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Shareholder Rights, Boards, and CEO Compensation

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Abstract

I analyze the role of executive compensation in corporate governance. As proxies for corporate governance, I use board size, board independence, CEO-chair duality, institutional ownership concentration, CEO tenure, and an index of shareholder rights. The results from a broad cross-section of large U.S. public firms are inconsistent with recent claims that entrenched managers design their own compensation contracts. The interactions of the corporate governance mechanisms with total pay-for-performance and excess compensation can be explained by governance substitution. If a firm has generally weaker governance, the compensation contract helps better align the interests of shareholders and the CEO.

JEL classification: G32; G34; J33

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1. Introduction

Recently, there has been a renewed interest in the debate on whether executive compensation contracts are excessive or fair and market-based. Several researchers have argued that managers have too much discretion and can influence their compensation contracts.[1] Other researchers have argued that CEO pay and performance sensitivity are equilibrium outcomes of an efficient labor market where talent is scarce and employment risk is high.[2] The role of corporate governance is critical in this debate. Do governance attributes and compensation arrangements act as substitutes? Is a strong governance environment required to enforce compensation contracts that help solve principal-agent problems? Or do weak governance mechanisms allow CEOs to unduly influence the structure of their compensation?

I use comprehensive data on governance attributes and compensation contracts for large public firms over the period 1993-2004 to shed light on the above questions. A significant amount of previous work has studied the interactions of selected governance mechanisms and the level of compensation or fraction of compensation paid in equity.[3]

The contribution of my paper is to systematically analyze a comprehensive set of governance mechanisms. Studying as large a set of governance mechanisms as possible is

[1] E.g., Bebchuk and Fried (2004), Bebchuk, Grinstein, and Peyer (2006), Bertrand and Mullainathan (2001), or the earlier work of Crystal (1991).
[2] E.g., Gabaix and Landier (2006), Himmelberg and Hubbard (2000), Kaplan and Rauh (2007), Kaplan and Minton (2006), and Rajgopal, Shevlin, and Zamora (2006).
[3] E.g., Bertrand and Mullainathan (1999) (CEO compensation, takeover legislation), Borokhovich, Brunarski, and Parrino (1997) (CEO compensation, supermajority and fair price charter amendments), Core, Holthausen, and Larcker (1999) (CEO compensation, board of directors and CEO-chairman duality), Cyert, Kang, and Kumar (2002) (CEO compensation, board of directors and external shareholder), Gibbons and Murphy (1992) (annual pay-for-performance sensitivity, CEO tenure), Hartzell and Starks (2003) (annual pay-for-performance sensitivity and CEO compensation, institutional ownership concentration), Mehran (1995) (percentage of annual equity compensation, outside directors), and Yermack (1996) (Change in CEO compensation, board size).

important for a study of the interaction of governance and compensation, either to accurately measure managerial entrenchment or to identify the overall employment risk which helps shape the optimal contract of the executive. Furthermore, I use a measure of overall pay-for-performance sensitivity that is derived from all past and current stock and option grants and can better capture managerial incentives (e.g., Hall and Liebman (1998), and Core and Guay (1999)).

More precisely, my study analyzes three competing hypotheses about the interaction of the corporate governance environment and the design of executive compensation contracts. Under the *substitution hypothesis*, executive compensation contracts represent one of a number of ways of aligning the incentives of managers and shareholders. In designing these contracts, shareholders or their representatives establish pay-for-performance sensitivity in the context of other governance mechanisms. For example, in a firm with a large board led by the CEO, the CEO's pay-for-performance sensitivity will be higher to align the interests of management and shareholders.

Under the *complementarity hypothesis,* a strong governance environment is needed to impose a compensation contract on the executive that is performance-sensitive. For example, Hartzell and Starks (2003) demonstrate that increased monitoring, measured by institutional ownership concentration, is associated with a higher fraction of a CEO's salary that is paid in equity.

Under the *entrenchment hypothesis*, by contrast, the design of executive compensation contracts is viewed not as a governance instrument for addressing the agency problem between managers and shareholders but as part of the agency problem itself (e.g., Bebchuk and Fried (2004)). If the governance mechanisms of a firm are ineffective, a CEO may be able to influence the compensation contract to his or her

advantage. Since risk-averse CEOs, whose human capital is tied to the firm, dislike the lack of diversification resulting from equity ownership in their company, they will seek a reduction in their pay-for-performance sensitivity. Furthermore, they may pursue an increase in their level of compensation.

I use three firm-specific governance areas as identified by the prior literature (e.g., Becht, Bolton, and Röell (2003)) to capture the firm's corporate governance environment: the quality of the board of directors representing shareholders' interests; the relative ease of launching a takeover or proxy fight; and the degree of active and continuous monitoring by a large outside shareholder. Board quality is measured by board size, the fraction of outside directors, CEO and board chair duality, and CEO tenure. The ease of takeover activity is measured by an index of anti-takeover provisions. Shareholder monitoring is measured by institutional ownership concentration and by pension fund ownership.

Based on regressions of pay-for-performance sensitivity and total compensation on governance characteristics and a set of controls, I find evidence that is generally consistent with the substitution hypothesis. Most governance characteristics such as board independence, CEO/chair duality, institutional ownership concentration, pension fund ownership, and CEO tenure appear to serve as substitutes for CEO pay-for-performance sensitivity. The effects are economically large. For example, a chief executive who also chairs the board has a 37% higher pay-for-performance sensitivity; a one-standard-deviation increase in ownership by pension funds is associated with 14.8% lower pay-for-performance sensitivity.

