Working Paper

CORPORATE GOVERNANCE AND THE WEIGHTING OF PERFORMANCE MEASURES IN CEO COMPENSATION

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Abstract

We empirically examine how corporate governance affects the structure of executive compensation contracts. In particular, we analyze the implicit weights of firm performance measures in explaining CEO compensation. We find that weaker corporate governance is associated with compensation contracts that put more weight on accounting-based measures of performance (i.e., return on assets) than on stock-based performance measures (i.e., market returns). This finding is consistent with CEOs in firms with weaker governance structures—where the CEO has more influence over the contracting process—choosing to weight more heavily those performance measures that they are better able to control. To further examine the implications of these results, we investigate the association between variation in compensation and governance and find that weaker governance is associated with lower variance in compensation. We also find that executive compensation contracts in firms with weaker governance rely more on cash compensation at the expense of stock-based compensation.

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1. Introduction

Weak corporate governance leads to higher agency costs. Gompers et al. (2003) propose this as the most plausible rationale to explain the relationship that they document between corporate governance and long-term stock returns. Various mechanisms link governance with agency costs. The contracting process with the CEO is one of them; because of its relevance, this mechanism has received significant attention in both the academic and the managerial literature. Weaker governance leads to agency costs by facilitating sub-optimal contracting between shareholders and the CEO, where the latter exerts his bargaining power to write a favorable contract at the expense of the former. Core et al. (1999), using survey-based compensation data, report evidence consistent with this argument and find that variables associated with weak governance are correlated with higher level of CEO compensation, worse stock returns, and worse operating performance.

While weak governance appears to be associated with poorer performance and excess compensation, it remains unknown how CEOs exert their power to modify their compensation contracts and extract additional rents. This study focuses on one potential approach to leveraging this bargaining power. In particular, it examines whether the implicit weight on various performance measures relevant to the design of CEO contracts varies across governance structures. A favorable bargaining position may allow the CEO to increase the weight that the contract puts on more controllable measures, thus reducing variability in actual compensation, easing the likelihood of achieving target objectives, and increasing the rents that the CEO is able to capture. From the CEO's point of view, controllable measures have a better signal-to-noise ratio, which reduces the uncertainty about outcomes, and a more transparent association between certain types of effort and measured outcome – thus, making it easier for the agent to exert the type and level of effort required to achieve the objectives. From the shareholders' point of view, these measures are incomplete—because they leave out certain types of effort relevant to the value of the firm—and incongruent – because they weight different types of effort sub-optimally. Thus, the deviation from the optimal contract in favor of controllable measures is done at the expense of noisier measures that enhance the completeness and congruency of the contract. We focus on two main classes of performance measures: accounting-based measures of performance (return on assets) and stock-based measures (stock returns); and examine whether accounting-based measures—arguably more controllable—have higher implicit weights and / or, conversely, whether stock-based measures—less controllable—receive lower weights as governance quality decreases.

Previous accounting literature has studied the implicit weights of various performance measures on the design of CEOs' compensation contracts (Lambert, 2001), such

as the relevance of accounting numbers beyond stock returns (Lambert and Larcker, 1987; Sloan, 1993) and the relevance of non-financial performance measures (Bushman et al., 1996; Ittner et al., 1997; Davila and Venkatachalam, 2004). The implicit weights vary with the ability of the various measures to congruently reflect the CEO's multi-dimensional effort while minimizing the risk imposed upon him. Accordingly, the weight on a particular measure increases as its relative noise decreases (Banker and Datar, 1989) and its ability to reflect CEO effort increases (Baber et al., 1996). The findings are grounded on agency theory (Holmstrom, 1979), which predicts the relevance to contracting of measures other than stock returns based on noisiness (Banker et al., 1989), congruency (Feltham and Xie, 1994), efficiency (Bushman and Indjejikian, 1993), and trading (Baiman and Verrecchia, 1995) arguments. These studies typically focus on cash compensation and, in some cases, stock-based compensation; but they consistently ignore changes in the value of the CEO's portfolio of equity-based holdings. When the portfolio is considered—a necessary step to be consistent with theory predictions that examine managers' incentive structure—some of these findings lose much of their significance (Core et al., 2003).

Previous studies work under the assumption of optimally designed contracts; therefore, the change in value of the CEO's portfolio is a relevant piece of information to reflect the incentive structure that the manager faces. In contrast, the increase in agency costs associated with weak governance is grounded on the CEO's ability to exercise power to deviate from the optimal contract into a more favorable one. This favorable bargaining position can be leveraged through the design of the compensation contract for the period, but does not influence the change in value of the beginning-of-the-year portfolio over the period. Even if changes in the value of the portfolio dominate the manager's incentive structure, he can only exercise his bargaining power in negotiating the structure of the annual pay. That is, weak governance, if relevant, will affect the design of the compensation contract and, in particular, the implicit weights of the various performance measures. The CEO bargaining power associated with weak governance only affects the CEO's portfolio at the beginning of the year if, as part of the negotiation process in previous years, his stock-based compensation and / or his stock selling pattern deviated from the optimal.

Using 6,536 observations of changes in CEO compensation—cash and non-cash components—for 1,879 CEOs during the years from 1993 through 2002 and a proxy of governance quality that combines various aspects associated with it—including a governance index (Gompers, 2003) and characteristics of the board of directors such as number of meetings, percentage of executives on the board, and whether the CEO is also the chairman— we find that the implicit weight on accounting performance measures increases as governance quality deteriorates. The results are robust to using change in return on assets (ROA), return on equity (ROE), and earnings per share (EPS) as the accounting performance measure. Furthermore, we also find that not only is the level of governance associated with the weighting of performance measures in CEO compensation, but also that changes in governance are associated with changes in the weight of the accounting-based performance measures.

The higher weight that accounting measures receive with weaker governance structures suggests that CEOs may use the associated bargaining power not only to increase their average compensation (Core et al., 1999) but also to reduce the variance in compensation. Because accounting performance measures are more controllable and less noisy than stock-based measures, increasing their weight may reduce the overall variability of the compensation package. Consistent with this conjecture, we find that weaker governance is associated with lower variance in CEO pay. Finally, we also find that weaker governance is associated with a lower proportion of the equity-based component of CEO compensation and a higher proportion of the cash-based component of CEO compensation, compared with firms with stronger governance.

These results are consistent with the thesis that agency problems associated with weaker governance are, in part, related to sub-optimal design of the CEO's contract – as reflected in the weighting of performance measures, the variability of compensation, and the mix of compensation components.

The rest of the paper is structured as follows. The next section discusses related research and develops our main hypothesis. Section 3 describes the research design, variable measurement, and sample selection. Sections 4 and 5 present the results related to our main hypothesis and additional results on the effect of governance upon the design of CEO compensation contracts. Section 6 concludes the paper.

2. Governance and CEO Contracting

Corporate governance is a contentious issue. While it is widely accepted as a key element to the satisfactory functioning of firms, opinions diverge as to how it should be structured. Through mechanisms such as corporate governance provisions—which include protection mechanisms such as poison pills or golden parachutes—and board of director characteristics—including board size and directors' affiliations—corporate governance design determines the power of shareholders vis-à-vis management. The literature on corporate governance provides mounting evidence on how governance structures are associated with firm performance and how the distribution of power affects the allocation of rents. While the evidence suggests that CEOs in firms with weaker governance receive higher compensation, it is unclear how their contracts are designed to capture these rents. Simply increasing their salary or their bonus without a link to firm performance may draw shareholders' attention and expose managers to reputation costs that may damage their human capital. Performance-based pay would appear to be an effective way of capturing these rents without drawing attention. One option is to tie compensation to observable luck, where CEOs are rewarded for positive performance due to events beyond their control but are spared from being punished for negative events. Alternatively, they may favorably design their compensation contracts to select measures of performance that they can more readily influence.

