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Managerial Entrenchment and Payout Policy

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Abstract

Building on the managerial entrenchment literature, we develop and test a novel perspective on payout policy that integrates the influence of internal governance mechanisms, investment opportunities, management compensation, and monitoring by large shareholders. Our study incorporates both dividend payments and share repurchases, and examines the determinants of the likelihood and the level of payouts. Our model performs well in both in-sample and out-of-sample predictions on a sample of 2,081 firms during 1992–2000. We find that both the likelihood and the level of payouts are significantly and positively (negatively) related to factors that increase (decrease) executive entrenchment levels, even when controlling for size, leverage, and the proportion of tangible to total assets. We identify factors that significantly affect the likelihood but not the level of payouts (or vice versa), and show that entrenchment has an asymmetric influence on dividend vs. shares repurchase policy.

I. Introduction

It is widely accepted that shareholder-manager agency conflicts strongly influence corporate financial policies. Following Jensen and Meckling (1976), the literature argues that shareholders choose financial policy ex ante to minimize agency costs. The optimal financial policy trades off the benefits of managerial access to relatively low cost sources of capital for good projects with the agency costs induced by managerial moral hazard (e.g., Stulz (1988), (1990)).

However, the ex ante optimal financial policy may not be incentive compatible for entrenched managers who can only be disciplined at some cost to the shareholders. A growing literature examines the mechanisms through which managers entrench themselves and pursue policies that do not maximize shareholder value (Stulz (1988) and Shleifer and Vishny (1989)).

The literature also studies the implications of such entrenchment for payout policy (e.g., Zwiebel (1996), Fluck (1999), and Allen, Bernardo, and Welch

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(2000)). Entrenched managers voluntarily commit to payouts as a protection against disciplinary sanctions by outsiders. Other things being equal, managers who are more likely to take sub-optimal decisions choose higher payouts, as do managers who can be disciplined by outsiders at relatively low cost. Consequently, managers with a higher quality of investment opportunities make lower payouts (Zwiebel (1996)), but managers who are subject to more effective external monitoring make higher payouts (Fluck (1999)).

We note that the entrenchment hypothesis imposes restrictions on *both* the likelihood of payout and the level of payout (conditional on a positive payout). The restrictions on payout levels distinguish the entrenchment framework from the signaling literature.[1] They are also different from the implications of the free cash flow agency model (Jensen (1986)) since they are derived from policies that are constrained to be incentive compatible for entrenched managers.

However, few studies directly examine the predictions of the entrenchment hypothesis with respect to corporate payout policy.[2] In this paper, we first extend the received entrenchment literature to allow for the role of executive incentive compensation, and then derive and empirically test the implications of the extended entrenchment framework for payout policy.

The theoretical entrenchment literature typically does not directly consider the role of managerial compensation. However, what matters to shareholders is not the level of managerial protection per se but the potential for non-value-maximizing decisions by management. Incentive compensation contracts, especially those that tie top management compensation to the firm's long-run stock performance, reduce the nefarious consequences of entrenchment, ceteris paribus (Lewellen, Loderer, and Martin (1987), Hall and Liebman (1998), and Zhou (2001)). Thus, in addition to the implications for payout policy elucidated above, our extended entrenchment framework predicts a negative relation between payouts (especially dividend payments) and equity-based executive compensation (i.e., stock options and restricted stock awards).

We conduct our empirical tests on a sample of 2,081 publicly traded firms during 1992–2000, using S&P's Execucomp database and the firms' proxy statements. We measure executive entrenchment level with a variety of characteristics relating to the CEO's power over the internal governance mechanisms, investment opportunities, the CEO's incentive compensation, and monitoring by large external shareholders.

Our analysis examines not only dividends but also total payouts by combining dividends and share repurchases. This is important since the theoretical entrenchment literature does not explicitly distinguish between dividends and share repurchases. In addition, we avoid limitations of many studies that focus only

[1] See Allen and Michaely (1995), (2003) for surveys on the stylized facts regarding dividends and payouts, and on the various available theoretical models of payout behavior.

[2] The literature does empirically examine the validity of the implications of the entrenchment hypothesis for leverage (Jung, Kim, and Stulz (1996) and Berger, Ofek, and Yermack (1997)). However, the implications of the entrenchment hypothesis for leverage are more ambiguous. Depending on the costs of the disciplinary mechanisms, entrenched managers may either under- or over-lever with respect to the value-maximizing level of debt (Novaes and Zingales (1996)).

on dividend payments even though the importance of share repurchases has been growing in recent years.[3]

We find strong support for the major payout policy-related predictions of the extended entrenchment hypothesis: both the likelihood of payouts and the payout level are significantly and positively (negatively) related to factors that increase (decrease) executive entrenchment levels. The influence of entrenchment-related variables on payout policy is significant even after controlling for firm size, leverage, and the ratio of tangible to total assets. Our model performs well in both in-sample and out-of-sample predictions. Thus, the entrenchment perspective adds substantial explanatory power to models of payout policy—especially dividend policy—presented in the literature.

We also show that certain factors, such as board independence and in-the-money executive stock options, significantly affect the likelihood of the payout but not the determination of the payout level. Similarly, other factors, such as the CEO's share ownership, affect dividend policy but not the shares repurchase decision. Finally, there are factors, such as executive stock options, that have an opposing influence on dividends and share repurchases.

We also examine size- and leverage-based effects on payout policy, controlling for the entrenchment-related variables. We find that the reported negative relation of stock ownership and dividends (Jensen, Solberg, and Zorn (1992)) is not significant, once we control for firm size. Moreover, the negative association between CEO stock options and the likelihood of dividend payments observed in the literature (e.g., Lambert, Lanen, and Larcker (1989) and Fenn and Liang (2001)) does not apply to very large firms. Similarly, the influence of large external shareholders and independent boards on payout policy is relatively weak for the largest firms. Finally, we show that debt covenant constraints on payouts have a significant impact on payout policy, especially dividends.

Overall, our analysis demonstrates substantial empirical support for a perspective on payout policy that integrates the influence of internal corporate governance, investment opportunities, management compensation, and monitoring by large external shareholders. Our analysis is among the first to distinguish between firm-specific factors that influence the basic pay vs. no-pay decision and those that affect the choice of the payout level. We are also among the first to examine empirically the interaction between board independence and monitoring by large shareholders in the context of corporate payout policies.

Our results are of independent interest from the viewpoint of the dividend and shares repurchase literatures. Fama and French (2001) establish that non-paying firms tend to have better growth options compared to dividend paying firms. However, we examine whether, *controlling* for investment opportunities, there is a systematic relationship between the likelihood of dividend payments and the strength of corporate governance mechanisms. We extend and refine the growing literature on the relation of executive incentive compensation to dividend payment behavior (Smith and Watts (1982), Gaver and Gaver (1993), White (1996), and Fenn and Liang (2001)). We examine the relative influence of total

[3]The changing composition of payouts (between dividends and share repurchases) during the 1980s and 1990s has been observed in both academic and popular literatures. Fama and French (2001) and Allen and Michaely (2003) document these trends in a variety of useful ways.

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vs. in-the-money executive stock options on dividend policy, a distinction that the literature rarely explores.

Our analysis also adds to the empirical literature that generally focuses only on the signaling aspects of share repurchases (e.g., Vermalaen (1981) and Dann, Masulis, and Mayer (1991)). We find that corporate governance and investment opportunity-related variables significantly influence the shares repurchase decision. The determinants of shares repurchase policy are a subject of increasing interest in the literature (e.g., Jagannathan, Stephens, and Weisbach (2000)).

We organize the paper as follows. Section II develops the basic framework and the empirical test design. Section III describes the data and the sample. Section IV presents the results of the basic Logit and Tobit regressions. Section V examines the role of size and leverage, and Section VI conducts the out-of-sample forecast tests. Section VII concludes.

II. Empirical Test Design

Entrenchment models assume that managers derive utility from controlling the firm and by undertaking new projects, i.e., empire building. Due to costly verification and other enforcement impediments, shareholders cannot simply contract away the manager's sub-optimal investment behavior. Managers can be separated from control only if there is a successful proxy motion by shareholders (Fluck (1999)), if there is a takeover (Shleifer and Vishny (1986)), or if the firm declares bankruptcy (Zwiebel (1996)). Entrenchment is possible due to transactions costs in shareholder activism and the market for corporate control. Managers may also effectively entrench themselves by making manager-specific investments (Shleifer and Vishny (1989)) and by strategically enhancing their voting rights (Stulz (1988)).

Entrenchment is especially costly to the shareholders when investment opportunities are poor, since highly entrenched managers can undertake negative NPV projects if they derive personal benefits from control of assets. Conversely, the risk of value destruction by entrenched managers is lower when there are numerous positive NPV investment opportunities. Finally, the risk of sub-optimal behavior is lower if incentive compensation sufficiently aligns managerial and shareholder interests.

A. Latent Managerial Types and Observed Payout Choice

Consistent with the theoretical literature, our empirical test design relates payout behavior to the notion of *managerial types*. We quantify the manager's type as being proportional to the likelihood of value-maximizing behavior. Strong (weak) manager types are more (less) likely to take value-maximizing investment decisions due to superior (inferior) investment opportunities (Zwiebel (1996)) and better (poor) incentive alignment with shareholder interests. In equilibrium, strong manager types have less of a need to make payouts as a disciplining device, compared to weaker manager types. Similarly, more effective internal governance mechanisms and external monitoring by large shareholders increase the required payouts from weak manager types (Fluck (1999) and Allen et al. (2000)).

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Our formulation of managerial types therefore allows a parsimonious integration of various theoretical implications of managerial entrenchment for payout policy that are available in the literature.

However, in practice, managers typically decompose the payout decision into two steps (Lintner (1956) and Kumar and Lee (2001)). First, they choose whether to make a payout. Conditional on choosing to pay, they then decide the level of the payout. In terms of our framework, strong manager types are less likely to make a payout, ceteris paribus, compared to weak manager types. And, conditional on making a payout, strong manager types choose lower payout levels relative to weak manager types, ceteris paribus. We test these hypotheses, relating to the basic payout vs. no-payout decision and the payout level, sequentially. We also provide separate tests for dividends and total payouts (i.e., the sum of dividends and repurchases).

Our empirical test design also facilitates the econometric implementation of the entrenchment model. The latent (or unobservable) manager type is denoted by a real-valued parameter t^*, where higher t^*-values indicate stronger managerial types. As noted above, this formulation is sufficiently flexible to map into various models in the literature,[4] and the managerial type t^* is readily related to the payout vs. no-payout decision. We define a dichotomous variable (Payout) that equals 1 if the firm makes a payout in a given period, but is 0 otherwise. Consistent with our basic hypothesis, we can write the payout choice model as

$$\text{Payout} = \begin{cases} 1 & \text{if} \quad t^* \leq 0 \\ 0 & \text{if} \quad t^* > 0. \end{cases} \tag{1}$$

The entrenchment framework also implies that the chosen payout level should be higher for weak managerial types, ceteris paribus. Using the payout yield, $\delta \equiv [(\text{Cash Payout})/\text{Stock Price}]$, as the dependent variable, we hypothesize that the observed δ is a non-increasing function of t^*.

