To empirically examine this issue, we constructed a data set containing approximately 400 large firms. Using this data set, we estimated a simultaneous equations system and found evidence of interdependence in the use of control mechanisms. We then compared cross-sectional OLS estimates in which firm performance, measured by Tobin's Q, was regressed on individual control mechanisms to two other estimates. The first regressed firm performance on the entire set of control mechanisms, and the second incorporated firm performance and use of all the mechanisms in a simultaneous equations framework. In the single mechanism OLS regressions, we found statistically significant relationships between firm performance and insider ownership, outside representation on the board of directors, debt financing, and corporate control activity. Greater insider ownership was positively related to performance, while more outsiders on the board, more debt financing, and greater corporate control activity were negatively related to performance. In the expanded OLS regression, the relationship between insider shareholding and firm performance disappeared but nothing else changed. In the simultaneous equations estimation, the effects of insider shareholding, firm debt, and corporate control activity all were statistically insignificant. Only the effect of outsiders on the board of directors persisted.

Except for board composition, our results are consistent with optimal use of each control mechanism. The persistent negative effect of more outsiders on the board of directors on firm performance is a puzzle. One possible rationale is that boards are expanded for political reasons, perhaps to include politicians, environmental activists, or consumer representatives, and that these additional outside directors either reduce firm performance or proxy for the underlying political constraints that led to their receiving board seats.

APPENDIX: Variable Definitions

POD = Percentage of equity owned by officers and directors;

PINST = Percentage of equity owned by financial institutions;

PFIVE = Percentage of equity owned by 5-percent owners;

OBOARD = Percentage of outside (i.e., nonemployee) directors on the Board;

FSHC = CEO's firm-specific human capital in years, measured as the number of years the CEO has worked with the firm;

D/V = Debt to firm value ratio, defined as (LTD + STD + PFD − CASHS)/V, where

- LTD = Book value of long-term debt,
- STD = Book value of short-term debt,
- PFD = Preferred stock at liquidating value,
- CASHS = Cash and marketable securities,
- V = EQUITY + LTD + STD + PFD + CV,
- EQUITY = Market value of equity at the year-end, and
- CV = Book value of convertible debt and convertible preferred stock;

PACQ = Probability of acquisition, measured as the relative frequency of acquisitions in the 2-digit SIC industry of a firm during 1981–1987 (an industry consists of all firms in the same 2-digit SIC industry that were listed on NYSE as of December 31, 1980);

σ_S = Standard deviation of stock returns estimated from 60 monthly stock returns from January 1983 to December 1987;

LASSET = Natural log of book value of total assets in millions of dollars;

REG = 1 for a firm in a regulated industry, viz. public utility, railroad, banking, finance or insurance (i.e., primary 2-digit SIC code = 40, 48, 49, 60, 61, or 63), 0 otherwise;

TENURE = Tenure as CEO in years;

FOUNDER = 1, if the CEO founded the company, 0 otherwise;

NOD = Number of officers and directors;

NYSE = 1 for firms traded on the NYSE, 0 otherwise;

NINSTI = Average number of institutional owners for the 3-digit SIC industry of the firm;

RDA = Research and development expenditures/Total assets;

RDAI = Average RDA for the 3-digit SIC industry of the firm;

LOB3 = Number of lines of business a firm operates at 3-digit SIC level, as reported by the S & P Register;

AGE = CEO's age in years;

JOBS3 = Job opportunities in the industry of a firm, measured as the number of firms on NYSE in its 3-digit SIC industry;

CR = Cash flow return, measured as OCF/V, where

OCF = Sales − Cost of goods sold − Selling and administrative expenses + Depreciation;

ADVA = Advertising expenditures/Total Assets;

Q = Tobin's Q, measured as V/ASSET; and

FIN = 1, if the firm is in banking, finance, or insurance industry (i.e., primary 2-digit SIC code = 60, 61, or 63); 0 otherwise.

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