Empirical evidence indicates that corporate governance provisions are associated with firm performance as well as the contracting process with top management. Brickley et al. (1994), consistent with arguments suggesting a beneficial role of corporate provisions (Stein, 1988), find a positive stock price reaction to the adoption of poison pills when the board has a majority of outside directors. Gompers et al. (2003) find that democratic firms—where corporate provisions grant power to shareholders—have better stock returns (8.5% per year), higher firm value, higher profits, higher sales growth, and lower capital expenditures than their counterparts, dictatorial firms that grant power to management at the expense of shareholders. Corporate provisions are also associated with CEO compensation. Companies that adopt particular provisions such as various types of anti-takeover charter amendments also report higher CEO compensation in the year of adoption and the subsequent three years than companies that do not adopt these provisions (Borokhovich et al., 1997). This evidence is inconsistent with governance provisions facilitating the writing of efficient long-term contracts (Knoeber, 1986; Stein, 1988). Rather, it supports the idea of takeover defenses as mechanisms to attenuate the discipline that takeovers impose (Jensen, 1993).

Corporate governance also happens through the board of directors, and its functioning has been the subject of much debate (Crystal, 1991). Empirical evidence indicates a positive relationship between firm value and higher quality governance. Yermack (1996) finds that

firm value decreases with board size. Rosenstein and Wyatt (1990) find a positive stock price reaction to the announcement of the appointment of a new external board member. The role of the board of directors as the ultimate decision maker about the design of the CEO compensation contract also suggests a relationship between these two variables. The quality of the board is proxied by several of its characteristics that have been found to be of relevance to explain CEO compensation (Boyd, 1994; Lambert et al., 1993). Cyert et al. (2002) report a negative association between stock ownership by a large shareholder and by the compensation committee, and the level of salary, equity, and discretionary compensation. Core et al. (1999) find that board of director characteristics associated with weak governance—including a CEO holding the chairman position, board size, directors appointed by the CEO, gray outside directors, old directors, and busy directors—are correlated with higher levels of CEO compensation after controlling for economic determinants of compensation; moreover, they find that predicted excess compensation, based on the governance structure of the firm, is negatively correlated with stock returns one year, three years and five years ahead. Bertrand and Mullainathan (2001) examine how CEOs exert their power to extract additional rents and find that weaker boards reward CEOs for observable changes in firm performance beyond the control of the CEO (luck) to a larger extent. Having a large shareholder on the board reduces this "pay for luck" by between 23 and 33 percent; shorter CEO tenure, smaller boards, and a smaller fraction of insiders also reduce "pay for luck." Harvey and Shrieves (2001) study the structure of CEO compensation and find that the presence of outside directors and large shareholders—as proxies for better quality governance—are associated with a higher percentage of long-term compensation (grants of stock, stock options, and long-term incentive plans). The maintained assumption in this literature is that the characteristics of the board of directors are exogenous to CEO compensation and firm performance (Hermalin and Weisbach, 2003).

Various arguments support the observed regularities. The most common one is to attribute them to an increase in agency costs associated with weak governance. These agency costs translate into lower operational performance and excess rents to managers in the form of compensation, and are consistent with the existence of inefficient contracts. Furthermore, the market appears to underestimate these costs, which are associated with forward-looking stock returns. This argument has also been put forward to explain the relationship between several proxies of agency costs—such as high free cash flows (Lang et al., 1991), low managerial ownership (Lewellen et al., 1985), and personal objectives (Morck et al., 1990)—and the negative returns at the announcement of a bid to acquire another firm.

One source of these agency costs that is associated with CEO compensation is inefficient contracting. For instance, Bertrand and Mullainathan (2001) argue that measures informative to CEO performance, which would be included in the optimal contract, are ignored in actual contracts. In this paper, we also assume that some of the agency costs associated with weaker governance are due to inefficient contracting and, in particular, to an inefficient weighting of performance measures.

A simple theoretical model presents more precisely how the agent's bargaining power and his ability to extract rents from the principal translates to the design of the compensation contract. Consider a standard agency setup with linear contracting, a risk-averse agent who puts effort e at a cost $c(e) = 1/2\ e^2$ with exponential utility function and absolute risk aversion r (Feltham and Xie, 1994), a risk neutral principal and uncorrelated normally distributed random error terms (Reichelstein and Dutta, 2003). Let's assume that the gross payoff to the risk neutral principal is proportional to e and there are two signals for contracting[1]:

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[1] The first signal *(p)* can be thought as being the stock price and the second signal *(a)* as being return on assets.

$$p = \alpha_1 \, e + \varepsilon_p$$

$$a = \beta_1 \, e + \varepsilon_a$$

with the variances of the error terms being $\mathrm{var}(\varepsilon_p)$ and $\mathrm{var}(\varepsilon_a)$. The contract is linear in both signals:

$$s(p, a) = \gamma_0 + \gamma_1 \, p + \gamma_2 \, a$$

where γ_0 is a constant, and γ_1 and γ_2 are the weights of signals p and a respectively. The agent is kept to his reservation utility; but an increase in his bargaining position is reflected in an increase in his reservation utility. The cheapest way to extract rents from this improved position is to unambiguously raise compensation through a higher γ_0. An increase in the constant component of the compensation contract does not require an increase in the risk premium associated with modifying the performance-based components. Empirically, this strategy is associated with an increase in the level of compensation and is consistent with weaker governance being associated with higher compensation levels (Core et al., 1999). In addition, or alternatively, the agent may modify to his advantage the coefficients on the performance signals. This strategy may be preferred if an increase in the level of compensation is easily detected and leads to reputational costs. Notice, however, that externally imposing the additional constraint of keeping the constant component of the contract (γ_0) unchanged as the reservation utility increases leads to a less efficient contract. Empirically, the cross-sectional variation in the weights of the performance measures can be examined using a changes specification that suffers from fewer omitted correlated variables' problems – a common threat to levels' specifications in compensation studies (Murphy, 1998). However, the question remains as to how the weights on both measures change as the bargaining position of the agent improves. The optimal level of effort is $e^* = \gamma_1 \, {}^* \, \alpha_1 + \gamma_2 \, {}^* \, \beta_1$.

The participation constraint leads to:

$$U(\text{agent}) = c(e^*) + \gamma_0 + \tfrac{1}{2} \, r \, (\gamma_1^2 \, \mathrm{var}(\varepsilon_p) + \gamma_2^2 \, \mathrm{var}(\varepsilon_a)) = ru$$

where ru is the agent's reservation utility, and the first term includes the cost of effort, a constant wage, and the cost of imposing risk upon a risk-averse player respectively.

The net payoff to the principal is:

$$P = e^* - [c(e^*) + \gamma_0 + \tfrac{1}{2} \, r \, (\gamma_1^2 \, \mathrm{var}(\varepsilon_p) + \gamma_2^2 \, \mathrm{var}(\varepsilon_a))]$$

And the optimal contract is such that:

$$\partial P / \partial \gamma_1 = \alpha_1 - [r \, \gamma_1 \, \mathrm{var}(\varepsilon_p) + e^* \, \alpha_1] = \alpha_1 - \partial U / \partial \gamma_1 = 0 \ \text{ and}$$

$$\partial P / \partial \gamma_2 = \beta_1 - [r \, \gamma_2 \, \mathrm{var}(\varepsilon_a) + e^* \, \beta_1] = \beta_1 - \partial U / \partial \gamma_2 = 0$$

where the first term is the effect on the effort level and the second term is the effect on the compensation to the agent, which includes the effect on the risk premium and the effect on the agent's cost of effort.

The relative weights are proportional to the signal-to-noise ratio (Banker and Datar, 1989):

$$\gamma_1 / \gamma_2 = [\alpha_1 \; \text{var}(\varepsilon_a)]/[\beta_1 \; \text{var}(\varepsilon_p)]$$

If measure *p* represents stock returns and measure *a* represents accounting returns, empirical evidence indicates that CEO compensation contracts put more weight on stock returns' performance measures ($\gamma_1 > \gamma_2$), and that stock returns are noisier than accounting performance measures ($\text{var}(\varepsilon_p) > \text{var}(\varepsilon_a)$) (Core et al., 2003), thus $\alpha_1 > \beta_1$ and $\partial U / \partial\gamma_1 > \partial U / \partial\gamma_2$.