A direct empirical implementation of the entrenchment literature suggests equating the Payout variable above with cash disbursements by combining dividends and repurchases, since this literature does not typically distinguish between dividends and share repurchases. However, it is useful to evaluate the impact of entrenchment separately on dividends and total payouts for at least two important reasons.

First, there are many tax and corporate governance-based arguments in the literature that suggest a limited elasticity of substitution between dividends and share repurchases for investors and managers (e.g., Miller (1977), Brennan and Thakor (1990), and Allen et al. (2000)). In addition, executive stock options are likely to affect the dividend payment and the shares repurchase decisions quite differently. The value of executive stock options, like all call options, is negatively related to future dividend payments (Lambert et al. (1989) and Fenn and Liang (2001)).[5] On the other hand, share repurchases potentially offset the equity

[4] For example, Zwiebel (1996) represents managerial types through the probability (say, q) of having positive NPV projects. In this case, we interpret t^* as the image of a strictly increasing mapping $t^* = T(q)$ when the function T maps the unit interval to the real line.

[5] Executive stock options are generally not payout protected against dividends so that dividend uncertainty is an important issue in their valuation (see, e.g., McDonald (2003), Chapter 16).

dilution effects of large stock option grants and can increase the value of stock options held by managers. Thus, other things held equal, executives with large stock options awards have an incentive to shift payout composition toward share repurchases, and stock options and share repurchases can be positively linked (e.g., Weisbenner (2000)). In sum, managerial entrenchment is likely to affect the dividend payment and shares repurchase decisions differently, and our analysis attempts to examine the nature of these differences.

B. Estimation of Managerial Types

We assume the managerial type t^* is a linear function,

$$t^* = \alpha + \beta' X + \varepsilon. \tag{2}$$

Here, X is a vector of observable indicators reflecting managerial type and ε is a random error. We will specify X shortly. It is also convenient to express equations (1)–(2) in terms of the associated probabilities of observing a payout (or non-payout),

$$\begin{aligned} \text{Prob}(\text{Payout} = 1) &= \text{Prob}(t^* \leq 0) = \text{Prob}(\alpha + \beta' X + \varepsilon \leq 0) \\ &= \text{Prob}(\varepsilon \leq -(\alpha + \beta' X)) = F(-(\alpha + \beta' X)). \end{aligned} \tag{3}$$

Here, F is the cumulative distribution function. Under the assumption that F is logistic, we arrive at the usual specification of a Logit model.

The vector X should include variables, taken to be exogenous in the short to medium run that determine the strength of the managerial type. Based on the foregoing discussion, X in our empirical work includes four classes of variables that proxy for: i) the quality of investment opportunities, ii) the effectiveness of internal governance mechanisms, iii) monitoring by large external shareholders, and iv) the CEO's incentives for shareholder value maximization.

We proxy the quality of the investment opportunity set in a number of ways. We use the market-to-book value of assets ratio as a measure of the proportion of the market value of the firm that is comprised of growth options (e.g., Smith and Watts (1992)). We also use other proxies such as the geometric average growth rate of assets, investment intensity, and the ratio of R&D investment to assets. Finally, we construct an investment opportunity factor score measure that combines the said variables using principal components (e.g., Baber, Janakiraman, and Kang (1996)).[6]

We proxy the CEO's power and the effectiveness of internal governance mechanisms through a variety of CEO-specific and board structure-related variables motivated by the corporate governance literature.

CEO's Tenure. This variable affects managerial type in two ways. Organizational theorists argue that tenure and the CEO's internal power are positively related

[6]The four variables in the factor score are: first, the firm's investment intensity from year $t-2$ to year t; second, the geometric growth in the market value of assets from year $t-2$ to year t; third, the market-to-book ratio of assets at the end of year t; and, fourth, the ratio of R&D expenses to the book value of assets at the end of year t.

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(e.g., Finkelstein and Hambrick (1989)). Greater power makes the CEO less vulnerable to disciplining by outsiders. Murphy (1986) argues that CEOs nearing retirement have greater moral hazard because they have a shorter career horizon and the disciplining power of reputation is relatively weak. These arguments suggest a negative association between tenure and managerial type, ceteris paribus.[7]

Service Length. Some empirical studies show that CEO tenure is only marginally significant in determining CEO power.[8] We notice that in our sample a large fraction of CEOs in dividend paying firms have stayed with the same firm for a relatively long period,[9] though there is little difference between the paying and non-paying firms with respect to CEO tenure. Hence, as an alternative to tenure, we use *years credit to retirement* (available through the Execucomp database) that indicates the length of service of the CEO in the firm.

Long Service. We examine the possibility of a non-linear relationship between CEO power and service length by using a dummy variable that identifies CEOs with over 25 years of service with the firm. This places them in the top decile of the sample in terms of service length of CEOs.

Board Independence. A high proportion of outside directors on the board is often considered to enhance the quality of corporate governance (e.g., Fama and Jensen (1983)).[10] If greater board independence improves internal monitoring and facilitates disciplining of the CEO, then Fluck (1999) would suggest that payouts and board independence are positively associated, other things held constant. Interestingly, the free cash flow agency hypothesis (Jensen (1986), (1993)) would also indicate that improved internal monitoring results in increased payouts.

Consistent with the existing literature, we define outside directors as those that are not direct family members or relatives of the CEO, and are not current or former employees. We use a dummy variable to identify boards where the proportion of independent directors is above some minimum threshold. However, since received theory provides little guidance in terms of quantitative thresholds for true board independence, we use a variety of thresholds (20%, 40%, and 60%) to test for the role of board independence.

CEO Duality. Jensen (1993) and Boyd (1994) argue that CEO "duality" (where the CEO is also the chair of the board) diminishes the independence and effectiveness of the board and increases CEO power. We use a dummy variable to identify whether a CEO is also a chair of the board (Duality).

[7] For a CEO who left her position during the sampling years, we calculate tenure as the departure date minus her inauguration date. For continually serving CEOs, we calculate tenure as the difference between the end of the current reporting year and her inauguration date.

[8] Tables 1 and 2 of Berger et al. (1997) show that CEO tenure has a significant effect on a firm's debt policy. But this result is not robust.

[9] Twenty-five percent of the top managers of the dividend paying firms in the sample have spent over 14 years in the same firm before their CEO appointment.

[10] However, empirical evidence on the effect of board independence on firm performance is mixed. While Rosenstein and Wyatt (1990) and Brickley, Coles, and Terry (1994) find that firm value is related to board composition, Hermalin and Weisbach (1991) and Yermack (1996) find little evidence that board composition matters.

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Near Retirement. If the CEO's impending retirement is well known, then there are potential negative power consequences due to his or her "lame duck" status. However, the CEO may also no longer need to pay dividends for self-protection. The net effect on the likelihood of dividend payout is thus ambiguous. We introduce a dummy variable to identify those CEOs who are leaving their positions within two years, a variable available through Execucomp.

Large Shareholder. Large shareholders have greater incentives to monitor the management and bear the costs of disciplining errant management (Shleifer and Vishny (1986) and Cyert, Kang, and Kumar (2002)). Thus, the presence of large external shareholders should increase payouts, ceteris paribus (Fluck (1999) and Allen et al. (2000)).[11] However, large shareholders may find less of a need for using dividend payouts as disciplining mechanisms if they have strong voting positions or board representation. Furthermore, tax minimization considerations may also set up offsetting incentives (i.e., preference for low dividend payouts) for blockholders.

We use the fraction of total shares owned by the largest outside shareholder, whenever we can identify the existence of such a blockholder.[12]

Governance Interaction. An important, and quite unexplored, issue in corporate governance is whether independent directors substitute for or complement the external influence of large shareholders. We examine the interaction of a large external shareholder and an independent board. We use a multiplicative dummy variable that is triggered whenever a large external shareholder with relatively high (at least 10%) share ownership and a board with relatively high proportion (at least 50%) of independent directors are jointly present.[13]

We turn next to the proxies for executive incentive compensation. Jensen and Murphy (1990) argue that cash salary and bonus provide relatively low powered incentives. Other recent evidence also indicates that entrenched or powerful CEOs tend to have a large share of their compensation paid though cash salary and bonus (e.g., Core, Holthausen, and Larcker (1999)). Thus, ceteris paribus, a higher ratio of salary and bonus to the CEO's total annual compensation indicates a weak manager type. Conversely, the CEO's personal stock ownership in the firm and awards of stock options provide high powered incentives. Moreover, higher CEO stock ownership also appears to increase CEO power relative to outside shareholders. For example, Denis, Denis, and Sarin (1997) show that top management ownership has a significant negative impact on CEO replacement and turnover. However, consumption needs may set up offsetting incentives (i.e., preference for higher dividends) for CEOs with substantial stock ownership.

[11] Brennan and Thakor (1990) and Allen et al. (2000) arrive at somewhat opposing predictions regarding large shareholder preferences for dividends vs. share repurchases. The former model suggests that large shareholders will prefer repurchases while the latter suggests that they will prefer dividends.

[12] From an empirical perspective, one cannot identify the largest shareholder unless some party holds more than 5% of the firm, since U.S. firms are required to report large blockholder share holdings only if they exceed 5% of common shares. In fact, there is no outside shareholder with share ownership exceeding 5% in about 40% of our sample observations. Not surprisingly, most of the large firms in the sample belong to this group.

[13] We are grateful to the referee for suggesting this point to us.

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Cash Compensation. We use the log of the dollar value of the cash salary and bonus (Salary and Bonus). We also use the fraction of total annual CEO compensation paid through cash salary and bonus (Compensation Ratio).

Direct CEO Stock Ownership. For a variety of reasons, the fraction of outstanding shares directly owned by a CEO (Fraction of Shares Owned by CEO) is an appealing measure of CEO stock ownership. However, we also use the market value of the shares owned by the CEO (Market Value of Shares) as a measure of direct stock ownership.[14] Finally, we examine the possibility that extraordinarily large CEO share ownership confers greater effective control by using a dummy variable for cases where CEO share ownership exceeds 1% of the outstanding shares (Large CEO Stock Ownership). Denis et al. (1997) find that the executive turnover rate drops significantly when the CEO owns more than 1% of the firm's shares.

Executive Stock Options. Executive stock options have become an increasingly prominent means of delivering high powered incentives to management. We consider two measures of CEO stock options. The first is the total value of executive stock options awarded to the CEO in a given year (Executive Stock Options). The second is the value of in-the-money (exercisable) options held by the CEO (In-the-Money Options). We note that few studies attempt to isolate the influence of in-the-money options on payout policy. Both these executive options variables are directly available from the Execucomp database.[15]

Finally, we control for other firm-specific characteristics known to be associated with payout policy. We control for the age of the firm, since dividend paying firms tend to be older or more mature firms (Fama and French (2001)). We also control for the proportion of total assets represented by tangible assets. The literature suggests that firms with a large intangible asset component would be less likely to pay dividends, ceteris paribus (Myers (1977) and Smith and Watts (1992)). However, the influence of tangible assets on total payouts would be more ambiguous since firms with most of their asset value in intangible assets would prefer payouts through share repurchases.