When the agent is offered the optimal contract $(\partial U / \partial\gamma_1) / (\partial U / \partial\gamma_2) = \alpha_1 / \beta_1$, but the reservation utility increases and the contract deviates from the optimal, then $(\partial U / \partial\gamma_1) / (\partial U / \partial\gamma_2) > \alpha_1 / \beta_1$ and increasing the weight on accounting measures (γ_2) is more efficient.

Thus, agents that enjoy weaker governance structures can leverage their bargaining power to capture additional rents from the agency relationship. Moreover, a simple increase in the fixed component of their compensation is subject to reputational costs. Therefore, they modify the contract in such a way that pay for performance still happens but they put more weight on (controllable) measures with better signal-to-noise ratio, and lower weight on the optimal contract such as accounting performance measures.

3. Research Design

3.1. Empirical Specification

Previous empirical work indicates that CEO compensation is associated with market (stock returns) and accounting (i.e., return on assets) measures of performance (Core et al., 2003; Bushman and Smith, 2001; Bushman et al., 1998, 2001; Kaplan, 1994; Sloan, 1993; Jensen and Murphy, 1990; Lambert et al., 1987). The null hypothesis in this paper is that observed governance structures induce optimal contracting with the CEO. Under these conditions, only economic determinants of contract design identified in this stream of research should explain cross-sectional differences in the weights of accounting and stock performance measures. In particular, governance structures should not be significant in explaining these weights.

Our model regresses the change in CEO compensation on our two performance measures: changes in stock price (stock returns) and changes in accounting returns. We use a changes specification to minimize the effect of omitted variables that remain relatively constant over a period of time (one year) such as industry variables and firm-specific factors including firm strategy or CEO quality.

We control for variables that have been found to affect our dependent variable. Baber et al. (1996) find that the association between CEO compensation and stock returns is larger for firms with a larger opportunity set. This is consistent with stock prices better capturing the intangible value of future opportunities compared to accounting returns that only reflect current value generated. Following Smith and Watts (1992), we use the book-to-market ratio at the beginning of the year as our proxy for the firm's investment opportunities. We also control for the relative noise of our two sets of performance measures. Because the relative weights on performance measures are a decreasing function of the relative noise in the performance measures (Banker and Datar, 1989), we expect relative noise to affect the cross-sectional weights on accounting and stock measures. We use the ratio of the accounting-based performance measure variance to the returns-based performance measure variance as the proxy for relative noise (Sloan, 1993).

Because governance (as well as growth opportunities and relative noise) is hypothesized to affect CEO compensation through the differential weighting of performance measures in the CEO contract rather than CEO compensation directly, we model its effect through interaction terms between our governance proxy (growth opportunities and relative noise) and our two measures of firm performance after controlling for these variables' direct effects. We estimate the following empirical model, where the symbol Δ denotes change:

$$\Delta\ compensation_t = \beta_1{}^*\ stock\ returns_t + \beta_2{}^*\ \Delta\ accounting\ measure_t + \beta_3{}^*\ governance$$

$$+\ \beta_5{}^*\ \Delta\ accounting\ measure_t{}^*\ governance + \beta_4{}^*\ stock\ returns_t{}^*\ governance$$

$$+\ \sum \beta_i{}^*\ control\ variables_t + \sum \beta_j{}^*\ stock\ returns_t{}^*\ control\ variables_t$$

$$+\ \sum \beta_k{}^*\ \Delta\ accounting\ measure_t{}^*\ control\ variables_t + \varepsilon_t$$

If either of the two coefficients, β_4 and β_5, on the interaction between governance and the two performance measures is significant, the null hypothesis is rejected in favor of governance having an effect on the design of compensation contracts. Moreover, if weaker governance is associated with an increase in the weight of accounting measures at the expense of stock returns, then the coefficient on the interaction term between governance and accounting measures (β_4) will be positive and / or the coefficient on stock returns times governance will be negative (β_5). Following previous findings, we expect the interaction between accounting and growth opportunities to be negative and / or the interaction between stock returns and growth opportunities to be positive (that is, CEO contracts in firms with more growth opportunities put less weight on accounting numbers and / or more weight on stock returns). We also expect the coefficient for the interaction term between accounting (stock returns) and accounting noise relative to stock returns noise to be negative (positive).

The specification is subject to several caveats. Firm governance and the structure of CEO compensation contracts are both choice variables and thus endogenous (Hermalin and Weisbach, 2003). It may be the case that increasing the weight of accounting measures enhances the perceived performance of the CEO, giving him the power to affect the governance structure of the firm. Following prior empirical research in the field, we treat governance structure as exogenous to the design of CEO contracts. To the extent that this assumption deviates from practice, our results are affected by a simultaneous equation bias. The model specified includes variables that prior research has found to affect the weighting of various performance measures; however, these variables may not capture all the economic determinants of performance measures' weights, and governance variables may be correlated with these omitted variables. To limit this potential effect, we also run the specification on changes in governance that avoids the impact of any variable that may be correlated in the cross-section but uncorrelated over time. We also complement our main findings with additional tests that extend the effect of governance on the design of compensation contracts beyond the weighting of performance measures. Specifically, we examine the variance of CEO compensation and its composition over different governance regimes.

3.2. Variable Measurement

Research in CEO compensation typically focuses on two measures of CEO compensation that are also the variables in this paper. The first one is "cash pay," defined as the sum of annual salary plus bonus. The second measure adds non-cash items—including stock options, restricted stock, long-term incentive plans, and all other annual compensation—

to "cash pay." We label this latter variable as "total pay." We use the log transformation of compensation to mitigate the influence of outliers and define the dependent variable in changes. Thus, the variable log(compensation) is, alternatively, log(cash pay $_t$/cash pay$_{t-1}$) or log(total pay$_t$/total pay$_{t-1}$). As discussed above, we do not include the change in the CEO's equity portfolio value in our measure of compensation because the CEO's favorable bargaining position is exercised through the design of the compensation contract for the period, but his bargaining position does not influence the change in the value of the beginning-of-the-year portfolio. We obtain compensation information directly from the ExcuComp database. ExecuComp values stock option grants using Black and Scholes. While this valuation has been used as best reflecting the value that executives put on these instruments, alternative valuations have been proposed. We also estimate stock option grants' value using a modified valuation formula. Specifically, we assume that the options are held 70% of the options' time to maturity (Huddart, 1994). The inputs required to estimate this alternative value—number of options granted, exercise price, dividend yield, and time to maturity—are obtained from ExecuComp. We estimate volatility as the standard deviation of daily stock returns during the 120 days before the end of the fiscal year multiplied by 254 trading days of a typical year. Our conclusions are unaltered to this alternative stock option valuation method.

We measure changes in stock price (*Returns*) as log(annual return$_t$ + 1) using CRSP data. There is no consensus on a particular accounting measure of performance. Murphy (1998), using survey data, reports that most firms use at least one measure of accounting profits, either as the dollar value of profits, on a per-share basis, as a margin, or as a return. Researchers have also used different accounting measures of performance: return on equity (Lambert and Larcker, 1987; Baber et al., 1996), return on assets (Core and Larcker, 2002; Sloan, 1993), and earnings per share (Core el al., 2003; Sloan, 1993). We use the change in return on assets (ΔROA_t)—where ROA is operating income divided by average total assets—as our main accounting performance measure. We use Compustat to obtain the accounting data.

We measure corporate governance using an approach similar to the one used by Bertrand and Mullainathan (2001). Specifically, we develop a composite governance variable (*TotGov*) that incorporates the level of shareholder rights and several characteristics of the board's structure. This variable combines the following four governance proxies:

1. The first indicator is the governance index compiled by Gompers et al. (2003) to proxy for the level of shareholder rights. Using data compiled by the Investors Responsibility Research Center (IRRC) and state takeover law data, Gompers et al. construct an index for each firm in their sample by adding one point for every provision that reduces shareholders rights[2]. Higher values of this governance index are associated with poorer governance[3].