III. Data and Sample Selection

A. Data

The primary data source is the 1999 S&P's Execucomp database. This database contains records of 16,410 top managers from 2,081 publicly traded companies, covering the period from 1992 to 1998. For each firm in the database,

[14]The number of shares owned by the CEO may have a valuation bias, and hence use of market value of shares is superior. However, to the extent that the market value measure depends on the stock price that we also use to calculate the payout yield in the Tobit regressions, the fraction of stocks owned is a more appealing measure. In any case, our results turn out to be very robust to different measures of CEO stock ownership.

[15]We calculate option values using the stated exercise price and year-end stock prices as in Jensen and Murphy (1990). Data required to execute calculations are typically disclosed, but for cases where details are omitted, vesting is assumed to occur two years after the grant, and the exercise period is assumed to be the same as that for the most recent option where an exercise period is provided.

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we take the annual compensation records for the CEO and the firm's financial records from S&P's Compustat. The dividend payment records are taken from Compustat and CRSP. We obtain information on board independence and the ownership of the largest outside blockholder from proxy statements, since this information is not available on the Execucomp database.

Our full sample of all the firms on Execucomp from 1992 through 1998 yields 6,905 firm-year observations. Deleting missing value observations from the proxy statements ultimately yields a (restricted) sample of slightly over 4,300 firm-year observations. We run most of our Logit and Tobit regressions on the restricted sample, but we use the full sample to study differences between firm-specific characteristics of dividend paying and non-paying firms in order to benchmark our sample against other recent analyses of dividends in the literature. Finally, for our out-of-sample forecasting performance tests, we extend the sample to cover 1999–2000 as well. Our extended sample has 9,616 firm-year observations.

For a dividend paying firm, we calculate the annual dividend yield by using records extracted from the CRSP daily file. The annual dividend payment is defined as the sum of regular (quarterly, semi-annual, or annual) cash dividends paid within the same year. We take the dollar value of share repurchases from the Compustat database, and in keeping with the focus of our study, we compute the value of common stock repurchases only. [16]

There is a potential look-ahead bias if we use regressors obtained from the end of the payout period, rather than the beginning, since end-of-the-period values are likely to overstate the explanatory power of the model. We control for this by taking all regressors at their beginning-of-the-year values. Thus, for stock variables (such as CEO share ownership and the ratio of tangible to total assets) we take the values at the end of the previous year, while for flow variables (such as cash salary and bonus) we take the values from the previous year. Similarly, the payout yield measures for a given year are the cash payments paid in the year divided by the average of the prices at the beginning and end of that year. [17]

B. Sample Description

Figure 1 shows the market capitalization of the firm-year observations in the full sample for 1992–1998, using the CRSP year-end portfolio deciles assignment as a proxy. Although the records cover Portfolio 1 (the smallest value) through

[16] Our construction of the value of common stock repurchases is very similar to the one used in Jagannathan et al. (2000), Fenn and Liang (2001), and Grullon and Michaely (2002). To measure the dollar value of the repurchase, we start with the purchase of common and preferred stocks (Compustat annual item 115). Since we are interested only in the repurchase of common stocks, we adjust for any repurchases of preferred stock indicated by a decline in the redemption value of the preferred stocks outstanding between year $t-1$ and year t (Compustat annual item 56). Thus, the dollar value of common stock repurchases is equal to the difference between the purchase of common and preferred stocks and the purchase of preferred stocks. Observations that show an increase in the redemption value of preferred stocks outstanding from year $t-1$ to year t are excluded from our final sample.

[17] Our results are remarkably robust to various combinations of choices regarding the timing of payments and the share price. For example, results are essentially unaffected if we take the dividend yield to be the cash dividends in the current year divided by the average of the beginning and end of year closing prices of the previous year. The results also do not change much if we take regressors from the end of the current year.

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Portfolio 10 (the largest value), the majority of the observations tend to be large firms, a known feature of the Execucomp database. Figure 2 examines the evolution of the dividend paying vs. non-paying firms over the extended sample period, 1992–2000.[18] Consistent with related findings recently reported in the literature (Fama and French (2001)), the fraction of total firms that omit dividend increases throughout the last decade.

FIGURE 1

Sample Observations Categorized by Firm Size (1992–1998)

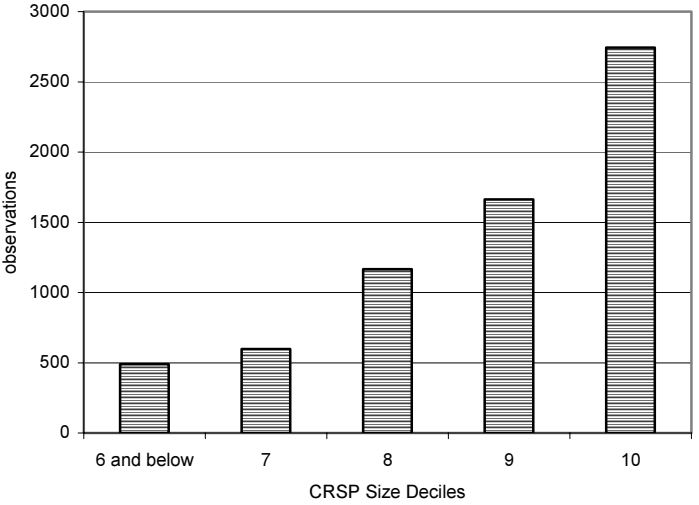


Figure 1 categorizes the firm-year observations on dividend payment behavior in the full sample (1992–1998) according to firm size. We use CRSP year-end portfolio deciles assignment as a proxy for size deciles.

Figure 3 organizes dividend paying vs. non-paying firms in the full sample according to the two-digit SIC industry groupings. Figure 3, graph A shows the number of firms in each category (paying or non-paying). Figure 3, graph B shows the number of firm-year observations in each category, and is hence informative of the frequency of dividend payment in various industries. The highest incidence of dividend paying firms is in the food, paper and chemicals, metals, manufacturing, and retail and wholesale trading industries. Firms in these industries also pay dividends more frequently.[19]

Panel A of Table 1 compares the characteristics of the dividend paying firms with those of the non-paying firms for the full sample. We report non-parametric and *t*-test statistics on the differences in the means of the dividend and non-paying firms, the null hypothesis being that there is no difference between paying and

[18]The apparent decline in the propensity to pay dividends during the 1990s is a topic of substantial interest (e.g., Fama and French (2001)). We use the extended sample to allow an examination of the more recent trends in payment behavior.

[19]Consistent with standard practice, we exclude regulated industries (public utilities and financial services with SIC codes 4900–4999 and 6000–6999, respectively) since these industries are known to exhibit special payout behavior.

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FIGURE 2
Dividend Paying vs. Non-Paying Sample Observations by Year (1992–2000)

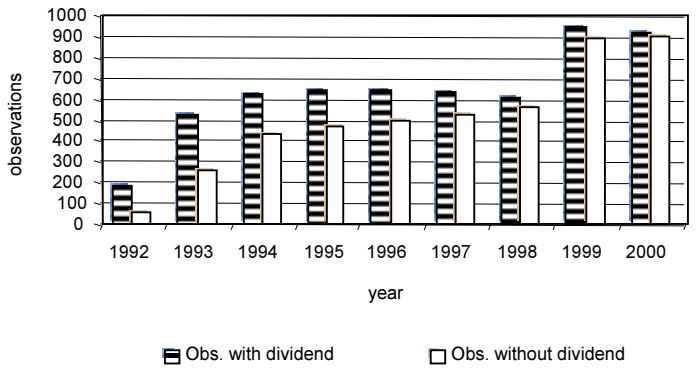


Figure 2 shows dividend paying vs. non-paying observations for each of the years in the extended sample (1992–2000).

non-paying firms. Briefly, dividend paying firms are significantly larger, older (measured in terms of the time from public listing), more profitable, and have fewer growth options (measured through lower market-to-book ratios) and higher ratios of tangible to total assets when compared to the non-paying firms. These findings are consistent with other studies (e.g., Fama and French (2001)). We also see that paying firms are significantly more levered than non-paying firms are.

Panel B of Table 1 compares the CEO-related characteristics of dividend paying vs. non-paying firms. On average, there is little difference in the tenures of CEOs of paying vs. non-paying firms. However, CEOs of paying firms stay with their firms for a much longer period. This is quite suggestive since the literature usually views the length of service in the firm to be positively associated with managerial entrenchment (e.g., Mace (1986) and Boyd (1994)). CEOs of paying firms have higher total compensation on average compared to CEOs of non-paying firms. However, CEOs of paying firms also own smaller fractions of outstanding shares and have a compensation structure that is less sensitive to stock performance compared to the CEOs of non-paying firms. We note that there is no significant difference in the value of exercisable in-the-money stock options held by the CEOs of paying vs. non-paying firms.

IV. Analysis of the Basic Payout Decision and Payout Yield Models

This section reports the results of the Logit regressions for the basic binary model for the likelihood of a positive payout.[20] We also report the results of the

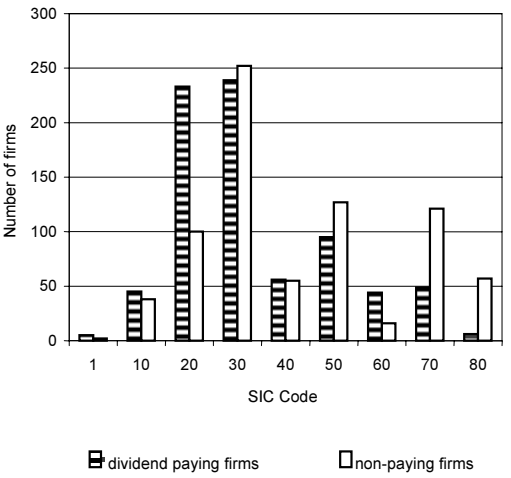
[20] As a robustness check, we also did Probit regressions, assuming $F(\varepsilon)$ to be normal. The results are very similar to the Logit analysis and not reported.

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FIGURE 3

Dividend Payment Behavior in Different Industries (1992–1998)

Graph A. Number of Firms



Graph B. Number of Observations

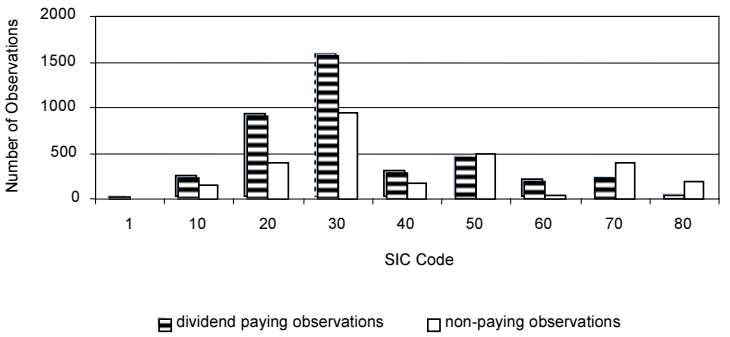


Figure 3 studies sample dividend paying behavior in various industries, grouped according to the two-digit SIC code. Figure 3, graph A shows the number of dividend paying vs. non-paying firms during 1992–1998 in each industry group. Figure 3, graph B shows paying behavior in terms of firm-year observations, and thus includes information on both the number of firms and the frequency of payment.

Tobit regressions on the basic entrenchment model for the determinants of payout yield.

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A. Preliminary Analysis

Our initial analysis revealed that a CEO's service length with the firm dominated CEO tenure in terms of significance. Since these two variables are highly positively correlated, in any case, CEO tenure was subsequently eliminated as an explanatory variable. We conclude that a CEO's total length of service in the firm is a better indicator of his or her power over corporate governance mechanisms compared to tenure. Preliminary analysis also showed that the CEO Duality (the case where the CEO is also the chair of the Board) and Near Retirement (the case where the CEO's retirement in the next two years has been announced) variables had an insignificant effect on payout policy in the basic Logit and Tobit regressions. We therefore do not report the results of these two variables.

Next, the fraction of shares owned by the CEO performed better than the market value of shares owned, which turned out to be mostly insignificant in the presence of the fractional ownership measure. We thus report results only with the fractional measure of ownership, but our results are essentially unchanged if we only use the market value of shares owned.

For reasons mentioned above, we examined the effect of using different thresholds to signify effective board independence. We found that defining

TABLE 1

Characteristics of Firms and CEOs in the Full Sample

Panel A. Firm Characteristics

					Difference in Means	
Variables	Obs.	Mean	Median	Std. Dev.	Wilcoxon Rank Sum	*t*-Test
Market value of assets (millions of dollars)						
All firms	6627	7240.77	1558.64	23934.52		
Dividend firms	3882	10265.52	2517.64	29769.05	26.50	14.11
Non-dividend firms	2745	2696.71	854.75	9579.91	(0.001)	(0.001)
Tangible assets ratio						
All firms	6152	0.32	0.29	0.85		
Dividend firms	3568	0.35	0.32	0.85	13.73	3.32
Non-dividend firms	2584	0.28	0.23	0.86	(0.001)	(0.001)
Market-to-book value of assets						
All firms	6635	2.17	1.64	1.78		
Dividend firms	3889	1.92	1.57	1.18	9.96	13.48
Non-dividend firms	2746	2.51	1.79	2.34	(0.001)	(0.01)
Leverage ratio						
All firms	6085	0.20	0.15	0.21		
Dividend firms	3552	0.20	0.17	0.18	9.04	2.22
Non-dividend firms	2533	0.19	0.11	0.25	(0.001)	(0.026)
Ratio of R&D to book value of assets						
All firms	6645	0.03	0.00	0.07		
Dividend firms	3889	0.02	0.00	0.03	11.52	12.09
Non-dividend firms	2756	0.06	0.003	0.10	(0.001)	(0.001)
Return on equity						
All firms	6625	7.12	12.96	186.78		
Dividend firms	3881	13.86	14.17	65.45	16.07	3.49
Non-dividend firms	2744	−2.41	10.59	279.34	(0.001)	(0.001)
Firm age						
All firms	6580	21.91	19	18.92		
Dividend firms	3880	28.82	25	19.36	40.83	39.49
Non-dividend firms	2700	11.98	8	12.91	(0.01)	(0.01)

(continued on next page)

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TABLE 1 (continued)

Characteristics of Firms and CEOs in the Full Sample

Panel B. CEO Characteristics

Variables	Obs.	Mean	Median	Std. Dev.	Difference in Means: Wilcoxon Rank Sum	Difference in Means: *t*-Test
Tenure (years)						
All firms	5957	8.69	6.58	7.53		
Dividend firms	3518	8.85	6.25	8.13	1.71	1.97
Non-dividend	2439	8.46	6.92	6.58	(0.087)	(0.048)
Service length (years)						
All firms	6662	9.87	0.00	13.80		
Dividend firms	3893	14.54	11.00	14.88	35.04	35.79
Non-dividend	2769	3.30	0.00	8.55	(0.001)	(0.001)
Salary and bonus (thousands of dollars)						
All firms	6662	1057.68	775.00	1807.24		
Dividend firms	3893	1245.29	939.43	2251.12	24.21	10.12
Non-dividend	2769	793.92	587.27	784.36	(0.001)	(0.001)
Total compensation (thousands of dollars)						
All firms	6593	2967.99	1521.97	10049.44		
Dividend firms	3846	3220.17	1698.88	12291.22	10.89	2.41
Non-dividend	2747	2614.91	1248.29	5539.62	(0.001)	(0.015)
Value of stock options awarded (thousands of dollars)						
All firms	6514	1321.99	350.99	4783.84		
Dividend firms	3802	1152.81	343.03	4568.48	1.96	3.38
Non-dividend	2712	1559.17	361.37	5061.72	(0.049)	(0.001)
Value of in-the-money exercisable stock options held (thousands of dollars)						
All firms	6514	5814.56	824.68	20862.90		
Dividend firms	3802	5491.37	738.53	19784.29	1.80	1.12
Non-dividend	2712	6267.63	930.14	22270.71	(0.071)	(0.263)
Ratio of shares owned by CEO to common shares outstanding						
All firms	6511	2.93%	0.39%	6.68%		
Dividend firms	3811	2.46%	0.25%	6.33%	14.56	6.77
Non-dividend	2700	3.60%	0.76%	7.09%	(0.001)	(0.001)
Ratio of salary and bonus to total compensation						
All firms	6575	0.58	0.56	0.28		
Dividend firms	3840	0.59	0.58	0.25	5.40	5.63
Non-dividend	2735	0.55	0.52	0.31	(0.001)	(0.001)

Table 1 describes major firm and CEO based-characteristics of the full sample of 2,081 firms for 1992–1998 (6,905 firm-year observations). Panel A reports the firm characteristics and panel B does so for the CEO characteristics. We report the sample mean, median, and standard deviation of the characteristics, and compare the characteristics across dividend paying and non-paying firms. We test the difference in means using non-parametric and *t*-test analysis. The null hypothesis (for each data item in the list) is that there is no significant difference between the two samples: the dividend paying and the non-paying sub-samples. The results of the *z*-statistic are reported and the associated *p*-value is in parentheses.

independence at the 20% threshold generally produced insignificant results. However, board independence exerts a significant influence on payout policy when we raise the threshold to 40%; i.e., the board is deemed effectively independent only if at least 40% of the directors are independent. Therefore, we report results with board independence defined with the 40% threshold level. Finally, the results from using various proxies for the investment opportunities (described in Section II) were similar. We use the market-to-book ratio of assets measure, since it is appealing on both theoretical and estimation grounds.

Exhibit 1 provides a precise definition of the dependent and independent variables, along with their predicted sign, that we use in our analysis.

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EXHIBIT 1
Definition of Variables

Exhibit 1 records the definitions of the dependent and independent variables used in the analysis. As a rule, for dependent variables in year t, the regressors are taken to be the beginning of the year values. We also indicate the theoretically predicted sign for the regressors in the binary choice and the payout yield regressions. A positive (negative) sign implies that the likelihood and the size of payout is positively (negatively) associated with the variable, holding other things fixed.

Dependent Variable	Construction of the Variable
Dividend yield	Dividend yield is obtained from CRSP. It is calculated as the amount of ordinary cash dividends (dividend code 1232,1242,1252) paid at the end of year t divided by the average year-end closing prices in years $t - 1$ and t.
Total payout yield	Total payout consists of cash dividends and the dollar value of share repurchases in year t divided by the average year-end market capitalization in years $t - 1$ and t.

Independent Variables	Predicted Sign	Definition of the Variable
Compensation ratio	Positive	Percentage of a CEO's cash salary and bonus to his or her total compensation in a given year, calculated using records obtained from the ExecuComp database.
Salary & bonus	Positive	Log (1 + value of cash salary and bonus given to a CEO in a certain year): extracted from the ExecuComp database.
Executive stock options	Negative	Log (1 + value of executive stock options): extracted directly from ExecuComp database.
In-the-money options	Negative	Log (1 + value of in-the-money exercisable executive stock options): extracted from ExecuComp database.
Service length	Positive	Number of years credited toward the CEO's retirement: extracted from the ExecuComp database.
Long service	Positive	A dummy variable equaling 1 only if the CEO has more than 25 years of service.
Fraction of shares owned by CEO	Negative	Ratio of number of shares owned by a CEO to total number of common shares outstanding for a sample firm at the end of a given year (includes stock awards in that year), calculated using records obtained through ExecuComp database.
Large CEO stock ownership	Negative	A dummy variable that equals 1 if a CEO controls more than 1% of total common shares of a firm in a given year.
Large shareholder	Positive	Fraction of total shares owned by the largest blockholder (other than the CEO) whenever this blockholder owns more than 5% of the firm's shares.
Board independence	Positive	A dummy variable that equals 1 if at least 40% of the board is comprised of outside directors, and equals 0 else.
Governance interaction	?	A dummy variable equaling 1 if there is a blockholder (other than the CEO) who owns more than 10% of a firm's shares and more than 50% of the board is comprised of outside directors.
Investment opportunities	Negative	Market-to-book (value) ratio of the firm's assets.
Tangible assets	Positive	The ratio, (net tangible assets)/(total assets). Tangible assets include properties, plants, and equipment.
Firm age	Positive	Log (1 + listing age of a firm). The listing age of a firm is set equal to the current reporting year minus the beginning date of a firm's listing year that is obtained through CRSP monthly file.
Firm size	Positive	Log (1 + market value of assets), where market value of assets is calculated as the book value of liabilities plus market value of equity.
Leverage	Negative	Debt/(debt + equity). The book value of debt and the market value of equity are used.

B. Results of the Logit Regressions

In our binary choice analysis, the dependent variable is the choice of making or omitting a payout (either a dividend payment or a shares repurchase or both) in a given year. We recall that equation (3) gives the likelihood of making a payout. Thus, if the estimated coefficient for any independent variable X_j is positive (negative) in the Logit regressions, then that variable is positively (negatively) related to the likelihood of payout, at the margin.

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Table 2 reports the results of our basic binary model for the likelihood of dividend payment and total payout. We analyze two specifications that differ only in the utilization of CEO compensation and governance information. However, the results are qualitatively similar in either specification.