[2] Gompers et al. (2003) examine 24 provisions: anti-greenmail, blank check preferred stock, business combination laws, bylaw and charter amendment limitations, classified board, compensation plans with change in control provisions, director indemnification contracts, control share cash-out laws, cumulative voting requirements, director's duties, fair price requirements, golden parachutes, director indemnification, limitations on director liability, pension parachutes, poison pills, secret ballot, executive severance agreements, silver parachutes, special meeting requirements, supermajority requirements, unequal voting rights and limitations on action by written consent.

[3] Our data covers the period 1993-2002. The governance index is only available for 1990, 1993, 1995, 1998, 2000, and 2002. Gompers et al. (2003) report that for the majority of firms there is little time-series variation in the governance index. Taking advantage of this fact, we align the governance index for 1993 with CEO compensation data for 1993 and 1994, the governance index for 1995 with CEO compensation data for 1995 and 1996, the governance index for 1998 with CEO compensation data for 1997 and 1998, the governance index for 2000 with CEO compensation data for 1999 and 2000, and the governance index for 2002 with CEO compensation data for 2001 and 2002. This approach has also been used by Hanlon et al. (2003) and Bowen et al. (2003). In 7.65% of the cases some firms do not have a governance index value for all the years. In such instances, we interpolate the available index values to avoid losing those observations. We also perform a robustness check on the effect of this assumption.

2. However, this governance index does not capture information on other traditional governance dimensions such as board characteristics. Hermalin and Weisbach (1998, 2003) argue that the main factor affecting a board's effectiveness is its independence from the CEO. Expanding their argument, we include an indicator variable that takes on the value of one if the CEO is also the chairman of the board and zero otherwise. Governance is weaker when the same person holds the CEO and chairman titles.

3. We also include an additional variable that contains the proportion of top executives that serve on the board. A higher proportion of executives on the board is associated with poorer governance.

4. Finally, Adams (2000) and Vafeas (1999) suggest that the number of board meetings is a good proxy for the directors' monitoring effort. We include this variable, where a higher value is associated with better governance.

Following Bertrand and Mullainathan (2001), we define the composite governance variable by taking the unweighted average of the standardized variables[4]. Higher values of *TotGov* are expected to be associated with poorer governance.

As our proxy for investment opportunities, we use the book-to-market ratio (*B/M*). We follow Smith and Watts' (1992) definition and estimate this variable as the ratio of book value of assets to market value of assets measured at the beginning of the period. The market value of assets equals the market value of equity plus the book value of total liabilities. As in Sloan (1993), the proxy to control for the relative noise in the performance measures is defined as the ratio of the variance of the accounting-based to the returns-based performance measures, *Var(ΔROA)/Var(Returns)*. To compute the variances, we impose five consecutive annual observations spanning years t-4 to t. Finally, we control for industry effects and for secular trends by adding two-digit SIC industry and year indicator variables. To mitigate the influence of outliers, we set the lower and uppermost percentiles of all the variables, excluding the governance variables, equal to the 1st and 99th percentiles.

The final specification after controlling for industry and year is as follows:

$\Delta \log(\text{compensation}) =$

$\beta_0 + \beta_1 \text{ Returns} + \beta_2 \text{ ROA} + \beta_3 \text{ TotGov} + \beta_4 \Delta ROA^*TotGov + \beta_5 \text{ Returns}^*TotGov$

$+ \beta_6 \text{ B/M} + \beta_7 \Delta ROA^*B/M + \beta_8 \text{ Returns}^*B/M + \beta_9 \text{ Var}(\Delta ROA)/Var(Returns)$

$+ \beta_{10} \Delta ROA^* \text{ Var}(\Delta ROA)/Var(Returns) + \beta_{11} \text{ Returns}^*Var(\Delta ROA)/Var(Returns)$

$+ \beta_{12} \text{ Industry} + \beta_{13} \text{Year} + e$

If CEOs exert their power to influence their compensation contracts so that more weight is given to accounting-based performance measures which they can better control, we predict that β_4 is positive and / or β_5 is negative or zero. If the presence of greater investment opportunities (low *B/M*) makes returns more sensitive to CEO actions, then we predict that β_7

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[4] The number of meetings is reverse coded to obtain *TotGov*. Like Bertrand and Mullainathan (2001), we use unit weights to construct *TotGov* following the recommendations of Grice and Harris (1998), who find that unit-weighted composites table better psychometric properties than alternative weighting schemes.

is positive and / or β_8 is negative. Finally, if the relative weights on the performance measures are a decreasing function of the relative noise in the performance measures, we predict that β_{10} is negative and / or β_{11} is positive.

3.3. Sample selection

Our initial sample is drawn from Compustat's Execucomp database. We select CEOs with compensation data to construct our regression variables and with at least three years in office to ensure that when we take changes, the compensation for year t-1 corresponds to an entire year[5]. This criterion also ensures that the CEO has had the opportunity to gain bargaining power and exert it, if he chose to do so, in situations in which weak governance exists. This criterion yields an initial sample of 8,073 CEO-year observations covering fiscal years 1993 to 2002. Lack of returns data in CRSP eliminates 998 observations. We also eliminate 60 observations due to missing Compustat accounting data items. Missing governance index data in IRRC eliminates 287 observations, and lack of board data in Execucomp reduces the sample by 192 observations. The final sample consists of 6,536 CEO-year observations, corresponding to 1,879 CEOs for years 1993-2002.

4. Results

In this section we present the main results relating governance to the use of accounting and stock-related measures in the design of CEO compensation.

4.1. Descriptive statistics

Table 1 gives descriptive statistics on the various variables in the research. Panel A summarizes the various components of CEO compensation. For each component of compensation, Panel A provides the overall statistics as well as the statistics when the sample is partitioned into a weak governance group and a strong governance group at the median of the governance variable (*TotGov*). On average, strong governance firms have lower cash pay and higher equity pay than weak governance firms. Consistent with previous findings, CEOs in weak governance firms receive a significantly higher total pay (at the median) than their counterparts in strong governance firms. The average cash pay in our sample is $1.337 million, the average equity pay is $2.416 million, and total pay is $4.240 million on average, although the distributions are skewed. These summary statistics are consistent with previous studies using a comparable time period (Core et al., 2003). Panel B presents descriptive statistics on the two definitions of our dependent variable.

Panel C summarizes governance-related variables. Firms in the sample have adopted a median of 9 out of 22 provisions that reduce shareholder rights as compiled by the IRRC, consistent with Gompers et al. (2003). The median number of board meetings is 7. The average percentage of executives on the board is 34%, consistent with previous evidence on a similar period (Harvey and Shrieves, 2001). The CEO is also chairperson in 79.9% of the observations.

Finally, Panel D summarizes other variables in the research design. The median change in ROA is 0, while the median return is 8.5%. The average of the standard deviation of

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[5] We compute the number of years in office using the date the individual became chief executive officer.

ΔROA is 0.040, compared to 0.431 for returns consistent with stock returns being noisier (Lambert and Larcker, 1987). The average book-to-market ratio and sales growth are 0.65 and 10.2%, respectively. The CEOs in our sample have been in office for an average of 10.6 years and the mean (median) value of the stock options exercised annually is $1.90 (0) million.

Table 2 contains the Pearson correlations among variables of interest. Firms with higher book-to-market have larger changes in cash compensation and a higher (lower) proportion of cash (equity-based) pay to total pay, consistent with firms facing a constrained opportunity set (fewer investment opportunities) putting more weight on short-term incentives and relying to a smaller extent on equity compensation. Total governance (*TotGov*) is positively correlated with the percentage of cash pay over total pay, suggesting that weaker governance is associated with higher (lower) reliance on cash (equity-based) compensation. Untabulated results also show that weaker governance is also associated with CEO tenure and the size of the firm. This latter correlation suggests that governance may deteriorate with firm size and, interestingly, it extends to all the components of our governance proxy.