TABLE 2

Logit Analysis of the Likelihood of Dividend Payment and Total Payout

Explanatory Variables	Predicted Sign	Dividend Payment		Total Payout	
		Specification (1)	Specification (2)	Specification (1)	Specification (2)
Intercept	—	−2.999 (−15.79)***	−4.422 (−12.72)***	−1.227 (−6.58)***	−2.231 (−6.67)***
Compensation ratio	Positive	0.473 (3.21)***	— —	0.096 (0.61)	— —
Long service	Positive	0.780 (3.89)***	0.726 (3.79)***	0.562 (2.33)**	0.569 (2.47)**
Service length	Positive	0.055 (15.01)***	0.051 (13.98)***	0.046 (9.89)***	0.042 (9.02)***
Large CEO stock ownership	Negative	— —	−0.255 (−3.05)***	— —	−0.268 (−2.96)***
Fraction of shares owned by CEO	Negative	−1.256 (−2.01)**	— —	−0.683 (−0.99)	— —
Salary & bonus	Positive	— —	0.325 (6.56)***	— —	0.226 (4.67)***
Executive stock options	Negative	— —	−0.049 (−3.91)***	— —	−0.011 (−0.81)
In-the-money options	Negative	0.009 (0.76)	— —	0.029 (2.27)**	— —
Large shareholder	Positive	−0.859 (−3.94)***	−0.682 (−3.01)***	−0.844 (−3.24)***	−0.713 (−2.64)**
Board independence	Positive	0.877 (4.03)***	0.953 (4.32)***	0.839 (3.21)***	0.904 (3.37)***
Governance interaction	?	— —	−0.408 (−3.23)***	— —	−0.366 (−2.51)**
Investment opportunities	Negative	−0.529 (−9.45)***	−0.531 (−9.51)***	−0.344 (−7.74)***	−0.318 (−7.30)***
Firm age	Positive	0.889 (18.53)***	0.848 (17.31)***	0.758 (14.07)***	0.724 (13.29)***
Tangible assets	Positive	0.763 (3.97)***	0.787 (4.12)***	0.012 (0.22)	0.012 (0.24)
No. of observations		4319	4396	3891	3962
Percentage correctly predicted		78.5	78.3	80.1	80.4
Log-likelihood		−2075.38	−2078.28	−1683.91	−1701.59
p-value of χ^2 of log-likelihood		< 0.001	< 0.001	< 0.001	< 0.001
Pseudo R^2		28.1%	29.3%	18.8%	19.6%

Table 2 presents the results of the Logit regressions for the likelihood of dividend payments and (total) payouts. For the dividend payment regression, the dependent variable is an index equal to 1 if a firm pays regular cash dividend in year t (calendar year), or 0 otherwise. For the total payout regression, the dependent variable is an index equal to 1 if the total payout yield is positive, and is set equal to 0 otherwise. We calculate the total payout yield in the manner explicated in Exhibit 1. Dividends and the market value of equity are obtained from the CRSP file while share repurchase and book value of asset are obtained through Compustat. A positive (negative) coefficient sign indicates that the variable is positively (negatively) associated with the likelihood of payouts, at the margin. t-statistics are reported in parentheses. McFadden's pseudo-R^2 is calculated as $(1 - L_M/L_O)$, where L_M is the log-likelihood for the estimated model, and L_O is the log-likelihood for the model with only an intercept. *, **, *** indicate t-statistic significance at the 10%, 5%, and 1% levels, respectively.

Our analysis shows that managerial type significantly influences the basic dividend payment and total payout decisions, as predicted by the entrenchment framework. Based on the success rate of in-sample classification of sample firms, the model appears to be about equally successful in describing the dividend pay-

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ment and the total payout decision. However, based on the significance of the estimated coefficients and the (pseudo) R^2, the theoretical framework does somewhat better in explaining the variation in the dividend payment decision compared to the shares repurchase decision. The relative superiority of the performance of the dividend decision model appears to be due to the opposing effects of some of the co-variates (e.g., stock options and ratio of tangible to total assets) on dividends and share repurchases.

In terms of the variables emphasized by the entrenchment framework, ceteris paribus, the likelihood of making a dividend payment increases significantly with the length of the CEO's service with the firm, higher non-equity-based CEO compensation, and greater proportion of outside directors on the board. Conversely, the equity-based (or incentive) component of the CEO's compensation, the quality of the investment opportunity set, and the presence of a large shareholder have a significant negative influence on the likelihood of dividend payment. Furthermore, independent boards and large shareholders appear to complement each other in the sense that their *joint* presence reduces the need for dividend payouts as a disciplining device.

Several other aspects of the dividend payment logistic regression results are noteworthy. CEO service length and direct share ownership appear to have a non-linear relationship with the likelihood of dividend payments: extra long service and substantially higher CEO equity ownership have a significant effect, even when controlling for service length and ownership fraction. In addition, in-the-money stock options held by the CEO do not significantly affect the payment decision, once we control for the CEO's total options awards and equity ownership. Finally, the likelihood of dividend payments is significantly and positively associated with firm age and the proportion of tangible to total assets, consistent with the received literature.

Many of the entrenchment-based independent variables affect the total payout decision in a manner qualitatively similar to their effect on the dividend payment decision. In particular, long CEO service, substantially higher CEO equity ownership, board independence, the presence of a large shareholder, and the quality of investment opportunities continue to play a prominent role even when share repurchases are included.

However, there are some interesting differences between the dividend payment and total payout models. Unlike the case for dividends, we find that executive stock options have no significant effect on the likelihood of total payouts, while in-the-money stock options actually have a positive effect. This corroborates our earlier argument that executive stock options have a much more ambiguous effect on the shares repurchase decision of entrenched managers, compared to the relatively cleaner (negative) relation of stock options to the dividend payment decision where both the entrenchment and the option valuation effects move in the same direction. Further, there is less evidence of a non-linear impact of the length of CEO service on shares repurchase decisions. Finally, there is no significant effect of the ratio of tangible to total assets to the likelihood of total payouts once share repurchases are included.

Overall, the results of the Logit regressions support the theoretical predictions of the enhanced entrenchment framework, especially for the binary divi-

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dend likelihood model. With the possible exception of the role of large external shareholders, all the significant explanatory variables influence dividend payment likelihood in a manner consistent with the predictions.[21] But, as we pointed out above, the effect of large external shareholders on payouts is complex and depends on the interaction of external monitoring with the effectiveness of internal governance mechanisms. Our analysis shows in fact that external monitoring by large shareholders complements internal monitoring by an independent board. This result reinforces the notion that large shareholders may find less of a need for using payouts as a disciplining mechanism if they have strong voting positions or board representation. Finally, the effect of executive stock options on share repurchases is more ambiguous than suggested by the entrenchment hypothesis.

Our basic model is highly significant from the perspective of likelihood ratio tests: the chi-square test statistics have *p*-values less than 0.001. At a 50% probability level, this model correctly predicts the dividend payment (total payout) decision for over 78% (80%) of the sample observations. However, one should interpret the apparent success of the model in classifying paying and non-paying decisions with caution. We can only reliably test the predictive power of the model with out-of-sample forecast tests (see Section VI).

C. Results of the Tobit Regressions

As we noted above, the theoretical entrenchment models also predict a negative relationship between payout *levels* and the strength of the managerial type, conditional on the firm making a payout. Therefore, we estimate the following empirical specification,

$$Y^* = \alpha + \beta' X + \varepsilon, \tag{4}$$

$$\frac{D}{P} = \begin{cases} Y^* & \text{if} \quad Y^* \leq 0. \\ 0 & \text{if} \quad Y^* > 0. \end{cases} \tag{5}$$

As before, we interpret D as either the ordinary cash dividend or the total cash payout, i.e., the sum of the cash dividends and dollar value of share repurchases. We have specified above the timing conventions on D and P. We show the results of the Tobit regressions for the basic dividend and payout yield models in Table 3.

Turning first to the dividend yield regressions, we find that the results support the predictions of the entrenchment model. The dividend payment level is significantly and positively associated with CEO power proxies related to compensation and length of service in the firm. Consistent with the arguments in the literature, dividend yield is significantly and positively associated with firm age and the percentage of tangible to total assets. However, we also find that dividend levels are significantly and negatively related to the quality of investment opportunities, equity-based managerial compensation, and direct CEO stock ownership.

As in the Logit regressions, dividend yields are higher when the board is relatively independent, but the presence of a large external shareholder depresses dividend payment levels. We again find that dividend payment levels are lower when

[21] It is also possible that the negative influence of large external shareholders on payout likelihood represents a latent size effect, since there is a negative correlation between size and the fraction of equity owned by the largest blockholder. We pursue this issue in Section V.

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TABLE 3

Tobit Analysis of the Determinants of Dividend and Total Payout Yield

Explanatory Variables	Predicted Sign	Dividend Yield		Total Payout Yield	
		Specification (1)	Specification (2)	Specification (1)	Specification (2)
Intercept	—	−2.063 (−14.98)***	−2.518 (−10.59)***	−0.431 (−7.63)***	−0.604 (−6.09)***
Compensation ratio	Positive	0.454 (4.26)***	— —	0.008 (0.18)	—
Long service	Positive	0.223 (1.85)*	0.340 (2.95)***	−0.001 (−0.01)	0.007 (0.13)
Service length	Positive	0.034 (17.14)***	0.032 (16.12)***	0.004 (3.98)***	0.003 (3.63)***
Large CEO stock ownership	Negative	— —	−0.415 (−6.78)***	— —	0.001 (0.05)
Fraction of shares owned by CEO	Negative	−1.634 (−3.51)***	— —	0.158 (0.79)	— —
Salary & bonus	Positive	— —	0.149 (4.42)***	— —	0.036 (2.46)**
Executive stock options	Negative	— —	−0.038 (−4.33)***	— —	−0.001 (−0.35)
In-the-money options	Negative	−0.029 (−3.63)***	— —	0.005 (1.48)	— —
Large shareholder	Positive	−0.614 (−5.15)***	−0.336 (−2.70)***	−0.163 (−3.02)***	−0.155 (−2.74)***
Board independence	Positive	0.453 (3.85)***	0.508 (4.38)***	0.149 (2.78)***	0.142 (2.69)***
Governance interaction	?	— —	−0.514 (−6.07)***	— —	−0.007 (−0.17)
Investment opportunities	Negative	−0.700 (−15.82)***	−0.738 (−16.96)***	−0.079 (−5.32)***	−0.075 (−5.20)***
Firm age	Positive	0.788 (23.82)***	0.717 (21.39)***	0.109 (7.47)***	0.103 (6.95)***
Tangible assets	Positive	0.384 (3.02)***	0.433 (3.45)***	0.008 (0.50)	0.008 (0.51)
No. of observations		4319	4396	3891	3962
Log-likelihood		−5956.33	−6020.20	−3705.32	−3744.04
p-value of χ^2 of log-likelihood		< 0.001	< 0.001	< 0.001	< 0.001
Pseudo R^2		33.1%	33.6%	9.7%	10.1%

Table 3 presents the results of the Tobit regressions for the dividend and (total) payout yield. For the dividend yield regression, the dependent variable is the cash dividend yield in year t (calendar year), calculated in the manner described in Exhibit 1. For non-paying firms, the yield is set to zero. For the total payout yield regression, the dependent variable is the total payout yield that is calculated in the manner explicated in Exhibit 1. Dividends and the market value of equity are obtained from the CRSP file while share repurchase and book value of assets are obtained through Compustat. The associated t-statistic is reported in parentheses. McFadden's pseudo-R^2 is calculated as $(1 - L_M/L_O)$, where L_M is the log-likelihood for the estimated model, and L_O is the log-likelihood for the model with only an intercept. *, **, *** indicate t-statistic significance at the 10%, 5%, and 1% levels, respectively.

monitoring by a large external shareholder coexists with board independence, reinforcing our earlier observation that monitoring by large shareholders and independent boards is complementary. We also find evidence that CEO service length and stock ownership have a non-linear relationship with dividend payment levels, conditional on a positive payment decision. Overall, the qualitative relationship of the independent variables to dividend payment levels is remarkably similar to that seen in the Logistic regressions for the basic dividend payment decision.

Interestingly, in-the-money stock options held by the CEO have a significant (negative) influence on dividend levels, even controlling for the CEO's total stock options awards and share ownership. In contrast, in-the-money stock options have no significant effect on the *likelihood* of dividend payments, once we control for

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the CEO's total stock options awards and share ownership (cf. Table 2). This result is intuitively appealing. If payouts are inversely related to the quality of investment opportunities, then the basic payment decision should be influenced by the overall quality of these opportunities (good or bad). But the size of the payment should also depend (negatively) on how good these opportunities are. The value of in-the-money (CEO) stock options is informative of how good the investment opportunities are, and therefore exerts significant influence on the level of payments.

Turning to the total payout yield regression, we find that payout yield is significantly and positively associated with CEO service length and cash compensation, board independence, and the age of the firm. Total payout yield is significantly and negatively associated with the quality of the investment opportunity set and the presence of a large shareholder. However, many of the independent variables that are highly significant in the dividend yield regression are no longer significant once we include the dollar value (or size) of the share repurchases, since these variables have conflicting effects on dividends and share repurchases. Consistent with our earlier findings (Table 2), stock option awards, direct CEO equity ownership, and the percentage of tangible to total assets are not significant predictors of total payout levels. Moreover, the complementary monitoring relationship between large shareholders and independent boards is not a significant influence on the level of share repurchases.

Table 3 suggests that the entrenchment-based framework is more successful in explaining the dividend payment levels than the shares repurchase levels, based on a comparison of log-likelihood and (pseudo) R^2 statistics between the dividend and the total payout specifications. In contrast, the performance of the theoretical model is relatively more symmetric in explaining the basic dividend payment and shares repurchase decisions (cf. Table 2). However, both the dividend and payout yield models are still highly significant in terms of likelihood ratio tests.

V. Size and Leverage Effects

Some of the most influential variables for determining the payout decision and the payout yield in the previous section are the length of CEO service, cash salary and bonuses as a proportion of total CEO compensation, the quality of the investment opportunity set, firm age, and the ratio of tangible to total assets. All of these variables are likely to be correlated with firm size. Firm size is generally positively correlated with age (e.g., Audretsch (1995)). Smaller firms are more likely to have a greater proportion of asset value in growth options and intangible assets and to have a large shareholder (cf. footnote 12). In addition, CEOs of small firms receive a significantly higher proportion of their compensation through equity-based compensation. We therefore examine whether the observed significance of the entrenchment-related variables on payout policy is really due to an underlying correlation between firm size and payout policy.

Similarly, leverage or capital structure related variables are absent from the basic entrenchment models of the previous section. However, leverage should impact payout policy for a number of reasons, and we examine this relationship in this section.

A. Size Effects

To test for size effects in payout policy, we extend the specification of the basic payout decision and yield models to include firm size, defined as (the natural log of) the market value of total assets. Table 4 reports the results of this analysis for the binary payout decision.

TABLE 4

The Effect of Firm Size on the Likelihood of Dividend Payment and Total Payout

Explanatory Variables	Predicted Sign	Dividend Payment		Total Payout	
		Specification (1)	Specification (2)	Specification (1)	Specification (2)
Intercept	—	−5.532 (−18.49)***	−5.248 (−14.89)***	−3.306 (10.86)***	−3.228 (−8.66)***
Compensation ratio	Positive	0.792 (5.19)***	— —	0.238 (1.45)	—
Long service	Positive	0.691 (3.39)***	0.712 (3.72)***	0.514 (2.11)**	0.572 (2.48)**
Service length	Positive	0.043 (11.27)***	0.044 (11.66)***	0.035 (7.27)***	0.034 (7.24)***
Large CEO stock ownership	Negative	— —	−0.115 (−1.34)	— —	−0.156 (−1.69)*
Fraction of shares owned by CEO	Negative	−0.631 (−1.00)	— —	−0.289 (−0.42)	— —
Salary & bonus	Positive	— —	0.113 (2.25)**	— —	0.063 (1.13)
Executive stock options	Negative	— —	−0.061 (−4.75)***	— —	−0.018 (−1.29)
In-the-money options	Negative	−0.024 (−1.93)**	— —	−0.163 (−0.01)	— —
Large shareholder	Positive	−0.608 (−2.71)***	−0.468 (−2.03)**	−0.636 (−2.39)**	−0.523 (−1.91)*
Board independence	Positive	0.743 (3.32)***	0.885 (3.94)***	0.703 (2.64)**	0.813 (2.99)***
Governance interaction	?	— —	−0.479 (−3.77)***	— —	−0.412 (−2.80)***
Investment opportunities	Negative	−0.642 (−10.72)***	−0.648 (−10.89)***	−0.364 (−7.81)***	−0.359 (−7.83)***
Firm age	Positive	0.719 (14.19)***	0.735 (4.49)***	0.631 (11.08)***	0.633 (11.13)***
Tangible assets	Positive	0.488 (2.61)**	0.583 (3.08)***	0.001 (0.01)	0.002 (0.04)
Firm size	Positive	0.424 (11.82)***	0.358 (9.38)***	0.356 (8.98)***	0.324 (7.80)***
Percentage correctly predicted		78.2	78.6	80.9	81.1
Log-likelihood		−1995.86	−2029.45	−1635.19	−1663.75
p-value of χ^2 of log-likelihood		< 0.001	< 0.001	< 0.001	< 0.001
Pseudo R^2		30.7%	30.8%	20.9%	21.7%

Table 4 analyzes the impact of firm size on the likelihood of dividends and total payouts, taking the basic likelihood model of Table 2 as the benchmark. The dependent variable is an index that equals 1 if the firm's dividend or payout yield is positive in year t, and equals 0 otherwise. The timing conventions for the calculation of the dependent variables and the regressors are specified in Exhibit 1. Firm size is the log of the market value of assets. The market value of assets is calculated as book value of all liabilities plus market value of equity. Dividends and the market value of equity are obtained from CRSP, while share repurchases and book value of liabilities are obtained through Compustat. t-statistics are reported in parentheses. McFadden's pseudo-R^2 is calculated as $(1 - L_M/L_O)$, where L_M is the log-likelihood for the estimated model, and L_O is the log-likelihood for the model with only an intercept. *, **, *** indicate t-statistic significance at the 10%, 5%, and 1% levels, respectively.

The results in Table 4 make two major points. First, the significance of the entrenchment-related variables in Table 2 is not a spurious finding due to a latent

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size effect. With the exception of the role of CEO stock ownership, both the significance and (algebraic) size of the coefficients for the various entrenchment and agency-related variables are robust to controlling for firm size. And, even after controlling for size, the model continues to be more successful in explaining the dividend payment decision compared to the shares repurchase decision. Second, we find that firm size is positively and significantly related to the likelihood of payouts (both dividends and share repurchases), even when we control for the age of the firm and the entrenchment related variables. The in-sample fit of the model improves with the inclusion of size as an explanatory variable for both dividends and total payouts.

Table 5 pursues the relation of firm size to the entrenchment framework by examining the dividend payment likelihood function for the bottom and top size quartile of firms.[22] We include the square of the firm size to control for the possibility that some of the included regressors are acting as proxies for firm size. We find that the effect of equity-based compensation on payout likelihood is quite heterogeneous in terms of size: CEO compensation is not significantly related to the payout decision for the largest firms, although the length of CEO service and the quality of investment opportunities continue to play a significant role in these firms. Thus, the negative (positive) association previously noted between CEO equity-based (cash-based) compensation and the likelihood of dividends (Tables 2 and 4 above, Lambert et al. (1989), and Fenn and Liang (2001)) is essentially a small- and medium-size firm phenomenon.

The likelihood of dividend payment in the largest firms is not significantly affected by board independence or by the presence of large external shareholders. One possible reason for this result is that there are very few observations with large external shareholders (i.e., holding more than 5% of equity) in the top firm size quartile. But it is also possible that the proportion of independent directors has less of an impact on governance, at the margin, for the largest firms: either the firm is very well governed due to intense external scrutiny by financial markets or the CEO is extremely powerful. At the other end of the size spectrum, the literature generally argues that governance problems are more acute (on average) for small firms, in part due to relatively low levels of monitoring by financial market institutions (see, e.g., Barth, Kasznick, and McNichols (2001)). Table 5 shows that for the smallest firms the joint presence of large shareholders and board independence is necessary for corporate governance to be a significant factor in the dividend payment decision.

We examine next the relation of firm size to payout levels. Table 6 shows that the significance and size of the coefficients for most of the entrenchment-based variables are unaffected when we control for size. Furthermore, payout yields are significantly and positively associated with firm size, even when controlling for firm age, the ratio of tangible to total assets, and the entrenchment and agency-related variables.

[22] We focus on dividend payments since the interaction of executive compensation and size with dividend payments has recently received much attention in the literature (e.g., White (1996) and Fenn and Liang (2001)).

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TABLE 5

Dividend Payment Likelihood for the Smallest and Largest Firms

Explanatory Variables	Predicted Sign	Bottom Size Quartile		Top Size Quartile	
		Specification (1)	Specification (2)	Specification (1)	Specification (2)
Intercept	—	−6.125 (−9.55)***	−5.126 (−6.15)***	−3.634 (−5.04)***	−5.431 (−5.45)***
Compensation ratio	Positive	0.943 (2.94)***	— —	0.331 (0.91)	— —
Long service	Positive	0.532 (1.59)	0.630 (2.07)**	0.557 (1.10)	0.623 (1.25)
Service length	Positive	0.027 (3.27)***	0.031 (3.73)***	0.041 (5.75)***	0.040 (5.68)***
Large CEO stock ownership	Negative	— —	0.094 (0.57)	— —	−0.108 (−0.36)
Fraction of shares owned by CEO	Negative	0.592 (0.62)	— —	2.103 (0.76)	— —
Salary & bonus	Positive	— —	−0.094 (−0.76)	— —	0.348 (3.33)***
Executive stock options	Negative	— —	−0.086 (−3.04)***	— —	−0.036 (−1.25)
In-the-money options	Negative	−0.044 (−1.17)	— —	0.026 (0.96)	— —
Large shareholder	Positive	0.306 (0.65)	0.355 (0.77)	−0.146 (−0.35)	−0.054 (−0.11)
Board independence	Positive	−0.562 (−1.18)	−0.193 (−0.23)	0.463 (1.17)	0.459 (1.16)
Governance interaction	?	— —	−0.914 (−3.76)***	— —	−0.098 (−0.24)
Investment opportunities	Negative	−0.745 (−5.46)***	−0.778 (−5.74)***	−0.538 (−4.24)***	−0.516 (−3.90)***
Firm age	Positive	1.003 (8.66)***	1.027 (8.78)***	0.612 (6.08)***	0.605 (5.99)***
Tangible assets	Positive	0.546 (1.34)	0.664 (1.66)*	1.521 (3.15)***	1.404 (2.95)***
Firm size squared	?	0.071 (4.67)***	0.074 (4.70)***	0.019 (2.87)***	0.018 (2.66)***
No. of observations		1038	1053	1112	1126
Percentage correctly predicted		73.1	73.4	86.4	86.8
Log-likelihood		−502.61	−505.47	−382.16	−381.48
p-value of χ^2 of log-likelihood		0.001	0.001	0.001	0.001
Pseudo R^2		25.8%	26.5%	22.4%	23.6%

Table 5 provides the dividend payment likelihood (Logit) model estimates (cf. Table 2) for the bottom- and top-quartile of the sample in terms of firm size. Firm size is the log of the market value of assets. The market value of assets is calculated as book value of all liabilities plus market value of equity. Dividends and the market value of equity are obtained from CRSP, while share repurchases and book value of liabilities are obtained through Compustat. The dependent variable is an index that equals 1 if the firm's Dividend yield is positive in year t, and equals 0 otherwise. t-statistics are reported in parentheses. McFadden's pseudo-R^2 is calculated as $(1 - L_M/L_O)$, where L_M is the log-likelihood for the estimated model, and L_O is the log-likelihood for the model with only an intercept. *, **, *** indicate t-statistic significance at the 10%, 5%, and 1% levels, respectively.