4.2. Governance and the weighting of performance measures in CEO contracts

Table 3 presents the results testing the hypothesized association between governance and the structure of CEO compensation. We report results for our two measures of CEO compensation as dependent variables. The first column contains the change in cash pay and the second column reports change in total pay, which includes non-cash in addition to cash compensation. The coefficients for year and industry dummies are not reported. If governance affects the weighting of the various performance measures, then at least one of the coefficients on the interaction terms between governance and performance measures will be significant.

We find that the interaction between governance and performance ($\Delta ROA * TotGov$) is positive and significant for our two compensation variables. This is consistent with companies with weaker governance (higher values of *TotGov*) putting more weight on accounting performance measures compared to companies with better governance. The sign for the interaction term between stock returns and governance (Returns * *TotGov*) is in the expected direction but not significant. These findings are consistent with CEOs in firms with weaker governance structures exercising their bargaining power through the design of the compensation contract, in particular by increasing the weight of accounting performance measures.

As expected, we find that both accounting and stock-based performance measures are positively correlated with change in compensation in both specifications. We also find that a higher book-to-market ratio (i.e., firms with a smaller investment opportunity set) is positively associated with changes in cash pay and negatively with total pay, reflecting the increasing relevance of equity pay as the investment opportunity set increases. Consistent with prior research, we also find that firms with higher book-to-market ratio weight accounting measures to a larger extent (Baber et al., 1996), but only for cash compensation (for the change in total pay, the coefficient is only significant at the 6% confidence level in a one-tail test). Also consistent with prior results, we find that accounting measures receive more weight as their noisiness relative to stock returns decreases (Lambert et al., 1987; Sloan, 1993)[6].

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[6] This result is consistent with previous research. However as Core et al. (2003) point out, it should not be interpreted as a confirmation of theory predictions (Holstrom, 1979; Banker and Datar, 1989). For this to be a test of that theory, the dependent variable should be the change in total compensation (total pay plus the change in the CEO's equity portfolio).

We also test the robustness of our results to alternative measures of accounting performance; in particular, to the change in return on equity (ΔROE_t)—where ROE is net income before extraordinary items and discontinued operations divided by average common equity—and the change in earnings per share scaled by beginning-of-the-period stock price ($\Delta EPS_t / P_{t-1}$) – where EPS is diluted earnings per share before extraordinary items and discontinued operations. We also examine the sensitivity of our conclusions to dropping those observations for which we interpolated the governance index (7.65% of the observations did not have a governance index for all the sample years)[7]. We repeat our tests using lagged values of the governance proxies to allow for the CEO to exert his bargaining power the year before. Our inferences remain unaltered by each of these tests. Finally, we also controlled for the CEO's percentage of stock ownership as independent variable and as an interaction with the two performance measures. Because CEOs with higher ownership already have a significant incentive attached to stock price through the shares that they own, it may be that their compensation contract may put more weight on accounting measures. The inferences remained unaltered and CEO ownership variables were insignificant.

The previous results examine the impact of governance on the weights of different performance measures. For different governance regimes, we find that these weights vary as hypothesized. While this is the most direct test of inefficient contracting associated with weak governance, it may be subject to our governance variable potentially proxying for a correlated omitted variable. As an additional robustness test, we modify the previous specification and replace *TotGov* with its change ($\Delta totGov$). The power of this test is much lower than our main regression. First, we do not have yearly measures for some of the variables that define *TotGov*; in particular, governance provisions captured in the governance index are only updated every two or more years. So our estimation of changes in governance is underestimated. Second, it relies on the assumption that changes in governance are rapidly translated into a change in the design of the CEO contract – within the same year in which governance changes take place. While such a rapid exercise of bargaining power may be true in certain companies, it may take longer to translate into contracting in other companies. In other words, while levels are informative about the ongoing association between the two variables of interest, changes in governance also inform about (and assume) how quickly the expected association happens and how fast CEOs can exert their newly gained power (as captured in the change in the governance proxy). On the other hand, a changes specification controls for potential omitted variables correlated with governance but with different time series properties. **Table 4** reports the results. We find that contemporaneous changes in governance are associated with an increase in the weight that accounting measures receive. The result is robust for both the change in cash pay and total pay. It is also robust to using the change in *TotGov* over the previous two years. This finding reinforces the evidence on the relevance of governance to the design of CEO compensation contracts, but also indicates that the effect of a redistribution in the power structure between the CEO and shareholders is reflected (on average) in the design of the contract in the same year in which governance changes.

5. Governance and the mix of pay in CEO compensation contracts

The evidence so far suggests that CEOs are able to exercise their bargaining power when governance is weak and increase the weight of accounting measures. As argued in section 2, accounting measures are more controllable, and this controllability has several attractive features from the CEO's perspective. One of them is that accounting measures are

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[7] See footnote 3.

less volatile than stock returns, which reduces the risk imposed upon the agent. An additional implication of our results in **Table 3** is that by increasing the weight of less volatile measures, CEOs may be able to reduce the volatility of their overall compensation. More specifically, weaker governance is expected to be associated with less volatility in CEO compensation. We examine the empirical implications of this argument in **Table 5**. Panel A provides descriptive statistics on the standard deviation of our two proxies of pay—cash pay and total pay—as well as on their changes (our dependent variables in **Table 3**). As in **Table 1**, we partition the sample at the median of *TotGov* and compare the mean of the weak and strong governance sub-samples. For the total sample and each subsample, we estimate the standard deviation of time series compensation for those CEOs for whom we have four or more consecutive observations. For total pay, the mean standard deviation for weak governance firms is significantly lower than for strong governance firms. This result is also significant when examining the standard deviation of the changes in cash pay and in total pay. These significant differences are robust to using the value of *TotGov* at points in time other than three years in the CEO position.

Panel B extends these descriptive statistics to a multivariate framework. In particular, it examines the relationship between the variation in change in compensation (rather than levels) and governance quality (*TotGov*) after controlling for variables that may affect this variation. In particular, we control for book-to-market because companies with larger investment opportunities may put more compensation at risk and thus increase its variation; we also control for size using the logarithm of assets; and we control for the variance of changes in accounting returns and stock returns, both of which receive positive weights in explaining change in compensation in **Table 3**. As in Panel A, we use the third year of a CEO's consecutive observations to select our independent variables; the third year corresponds approximately to the middle of the period used to compute the standard deviation of the changes in compensation. The results are robust to choosing other years to select the independent variables. The results indicate that weaker governance is associated with lower variation in change in total pay (but not in cash pay), suggesting that CEOs leverage their bargaining power in a weak governance situation by reducing the variability of their compensation. Investment opportunities (the inverse of *B/M*) are positively correlated with variation in total pay but negatively with variation in cash pay. Size and variation in the performance measures are positive and significant in both specifications.

An alternative way in which CEOs may limit the variation in compensation is through the mix of types of pay. The descriptive statistics in **Table 1** suggest that cash compensation is less volatile than equity compensation; in particular, the change in cash pay is smaller than the change in total pay. Thus, the variance in compensation may be reduced through a larger proportion of cash in the compensation mix. **Table 6** examines this approach to designing CEO compensation contracts. Panel A provides descriptive statistics following the structure in **Table 1**; it includes overall statistics, and statistics with the sample split at the median of *TotGov*. The proportion of cash pay over total pay is significantly larger for weak governance firms, and conversely the proportion of equity pay is significantly larger for strong governance firms.

Panel B presents the multivariate results. Our dependent variables are the proportion of cash pay, defined as log(cash pay / total pay), and the proportion of equity pay, defined as log(equity pay / total pay). Equity pay is the sum of annual grants of stock options and restricted stock. We use the log transformation to reduce the influence of outliers.

Because our dependent variables are levels rather than changes, in addition to the governance proxy (*TotGov*), we control for economic determinants that have been previously

found to be associated with levels of pay. In particular, Smith and Watts (1992) suggest that a firm's investment opportunity set is positively associated with equity incentives, since the presence of growth opportunities makes it more difficult to monitor managerial actions. In addition, options' incentive and retention features are especially important for growth firms. Following Smith and Watts (1992), we control for the investment opportunity set using the book-to-market ratio (*B/M*) as previously defined. Firms with a smaller (larger) opportunity set are more likely to rely on short-term cash compensation (long-term equity-based compensation). We also include the growth in sales as an additional determinant of CEO pay in addition to being another proxy for the investment opportunity set (Baber et al, 1996).

High free cash flow poses a problem for firms with low growth opportunities, since managers may invest the excess cash in negative net present value projects or engage in empire-building acquisitions. Jensen (1986) suggests that using stock-based compensation can mitigate this agency problem. Following Lang et al. (1991) and Core and Guay (1999), our proxy to capture this determinant (*Free cash flow problem*) is the three-year average of [(operating cash flow minus preferred and common dividends)/total assets] if the book-to-market ratio is greater than or equal to one – that is, firms expected to have low growth opportunities, and zero otherwise.

We control for the amount of options that the CEO exercised during the year using the fair value of the options exercised, because it is correlated with the amount of options granted and thus with equity pay (Core and Guay, 1999). The number of years the CEO has been in office (CEO *tenure*) is another hypothesized determinant of compensation. However, its relationship to the compensation mix may be non-linear. On the one hand, Harvey and Shrieves (2001) find that CEOs with longer tenure and approaching retirement receive more compensation in cash. On the other hand, the proportion of equity increases with tenure because the uncertainty about the CEO's ability is reduced, allowing firms to impose more risk on the CEO through equity compensation (Gibbons and Murphy, 1992). We model this potential non-linearity by including the squared term for tenure. Finally, we also control for size, which we measure as the log (assets).

We run two different specifications for the two different dependent variables: proportion of cash pay to total pay and proportion of equity pay to total pay. For our first dependent variable we use a linear regression with robust standard errors. Because of the significant number of zeros in our second dependent variable (21%), ordinary least squares' regression leads to biased results due to the self-selection problem associated with firms not choosing the level of equity pay at random. To mitigate this problem, we use a Heckman procedure (Heckman, 1979), a two-stage procedure that first estimates a selection model with the determinants of a firm's decision to grant options and then estimates the regression model[8].

The first column reports the results for proportion of cash compensation. These results indicate that the governance proxy (*TotGov*) is positive and highly significant, indicating that weaker governance is associated with a higher proportion of cash compensation. For CEOs that have exercised more options during the year, the proportion of cash is lower. This is consistent with these firms using more equity-based compensation to rebalance the CEO's incentive structure. While tenure is not significant, the squared term is positive, suggesting that the proportion of cash compensation increases with tenure. CEOs

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[8] The variables used in the selection model, in addition to the ones already included in the main regression, are the log of the market value of equity, the log of total sales, and the ratio of research and development expenditures to sales (Core and Guay, 1999).

with longer tenures receive more of their compensation in cash. This result is consistent with the Harvey and Shrieves (2001) findings. Firms with more investment opportunities (low B/M, high sales growth) use less cash in the CEO pay package. As expected, the proxy for size, log (assets), is negatively associated with the proportion of cash pay.

When we use proportion of equity pay as our dependent variable, the results are also consistent with expectations. We find that the coefficient on total governance (*TotGov*) is significantly negative, implying that stronger governance is positively associated with more equity-based pay in the CEO compensation package. We also find that more investment opportunities (lower B/M and higher sales growth) result in more equity-based pay; more option exercises imply more option grants to restore the optimal level of CEO option incentives, which increase the proportion of equity pay in CEO compensation; firms with excess cash flows tend to remunerate the CEO with more equity and less cash, to reduce the free cash flow problem; and larger firms grant more equity to the CEO. This is consistent with previous research. Demsetz and Lehn (1985) argue that the optimal level of managerial ownership is positively related to firm size. Finally, CEO tenure is positively associated with more equity-based pay, but at a decreasing rate.

6. Conclusions

Weak governance has costly effects on company performance; it has been associated with worse long-run performance both in accounting and stock-based returns and with sub-optimal decision making in mergers and acquisitions deals. CEO contracting is one of the most important tasks in corporate governance and, as such, it has been argued to be a significant source of agency costs in poorly governed firms. Previous empirical evidence has documented the association between weak governance and higher levels of CEO compensation as well as with asymmetric rewards where CEOs are rewarded for favorable but uncontrollable events but are not penalized when these events are unfavorable. In this paper we examine a different source of sub-optimal contracting. Starting from the assumption that poor governance is reflected in inefficient contracting with the CEO, where the CEO exerts his bargaining power to write an inefficient but favorable contract, we argue that the weighting of various performance measures vary across governance regimes. Because simply raising the salary—the most efficient way of capturing rents—is easily recognized and subject to reputational costs, CEOs in poorly governed firms increase the weight of controllable performance measures at the expense of more complete but noisier measures. More specifically, accounting performance measures, arguably more controllable, are expected to receive a higher weight, while stock-based measures, arguably noisier and more complete, are expected to receive a lower weight in weak governance settings.

The evidence in this paper is consistent with the hypothesized relationship between governance and the weights that these two performance measures receive. In particular, we find that the weight on accounting-based performance measures increases as governance deteriorates. The result is robust to various definitions of accounting returns and to levels as well as changes in governance. Because an attractive characteristic of controllable measures is their lower level of noise, we extend the empirical study and examine the variance of CEO compensation and the proportion of cash compensation across governance regimes. Consistent with CEOs using their bargaining power to decrease the variance in their compensation, we find that the variance in CEO pay decreases, and the proportion of cash compensation increases with weaker governance.

This evidence indicates that one mechanism that CEOs use to exert the power that weak governance grants them is through the design of their compensation contract, favorable to them, but sub-optimal (and a source of agency costs) from a shareholders' perspective. Thus, these results provide evidence that explains how CEOs achieve the previously documented association between the level of CEO compensation and governance variables including governance provisions and board of directors' characteristics.

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Table 1

Descriptive statistics

Panel A: CEO compensation

	Mean	Std. Dev.	Perc1	Perc25	Median	Perc75	Perc99
Cash pay	1.337	1.186	0.154	0.616	0.992	1.614	7.625
Cash pay (weak governance)	1.433	1.221	0.154	0.704	1.094	1.716	7.625
Cash pay† (strong governance)	1.233 ***	1.139	0.167	0.553	0.893 ***	1.461	6.937
Equity-based pay	2.416	4.835	0.000	0.088	0.700	2.317	31.840
Equity-based pay (weak governance)	2.245	4.408	0.000	0.099	0.730	2.214	25.192
Equity-based pay† (strong governance)	2.601 ***	5.251	0.000	0.083	0.669 *	2.409	31.840
Rest of pay	0.487	1.821	–0.425	0.012	0.072	0.295	8.160
Rest of pay (weak governance)	0.546	1.910	–0.317	0.016	0.090	0.359	8.967
Rest of pay† (strong governance)	0.423 ***	1.717	–0.619	0.009	0.053 ***	0.250	7.760
Total pay	4.240	6.179	0.255	1.079	2.135	4.607	40.942
Total pay (weak governance)	4.225	5.854	0.255	1.166	2.297	4.719	34.855
Total pay† (strong governance)	4.257	6.511	0.266	1.004	1.957 ***	4.402	40.942

Panel B: Changes in CEO compensation

	Mean	Std. Dev.	Perc1	Perc25	Median	Perc75	Perc99
Δ log (cash pay)	0.058	0.348	–1.120	–0.060	0.066	0.211	1.087
Δ log (total pay)	0.105	0.685	–2.165	–0.172	0.101	0.411	2.209

The sample consists of 6,536 CEO-year observations of Execucomp data (1,879 CEOs) for the years 1993-2002. All amounts in Panel A are in $ million. *Cash pay* is defined as the sum of annual salary and bonus. *Equity-based* pay is the sum of annual grants of stock options and restricted stock. *Total pay* includes cash pay, stock options, restricted stock, long-term incentive plan payouts, and all other annual compensation. *Rest of pay* is defined as total pay minus cash pay and equity-based pay. The sample is divided into two groups according to the quality of its corporate governance. We measure corporate governance using a summary measure of total governance (*TotGov*) that includes indicators of shareholder rights and characteristics of the board of directors. Weak (strong) governance indicates that the observation has a total governance score above (below) the median of *TotGov*. The variables have been winsorized at the 1 and 99 percentiles.