B. Payout Constraining Effects of Leverage

We expect leverage to have a negative effect on payout, other things held constant, for at least two reasons. There is a direct and restrictive impact of debt covenants on payouts. There may also be an indirect negative effect since debt-related payouts reduce firm liquidity and constrain (discretionary) payouts to shareholders.

We test the hypothesis of a negative relation of leverage to payouts by enhancing the basic specification to include firm leverage. Here we measure lever-

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TABLE 6

Effect of Firm Size on Payout Levels

Explanatory Variables	Predicted Sign	Dividend Yield		Total Payout Yield	
		Specification (1)	Specification (2)	Specification (1)	Specification (2)
Intercept	—	−3.495 (−18.11)***	−2.754 (−11.57)***	−0.642 (−7.87)***	−0.656 (−6.48)***
Compensation ratio	Positive	0.704 (6.51)***	— —	0.040 (0.84)	—
Long service	Positive	0.183 (1.53)	0.331 (2.87)***	−0.003 (−0.05)	0.011 (0.21)
Service length	Positive	0.027 (13.58)***	0.028 (14.15)***	0.003 (2.76)***	0.003 (2.70)***
Large CEO stock ownership	Negative	— —	−0.343 (−5.53)***	— —	0.012 (0.43)
Fraction of shares owned by CEO	Negative	−1.229 (−2.68)***	— —	0.208 (1.04)	— —
Salary & bonus	Positive	— —	0.035 (0.95)	— —	0.014 (0.88)
Executive stock options	Negative	— —	−0.043 (−5.03)***	— —	−0.002 (−0.69)
In-the-money options	Negative	−0.051 (−6.09)***	— —	0.002 (0.53)	—
Large shareholder	Positive	−0.423 (−3.56)***	−0.209 (−1.66)	−0.133 (−2.44)***	−0.128 (−2.24)**
Board independence	Positive	0.351 (3.01)***	0.456 (3.93)***	0.132 (2.48)**	0.131 (2.48)**
Governance interaction	?	— —	−0.539 (−6.38)***	— —	−0.011 (−0.29)
Investment opportunities	Negative	−0.758 (−16.95)***	−0.790 (−17.76)***	−0.082 (−5.46)***	−0.081 (−5.48)***
Firm age	Positive	0.647 (18.64)***	0.646 (18.57)***	0.089 (5.71)***	0.089 (5.78)***
Tangible assets	Positive	0.223 (1.84)*	0.330 (2.67)**	0.006 (0.36)	0.007 (0.41)
Firm size	Positive	0.249 (10.98)***	0.165 (6.74)***	0.036 (3.65)***	0.032 (3.01)***
Log-likelihood		−5884.52	−5986.53	−3681.81	−3722.02
p-value of χ^2 of log-likelihood		< 0.001	< 0.001	< 0.001	< 0.001
Pseudo R^2		33.8%	33.9%	9.9%	10.3%

Table 6 analyzes the impact of firm size on the levels of dividends and total payouts, taking the basic payout yield (Tobit) model of Table 3 as the benchmark. The dependent variables are the dividend and total payout yield in year t, calculated in the manner explicated in Exhibit 1. Firm size is measured as the log of the market value of assets. The market value of assets is calculated as book value of liabilities plus market value of equity. Dividends and the market value of equity are obtained from the CRSP file while share repurchases and book value of liabilities are obtained through Compustat. The value of the t-statistic is reported in parentheses. McFadden's pseudo-R^2 is calculated as $(1 - L_M/L_O)$, where L_M is the log-likelihood for the estimated model, and L_O is the log-likelihood for the model with only an intercept. *, **, *** indicate t-statistic significance at the 10%, 5%, and 1% levels, respectively.

age through the debt capitalization ratio (using the market value of equity). But our results are unaffected when we use other measures such as the debt-to-equity ratio.

Table 7 reports the effect of leverage on the total payout likelihood and total payout yield. We find that high leverage has a significantly negative relationship with the likelihood of payouts. Furthermore, leverage is significantly and negatively related to payout yield.[23] Our analysis thus supports the hypothesis that leverage negatively affects payouts, ceteris paribus. We note that the inclusion of leverage does not materially impact the role of the other independent variables

[23]The influence of leverage on dividend payments and the broader payout measure is quite similar.

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(cf. Tables 2 and 3), indicating that the role of the entrenchment variables in the payout likelihood is not due to spurious correlation with leverage.

TABLE 7

Effect of Leverage on the Likelihood and Level of Payouts

Explanatory Variables	Predicted Sign	Payout Likelihood		Payout Yield	
		Specification (1)	Specification (2)	Specification (1)	Specification (2)
Intercept	—	−0.847 (−4.32)***	−1.853 (−5.41)***	−0.348 (−5.96)***	−0.519 (−5.19)***
Compensation ratio	Positive	0.012 (0.07)	— —	−0.004 (−0.09)	— —
Long service	Positive	0.419 (1.74)*	0.428 (1.86)*	−0.019 (−0.34)	−0.011 (−0.21)
Service length	Positive	0.048 (10.29)***	0.045 (9.49)***	0.004 (4.42)***	0.004 (4.08)***
Large CEO stock ownership	Negative	— —	−0.259 (−2.83)***	— —	0.001 (0.02)
Fraction of shares owned by CEO	Negative	−0.626 (−0.91)	— —	0.151 (0.75)	— —
Salary & bonus	Positive	— —	0.209 (4.26)***	— —	0.033 (2.26)**
Executive stock options	Negative	— —	−0.011 (−0.79)	— —	−0.001 (−0.38)
In-the-money options	Negative	0.020 (1.52)	— —	0.004 (0.99)	— —
Large shareholder	Positive	−0.829 (−3.14)***	−0.704 (−2.55)**	−0.163 (−3.00)***	−0.153 (−2.75)***
Board independence	Positive	0.828 (3.10)***	0.876 (3.23)***	0.148 (2.76)***	0.141 (2.65)**
Governance interaction	?	— —	−0.342 (−2.32)**	— —	−0.003 (−0.08)
Investment opportunities	Negative	−0.462 (−9.22)**	−0.440 (−8.86)***	−0.107 (−6.59)***	−0.104 (−6.57)***
Firm age	Positive	0.757 (13.94)***	0.727 (13.24)***	0.108 (7.38)***	0.102 (6.88)***
Tangible assets	Positive	0.029 (0.61)	0.029 (0.59)	0.012 (0.74)	0.012 (0.76)
Leverage	Negative	−1.500 (−6.16)***	−1.507 (−6.26)***	−0.345 (−4.99)***	−0.347 (−5.13)***
Percentage correctly predicted		80.2	80.3	NA	NA
Log-likelihood		−1650.55	−1667.94	−3667.54	−3705.06
p-value of χ^2 of log-likelihood		< 0.001	< 0.001	< 0.001	< 0.001
Pseudo R^2		19.9%	20.6%	10.1%	10.4%

Table 7 analyzes the impact of firm leverage on the likelihood and levels of (total) payouts, taking the basic payout likelihood (Logit) and payout yield (Tobit) models of Tables 2 and 3 (respectively) as the benchmark. Leverage is measured as the market value debt-capitalization ratio (i.e., debt/(debt + equity)). Consistent with the standard practice in the literature, we use the market value of equity but the book value of debt. Leverage and market capitalization records are extracted from Compustat. The value of the t-statistic is reported in parentheses. McFadden's pseudo-R^2 is calculated as $(1 - L_M/L_O)$, where L_M is the log-likelihood for the estimated model, and L_O is the log-likelihood for the model with only an intercept. *, **, *** indicate t-statistic significance at the 10%, 5%, and 1% levels, respectively.

VI. Out-of-Sample Predictive Power

In this section, we examine the predictive power of the basic entrenchment model using out-of-sample forecast tests for the likelihood of positive cash payout (dividends and share repurchases), and also on the level of the payout.

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A. Predictive Power of the Binary Decision Model

We designate 1992–1998 as the in-sample period and 1999–2000 as the out-of-sample period. Using the estimated coefficients from the in-sample period, we compute the probability of a dividend payment and the probability of any cash payout (through dividends and share repurchases) on a *firm-by-firm* basis for 1999 and 2000 separately. That is, for each firm we use the independent variable values for 1999 and 2000 in equation (3) to compute the probability of payment (or non-payment). A firm is predicted to be a paying firm in the year 1999 (or 2000) if the probability of payment in that year strictly exceeds one-half, and is predicted to be a non-paying firm otherwise.

Preliminary analysis showed that both the Logit specifications in Table 2 have essentially the same predictive power for both 1999 and 2000. For space saving reasons, Table 8 only compares the predictions from specification (1) of Table 2 with the actual dividend payment and shares repurchase records (using the CRSP and Compustat databases). Panel A cross-tabulates the predictions of the model regarding zero or positive dividend payment and total cash payout against the actual payment behavior for the year 1999, and panel B does so for the year 2000. We calculate predictive accuracy by payout category (i.e., zero payout vs. positive payout) and present the predictive category over all observations.

The model performs quite creditably. In each of the two out-of-sample years, the overall predictive accuracy is over 75% for both the dividend payments and total payouts. However, the model performs better for the likelihood of dividend payments in comparison with the total payout likelihood. This finding is consistent with the earlier in-sample evidence reported in Table 2. We also see that the model is relatively more accurate in predicting non-payment of dividends vs. dividend payments, but the model performs better in predicting positive share repurchases relative to the case of no share repurchases.

The out-of-sample predictive performance of the model is encouraging because we define paying firms to include firms that are initiating or resuming dividends or doing share repurchases. Dividend initiations or resumptions (or shares repurchase decisions) are relatively infrequent events for the firm, and one would expect considerable noise in such decisions.