† The symbols ***, * indicate that the means (medians) are different at the 1% and 10% level, respectively.

Table 1 (continued)

Panel C: Governance variables

	Mean	Std. Dev.	Perc1	Perc25	Median	Perc75	Perc99
Governance Index	9.289	2.727	4	7	9	11	15
Number of meetings	7.203	2.953	3	5	7	9	16
Executives on the board (%)	34.29	18.60	11.11	20.00	33.33	42.86	100
CEO is also chair of board	0.799	0.400	0	1	1	1	1
TotGov	0.000	0.503	–1.160	–0.302	0.006	0.301	1

Panel D: Economic variables

	Mean	Std. Dev.	Perc1	Perc25	Median	Perc75	Perc99
ΔROA	–0.007	0.054	–0.242	–0.020	–0.001	0.013	0.169
Return	0.064	0.399	–1.264	–0.143	0.085	0.299	1.137
Std. Dev(ΔROA)	0.040	0.045	0.002	0.012	0.025	0.048	0.263
Std. Dev(Return)	0.431	0.356	0.073	0.219	0.326	0.503	2.196
B/M	0.650	0.261	0.104	0.451	0.671	0.861	1.215
Var(ΔROA) / Var(Return)	0.027	0.117	0.000	0.002	0.005	0.018	0.398
Fair value options exercised ($ million)	1.901	6.001	0.000	0.000	0.000	0.772	43.845
Free cash flow problem	0.003	0.015	0.000	0.000	0.000	0.000	0.092
CEO tenure (years)	10.6	7.3	3.1	5.2	8.4	13.4	38.0
Log (Assets)	7.665	1.708	4.284	6.404	7.488	8.813	12.201
Sales growth	0.102	0.214	–0.654	0.012	0.085	0.185	0.849

Governance Index is the governance index compiled by Gompers et al. (2003) to capture the level of shareholder rights. *TotGov* combines the four governance proxies into a summary measure of total governance by taking the average of the standardized variables. To perform this computation, number of meetings is reverse coded. *ΔROA* is the change in return on assets, where *ROA* is operating income divided by average total assets. Return is the log(annual return + 1), where annual return is the continuously compounded monthly CRSP return over the firm's fiscal year. *Std. Dev(ΔROA)* is the standard deviation of *ΔROA* measured with five consecutive annual observations spanning years t-4 to t. *Std. Dev(Return)* is the standard deviation of *Return* measured with five consecutive annual observations spanning years t-4 to t. *B/M* is the ratio of book value of assets to market value of assets measured at the beginning of the period. The market value of assets equals the market value of equity plus the book value of total liabilities. *Var(ΔROA) / Var(Return)* is the ratio of the variances of *ΔROA* and *Return*. *Fair value options exercised* is the fair value of the stock options exercised by the CEO in the year. *Free cash flow problem* is the three-year average of [(operating cash flow minus preferred and common dividends)/total assets] if the book-to-market ratio is greater than or equal to one, and zero otherwise. *CEO tenure* is the number of years the CEO has been in office. *Log (Assets)* is the log of total assets (in millions) at fiscal year-end. *Sales growth* is defined as the change in the log of total annual sales. With the exception of the governance variables, all the variables have been winsorized at the 1 and 99 percentiles.

Table 2

Correlation Matrix

	Δ log (cash pay)	Δ log (total pay)	Return	ΔROA	Governance Index	Number of meetings	Execs on Board	CEO is chair	TotGov	B/M	Var(ΔROA)/ Var(Return)	Proportion of cash pay
Δ log (total pay)	**0.347**											
Return	**0.348**	**0.224**										
ΔROA	**0.362**	**0.168**	**0.367**									
Governance Index	0.012	0.007	0.014	**0.059**								
Number of meetings	-0.021	-0.006	**-0.060**	-0.027	**0.126**							
Execs on Board	0.007	-0.012	**0.037**	**0.042**	**-0.071**	**-0.102**						
CEO is chair	0.019	0.021	0.024	**0.033**	**0.109**	0.001	0.021					
TotGov	0.024	0.007	**0.057**	**0.073**	**0.455**	**-0.377**	**0.529**	**0.541**				
B/M	**0.055**	-0.020	**0.064**	**0.073**	**0.138**	**0.151**	-0.004	0.019	0.007			
Var(ΔROA)/Var(Return)	-0.011	-0.006	-0.050	-0.048	-0.031	-0.019	-0.023	0.000	-0.023	-0.026		
Proportion of cash pay	**0.143**	**-0.438**	**0.035**	**0.105**	0.003	**-0.072**	**0.107**	-0.013	**0.092**	**0.247**	0.031	
Proportion of equity pay	**-0.109**	**0.212**	**-0.068**	**-0.101**	**-0.065**	-0.007	**-0.084**	-0.024	**-0.087**	**-0.280**	-0.007	**-0.634**

Bold figures indicate significance at the 1% confidence level.

Δ *log (cash pay)* is the change in cash pay. *Cash pay* is defined as the sum of annual salary and bonus. Δ *log (total pay)* is the change in total pay. *Total pay* includes cash pay, stock options, restricted stock, long-term incentive plan payouts, and all other annual compensation. *Return* is the log(annual return + 1), where annual return is the continuously compounded monthly CRSP return over the firm's fiscal year. Δ*ROA* is the change in return on assets, where *ROA* is defined as operating income divided by average total assets. *Governance Index* is the governance index compiled by Gompers et al. (2003) to capture the level of shareholder rights. *TotGov* combines the four governance proxies into a summary measure of total governance by taking the average of the standardized variables. To perform this computation, number of meetings is reverse coded. *B/M* is the ratio of book value of assets to market value of assets measured at the beginning of the period. The market value of assets equals the market value of equity plus the book value of total liabilities. *Var(ΔROA) / Var(Return)* is the ratio of the variances of ΔROA and Return. The variances are computed with five consecutive annual observations spanning years t-4 to t. *Proportion of cash pay* is defined as log(*cash pay / total pay*). *Proportion of equity pay to total pay* is defined as log(*equity pay / total pay*). With the exception of the governance variables, all the variables have been winsorized at the 1 and 99 percentiles.

Table 3

Performance metrics, governance and compensation

	Predicted sign	CEO compensation variable	
		Δ log (cash pay)	Δ log (total pay)
Δ ROA	+	1.163 ***	0.892 **
		(0.194)	(0.435)
Return	+	0.195 ***	0.344 ***
		(0.028)	(0.064)
TotGov	?	–0.002	0.001
		(0.009)	(0.018)
Δ ROA * TotGov	+	0.556 ***	1.042 ***
		(0.185)	(0.375)
Return * TotGov	–	–0.008	–0.043
		(0.026)	(0.047)
B/M	?	0.048 **	–0.113 ***
		(0.019)	(0.042)
Δ ROA * B/M	+	1.425 ***	1.114
		(0.337)	(0.708)
Return * B/M	–	0.054	–0.023
		(0.043)	(0.092)
Var(Δ ROA)/Var(Return)	?	0.036	0.009
		(0.033)	(0.055)
Δ ROA * Var(Δ ROA)/Var(Return)	–	–1.167 ***	–0.700 *
		(0.234)	(0.390)
Return * Var(Δ ROA)/Var(Return)	+	–0.178	–0.164
		(0.147)	(0.213)
Adjusted R^2		0.199	0.062
N		6,536	6,536

Δ *log (cash pay)* is the change in cash pay. Δ *log (total pay)* is the change in total pay. *Return* is the log(annual return + 1). *ΔROA* is the change in return on assets. *TotGov* combines the four governance proxies defined in **Table 1**. *B/M* is the ratio of book value of assets to market value of assets at the beginning of the period. *Var(ΔROA) / Var(Return)* is the ratio of the variances of *ΔROA* and *Return*. The variances are computed with five consecutive annual observations spanning years t-4 to t. Intercept, industry and year dummies included but not reported. The standard errors reported in parenthesis are based on the Huber-White estimator, which is robust to both serial correlation and heteroscedasticity (Rogers, 1993). The symbols ***, **, * indicate two-tail significance at the 1%, 5%, 10% level.

Table 4

Performance metrics, change in governance and compensation

	Predicted sign	CEO compensation variable	
		Δ log (cash pay)	Δ log (total pay)
Δ ROA	+	0.983 ***	0.452 **
		(0.185)	(0.440)
Return	+	0.194 ***	0.336 ***
		(0.028)	(0.065)
Δ TotGov	?	–0.022	0.015
		(0.021)	(0.036)
Δ ROA * Δ TotGov	+	0.753 *	2.566 ***
		(0.446)	(0.876)
Return * Δ TotGov	–	–0.017	–0.066
		(0.063)	(0.106)
B/M	?	0.048 **	–0.117 ***
		(0.020)	(0.042)
Δ ROA * B/M	+	1.683 ***	1.755 **
		(0.334)	(0.714)
Return * B/M	–	0.044	–0.011
		(0.043)	(0.093)
Var(Δ ROA)/Var(Return)	?	0.038	0.018
		(0.033)	(0.056)
Δ ROA * Var(Δ ROA)/Var(Return)	–	–1.171 ***	–0.706 *
		(0.247)	(0.410)
Return * Var(Δ ROA)/Var(Return)	+	–0.163	–0.120
		(0.147)	(0.211)
Adjusted R^2		0.199	0.062
N		6,448	6,448

Δ *log (cash pay)* is the change in cash pay. Δ *log (total pay)* is the change in total pay *Return* is the log(annual return + 1), where annual return is the continuously compounded monthly CRSP return over the firm's fiscal year. ROA is the change in return on assets. Δ*TotGov* is the change in *TotGov* from year to year. This variable is a proxy for total governance and combines the four governance indicators defined in **Table 1**. *B/M* is the ratio of book value of assets to market value of assets measured at the beginning of the period. *Var(ΔROA) / Var(Return)* is the ratio of the variances of Δ*ROA* and *Return*. The variances are computed with five consecutive annual observations spanning years t-4 to t. Intercept, industry and year dummies included but not reported. The standard errors reported in parenthesis are based on the Huber-White estimator which is robust to both serial correlation and heteroscedasticity (Rogers, 1993). The symbols ***, **, * indicate two-tail significance at the 1%, 5%, 10% level.

Table 5

Governance and variance in CEO compensation

Panel A: Descriptive statistics

	Standard deviation of Log (cash pay)	Standard deviation of Log (total pay)	Standard deviation of ΔLog (cash pay)	Standard deviation of ΔLog (total pay)
Weak governance	0.286	0.478	0.285	0.554
Strong governance	0.302	0.526 **	0.306 *	0.629 ***

Each cell contains the mean of the standard deviation of CEO pay. To compute the standard deviation, we impose the restriction of having four or more consecutive observations (N=751). *Cash pay* includes annual salary and bonus. *Total pay* includes cash pay, stock options, restricted stock, long-term incentive plan payouts, and all other annual compensation. Then, we compute the mean of the standard deviations by governance group. Weak (Strong) governance indicates that the CEO's firm has a total governance score above (below) the median of *TotGov*. This variable is a proxy for total governance and combines the four governance indicators defined in **Table 1** into a summary measure of total governance. Higher values of *TotGov* are associated with poorer governance. The symbols ***,**, * indicate that the means are different at the 1%, 5% and 10% level respectively.

Panel B: The effect of governance on the variance of CEO pay

	Standard deviation of ΔLog (cash pay)	Standard deviation of ΔLog (cash pay)
TotGov	–0.016	–0.091 ***
	(0.016)	(0.030)
B/M	0.085 **	–0.154 **
	(0.035)	(0.076)
Log (Assets)	0.019 ***	0.032 ***
	(0.006)	(0.011)
Var(Δ ROA)	1.927 *	4.480 **
	(1.102)	(1.777)
Var(Return)	0.048 ***	0.100 ***
	(0.017)	(0.032)
Adjusted R^2	0.122	0.140
N. observations	751	751

The sample consists of CEOs with four or more consecutive observations. *TotGov* combines the four governance proxies defined in **Table 1**. *B/M* is the ratio of book value of assets to market value of assets at the beginning of the period. *Var(ΔROA)* and *Var(Return)* are the variances of *ΔROA* and *Return*. Intercept and industry dummies included but not reported. The standard errors reported in parenthesis are based on the Huber-White estimator, which is robust to both serial correlation and heteroscedasticity (Rogers, 1993). The symbols ***, **, * indicate two-tail significance at the 1%, 5%, 10% level.

Table 6

Governance and structure of CEO compensation

Panel A: Descriptive statistics

	Mean	Std. Dev.	Perc1	Perc25	Median	Perc75	Perc99
Cash pay / Total pay	0.534	0.275	0.036	0.312	0.515	0.747	1
Cash pay / Total pay (weak governance)	0.545	0.268	0.038	0.332	0.52	0.752	1
Cash pay / Total pay † (strong governance)	0.522 ***	0.282	0.036	0.283	0.503 ***	0.739	1
Equity pay/Total pay	0.374	0.291	0	0.09	0.362	0.607	0.973
Equity pay/Total pay (weak governance)	0.356	0.277	0	0.09	0.346	0.563	0.964
Equity pay/Total pay † (strong governance)	0.395 ***	0.304	0	0.092	0.385 ***	0.647	0.973

†The symbols *** indicate that the means (medians) are different at the 1% level.

Panel B: Governance and pay mix

			Heckman regression
	Predicted sign	Proportion of cash pay to total pay	Proportion of equity pay to total pay
TotGov	+ / −	0.078 ***	–0.067 ***
		(0.016)	(0.015)
Fair value of options exercised	− / +	–0.017 ***	0.005 ***
		(0.002)	(0.001)
Free cash flow problem	− / +	–0.952 *	2.767 ***
		(0.549)	(0.800)
Log (assets)	− / +	–0.113 ***	0.033 ***
		(0.006)	(0.007)
B/M	+ / −	0.625 ***	–0.548 ***
		(0.041)	(0.047)
Sales growth	− / +	0.155	0.090 ***
		(0.042)	(0.029)
CEO tenure	?	–0.0003	0.015 ***
		(0.004)	(0.002)
CEO tenure-squared	+ / −	0.0003 ***	–0.002 **
		(0.0001)	(0.0001)
Adjusted R^2		0.268	
N. observations		6,535	6,534
N. uncensored observations			5,131
Wald chi-square test of zero slopes			1,026.19
Wald test p-value			0.000

Proportion of cash pay to total pay is defined as log(*cash pay / total pay*). *Proportion of equity pay to total pay* is defined as log(*equity pay / total pay*). B/M is the ratio of book value of assets to market value of assets at the beginning of the period. Fair value options exercised is the fair value of the stock options exercised by the CEO in the year. *Free cash flow problem* is the three-year average of [(operating cash flow minus preferred and common dividends)/total assets] if the book-to-market ratio is greater than or equal to one, and zero otherwise. *CEO tenure* is the number of years the CEO has been in office. *Log (Assets)* is the log of total assets at fiscal year-end. Intercept, industry and year dummies included but not reported. Intercept and industry dummies included but not reported. The standard errors reported in parenthesis are based on the Huber-White estimator, which is robust to both serial correlation and heteroscedasticity (Rogers, 1993). The symbols ***, **, * indicate two-tail significance at the 1%, 5%, 10% level.