Further analysis of the determinants of prediction accuracy of the model is illuminating. Table 9 attempts to identify firm characteristics associated with better (worse) prediction on dividend payment behavior. The model is most successful in predicting dividend payments for older, significantly levered, and low market-to-book ratio firms. The model also does better in predicting dividend payments for firms that are controlled by CEOs who have long years of service with the firm and who receive a relatively large proportion of compensation in cash salary and bonus. Interestingly, firm size significantly influences the model's predictive accuracy with respect to non-paying firms, but not with respect to paying firms.

B. Predictive Power of the Payout Level (Tobit) Model

We measure the out-of-sample predictive power of the payout yield models by comparing the mean squared error (MSE) and the mean absolute error (MAE)

TABLE 8

Out-of-Sample Forecast Performance of the Logit Model for 1999–2000

Prediction by Logit Specification (1)

Panel A. Out-of-Sample Predictive Accuracy for 1999

Actual Dividend Payments for 1999

Model Prediction	Non-Payment	Payment	Overall Accuracy
Non-Payment	**294 (87.2%)**	63	77.5%
Payment	120	**336 (73.7%)**	
Total of Actual Dividend Records	414	399	813

Actual Total Payouts for 1999

Model Prediction	Zero Payout	Positive Payout	Overall Accuracy
Zero Payout	**44 (59.5%)**	30	80.9%
Positive Payout	104	**525 (83.4%)**	
Total of Actual Payout Records	148	555	703

Panel B. Out-of-Sample Predictive Accuracy for 2000

Actual Dividend Payments for 2000

Model Prediction	Non-Payment	Payment	Overall Accuracy
Non-Payment	**317 (84.5%)**	58	76.3%
Payment	146	**340 (70.0%)**	
Total of Actual Dividend Records	463	398	861

Actual Total Payouts for 2000

Model Prediction	Zero Payout	Positive Payout	Overall Accuracy
Zero Payout	**27 (56.2%)**	21	78.1%
Positive Payout	145	**565 (79.6%)**	
Total of Actual Payout Records	172	586	758

Table 8 presents the out-of-sample forecast performance for the basic Logit model of Table 2 for 1999–2000. For each firm (that meets the data requirements for 1992–2000), we use the Logit model (1) estimates from Table 2 to construct an index variable that predicts dividend payment or non-payment using independent variable values for 1999 and 2000 *separately*. The firm is predicted to make a payout (not make a payout) in a given year if the probability of payout calculated from the Logit model is strictly greater (strictly less) than 50%. We then compare these predictions with the actual payout behavior for that year (1999 or 2000). The correct predictions are identified in bold type. The parentheses report the percentage of correctly predicted firms in each category (payment and non-payment) through the ratio: (Number of actual firms in category)/(Number of predicted firms in category). Overall Accuracy is calculated as: (Correctly predicted observations)/(Total observations).

of the in-sample model predictions with the corresponding MSE and MAE of the out-of-sample model predictions. In effect, we use the in-sample prediction errors as the benchmark for calibrating the out-of-sample prediction errors. Presumably, the out-of-sample prediction errors will be significantly higher than the in-sample errors if the model's out-of-sample performance is weak.

Our procedure is to use the estimated coefficients from the Tobit regressions to generate in-sample predicted values for 1992–1998, and the out-of-sample predicted values for 1999–2000, on a firm-by-firm basis.[24] We compute predicted values for in-sample and out-of-sample periods for both the raw regressions (i.e., unadjusted for censoring) and regressions adjusted for censoring. For each firm-year, we calculate the squared deviation (or an absolute deviation) of the predicted value from the actual value. The MSE and the MAE are the average of these de-

[24]We pool the 1999 and 2000 records to *accentuate* the difference between the in-sample and out-of-sample prediction errors. These differences are minimal when we compare them separately for 1999 and 2000.

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TABLE 9

Comparison of Characteristics of Firms Whose Dividend Payment Behavior is Correctly vs. Incorrectly Predicted by the Logit Model for the Year 2000

			Non-Parametric Approach				
Data Item	Mean (IC)	Mean (C)	Wilcoxon Rank Sum	Median Score[a]	Van der Waerden[b]	Savage Score[c]	*t*-Test
Panel A. Dividend-Paying Firms in 2000							
Service length	0.97	13.24	6.58 (0.001)	6.38 (0.001)	6.34 (0.001)	5.29 (0.001)	6.98 (0.001)
Salary & bonus	1441.74	1077.40	2.38 (0.017)	1.70 (0.089)	2.35 (0.019)	2.15 (0.032)	2.57 (0.011)
Compensation ratio	0.50	0.48	0.86 (0.389)	1.13 (0.256)	0.087 (0.383)	0.19 (0.844)	0.45 (0.652)
Firm size	9905.69	15648.81	1.25 (0.211)	1.71 (0.088)	1.35 (0.178)	1.12 (0.264)	1.36 (0.175)
Cash and equivalent	260.76	336.71	0.40 (0.432)	0.65 (0.256)	0.76 (0.687)	0.79 (0.510)	1.14 (0.451)
Leverage	0.17	0.27	3.51 (0.001)	2.55 (0.011)	3.60 (0.001)	2.83 (0.004)	3.73 (0.001)
Market-to-book ratio	3.12	1.93	3.07 (0.002)	2.27 (0.023)	3.26 (0.001)	4.99 (0.001)	3.40 (0.001)
Firm age	9.81	33.94	10.11 (0.001)	8.82 (0.001)	10.31 (0.001)	7.11 (0.001)	11.41 (0.001)
Panel B. Non-Paying Firms in 2000							
Service length	7.61	0.30	8.48 (0.001)	8.20 (0.001)	8.73 (0.001)	8.70 (0.001)	6.67 (0.001)
Salary & bonus	1243.54	849.49	4.43 (0.001)	3.43 (0.001)	4.45 (0.001)	3.94 (0.001)	2.60 (0.010)
Compensation ratio	0.58	0.41	5.62 (0.001)	5.43 (0.001)	5.41 (0.001)	3.96 (0.008)	5.54 (0.001)
Firm size	4852.90	2433.23	0.87 (0.384)	0.23 (0.817)	1.32 (0.188)	1.74 (0.082)	3.05 (0.001)
Cash and equivalent	105.58	213.26	3.73 (0.001)	2.17 (0.030)	4.20 (0.001)	3.49 (0.001)	3.80 (0.001)
Leverage	0.31	0.14	7.87 (0.001)	7.23 (0.001)	7.42 (0.001)	6.53 (0.001)	7.05 (0.001)
Market-to-book	1.62	3.46	8.07 (0.001)	7.28 (0.001)	7.77 (0.001)	7.12 (0.001)	8.31 (0.001)
Firm age	22.89	7.40	13.54 (0.001)	11.06 (0.001)	13.42 (0.001)	13.81 (0.001)	11.93 (0.001)

Mean (IC) and Mean (C) are the means of various characteristics for firms whose year 2000 dividend payment behavior is predicted incorrectly or correctly, respectively, by the Logit model specification used in Table 8. Table 9 compares the sample means of the characteristics across the two groups of firms. The characteristics are defined in Exhibit 1. The null hypothesis is that there is no significant difference between the two sample means: H_0: $x_1 = x_0$. The absolute value of the *z*-statistic analysis is reported in the first row; and the associated *p*-value is reported in parentheses.

[a]Median score is calculated as 1 if an observation is above the sample median, or 0 otherwise.

[b]Assuming sample is normally distributed.

[c]Assuming sample is exponentially distributed.

viations for the relevant sample (1992–1998 or 1999–2000). We then perform both non-parametric and *t*-statistic analysis to test the null hypothesis that the in-sample and out-of-sample MSE and MAE are the same.

We report the in-sample and out-of-sample MSE and MAE for both the dividend and the total payout yield in Table 10. We see that there is no significant difference between in-sample and out-of-sample performance for dividend yields, from the viewpoint of the *t*-statistic test. Interestingly, out-of-sample performance for the total payout yield is better than the in-sample performance. We conclude

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that the out-of-sample predictive power of the Tobit model does not degenerate relative to the in-sample predictive performance.

TABLE 10

Out-of-Sample Forecasting Performance of the Tobit Model for 1999–2000

Performance Measure	In-Sample	Out-of-Sample	Statistics for the Difference: Wilcoxon Rank Sum	Statistics for the Difference: Kolmogorv-Smirnov Scores[a]	Statistics for the Difference: *t*-Statistic
		Out-of-Sample Predictions for Years 1999 and 2000			
Panel A. Dividend Yield Model (1)					
Not adjusted for censoring					
MSE	2.21	2.34	1.83**	1.53**	0.62
MAE	1.08	1.05	1.84**	1.53**	0.96
Adjusted for censoring					
MSE	1.23	1.47	1.57	1.41**	1.35
MAE	0.79	0.77	1.57	1.40**	0.45
Panel B. Total Payout Model (1)					
Not adjusted for censoring					
MSE	0.39	0.06	3.70***	1.95***	3.03***
MAE	0.29	0.23	3.71***	1.90***	4.40***
Adjusted for censoring					
MSE	0.40	0.03	1.36	1.16	3.13***
MAE	0.21	0.14	1.36	1.17	4.34***

Table 10 presents the out-of-sample forecasting performance of the Tobit model for 1999–2000. Based on in-sample analysis, we use the Tobit model estimates from Table 3 to construct the dividend yield that predicts dividend payment using independent variable values for 1999 and 2000, and similarly for the total payout yield. For each firm (that meets the data requirements for 1999–2000), we use the model from Table 3, Specification (1), to estimate the predicted dividend or payout yield. We consider both predictions for uncensored observations and adjusted predictions for censored observations. Predictions for 1999 and 2000 are pooled together, and the performance measures are reported as mean squared error (MSE) and mean absolute error (MAE). The table presents the absolute values of *z*-scores for various non-parametric and *t*-statistics for the null hypothesis of equal errors between in-sample and out-of-sample performance. *, **, *** indicate *t*-statistic significance at the 10%, 5%, and 1% levels, respectively.

[a]The Kolmogorov-Smirnov statistic measures the maximum deviation of the empirical distribution function within the classes from the pooled empirical distribution function.

VII. Summary and Conclusions

We build on the theoretical literature on managerial entrenchment to develop a framework that yields refutable predictions on payout policy by integrating the influence of internal governance mechanisms, investment opportunities, management compensation, and monitoring by large external shareholders. In contrast to the earlier literature, our framework imposes restrictions on both the decision to make payouts and on payout levels. Our empirical analysis supports these predictions, both for dividend payments and total payouts (including share repurchases), but the model does somewhat better in explaining dividend rather than shares repurchase policy. We find that factors related to managerial entrenchment levels have a significant explanatory power with respect to the payout vs. no-payout decision and the level of payouts, even when controlling for the firm age, size, the quality of investment opportunities, and the ratio of tangible to total assets. The superior performance of the entrenchment-based model is robust, when applied to both in-sample fit and out-of-sample forecast tests. Overall, our analysis indicates that managerial entrenchment is a significant factor in the determination of corporate payout policy.

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