The results on one governance measure are potentially consistent with the entrenchment hypothesis. The shareholder rights index is negatively correlated with pay-

for-performance sensitivity and positively correlated with total annual CEO compensation. Further tests reveal though that managerial entrenchment is unlikely to explain these correlations. I document that the sensitivity of the compensation contract to the index of shareholder rights is largest for firms with strong shareholder rights. Yet, under the entrenchment hypothesis, the above correlation should be driven by firms with the most entrenched managers.

2. Development of key hypotheses

In this section, I develop the economic arguments that underlie the substitution, complementarity, and entrenchment hypotheses and lay out the strategy for the empirical tests.

The substitution hypothesis predicts that firms with weaker (stronger) corporate governance have higher (lower) overall CEO pay-for-performance sensitivity. More specifically, shareholders view the various governance mechanisms and pay-for-performance sensitivity as substitutes when aligning incentives. For example, shareholders may have agreed to protect the position of the CEO through his or her influence on the board of directors or through strong anti-takeover provisions in order to ensure that the CEO invests in long-term projects whose success is initially uncertain (e.g., Knoeber (1986)). It is necessary to reduce oversight of the manager, because a risk-averse manager would not undertake long-term projects if there is too great a likelihood of being fired prior to the revelation of the projects' true value (see Almazan and Suarez (2003), DeAngelo and Rice (1983), Borokhovich, Brunarski, and Parrino (1997)). However, if the firm's other governance mechanisms tend to be weaker, shareholders

should establish a relatively steep pay-for-performance sensitivity for the CEO to ensure proper alignment between the CEO's incentives and their own.

Under the substitution hypothesis, if pay-for-performance is high (and helps solve the governance problems), then the firm is better run and more profitable, and the CEO will participate in the resulting gains ex post, e.g. through the exercise of stock options, a stock portfolio that increases in value, or higher future compensation. But what are the consequences of the substitution hypothesis for the CEO's concurrent annual level of compensation? The level of compensation could be higher because the firm may have to compensate a risk-averse executive for the additional firm-specific risk by offering higher annual compensation. However, if different governance mechanisms act as perfect substitutes for each other, the overall employment risk of a CEO should remain constant, obviating the need for additional compensation for risk.

The entrenchment hypothesis has recently received considerable attention through a series of articles and a book by Bebchuk and Fried (2004). It suggests that a governance environment that makes it more difficult for shareholders to replace the CEO also facilitates self-serving decisions by the CEO, in particular in domains such as compensation. The entrenchment hypothesis predicts that firms with weaker corporate governance will have a lower CEO pay-for-performance sensitivity because risk-averse managers will seek to reduce their exposure to the firm's stock price by holding less equity (stock or options). An additional testable restriction of the entrenchment hypothesis is that entrenched managers can influence the level of their annual total compensation and thereby extract excess total compensation from the firm (e.g., Core, Holthausen, and Larcker (1999)). For example, a CEO who has potentially captured the

board — either through being both board chair and CEO, or through an insider-dominated board — could influence the decisions of the compensation subcommittee.

Under the third hypothesis, the complementarity hypothesis, stronger governance mechanisms may be associated with higher pay-for-performance, because establishing pay-for-performance may require, e.g., an active role by the board of directors or other monitors. For example, Hartzell and Starks (2003) provide evidence that larger institutional investor oversight increases the fraction of equity compensation in total annual compensation.[4] Under the complementarity hypothesis, executives would require a higher level of compensation since they bear more firm-specific risk through their increased pay-for-performance sensitivity.

Figure 1 summarizes the empirical predictions of the different hypotheses.[5] Figure 1 shows that regressions of pay-for-performance and a measure of the level of compensation on governance characteristics, controlling for the firm's environment, have the potential to yield results that can distinguish between the different hypotheses. The substitution hypothesis yields a prediction opposite to the two other hypotheses for the pay-for performance analysis. While both the complementarity and entrenchment hypothesis predict a positive correlation for the pay-for-performance regressions, the predicted sign differs for the level of compensation regressions.

[4] Researchers have also found evidence of governance mechanisms acting as complements in the study of turnover (e.g., Hadlock and Lumer (1997) and Mikkelson and Partch (1997)) or the effect of governance on equity prices (e.g., Cremers and Nair (2005)).
[5] I thank an anonymous referee for this suggestion.

3. Data

The initial sample consists of large, publicly traded U.S. firms listed in an Investor Responsibility Research Center (IRRC) publication (Rosenbaum (1990, 1993, 1995, 1998, 2000, 2002)) and appearing in the Standard & Poor's ExecuComp database over the period 1993-2004. I exclude firm-years with missing observations for any of the control variables or main governance variables described in detail below. I also exclude ExecuComp CEO-years in which options are granted but no exercise price is reported. I require one full year of tenure for a new CEO to be included in the database because the succession date rarely coincides with the end of the fiscal year, and the compensation data of the first year often covers only part of the year. These exclusion criteria leave a total sample of 11,029 CEO-years.

3.1 Proxies for corporate governance

I collect data for the three firm-specific dimensions of governance outlined in Becht, Bolton, and Röell (2003) — board of director effectiveness, anti-takeover provisions, and monitoring by large shareholders.

To measure the quality of governance provided by the board of directors, I collect data on board size, CEO and board chair duality, and the fraction of non-employee directors on the board. Jensen (1993), Yermack (1996), and Core, Holthausen, and Larcker (1999) argue that effective monitoring is reduced when the number of directors is high because it is easier for a CEO to capture the board, and individual board members are less likely to be held accountable. Jensen (1993) and Core, Holthausen, and Larcker (1999) further argue that when the CEO also chairs the board (CEO/chair duality),

agency problems are more severe. Goyal and Park (2002) show that the sensitivity of CEO turnover to firm performance is significantly lower when the CEO and board chair positions are held by the same individual. Cyert, Kang, and Kumar (2002) show that CEO compensation is higher when the CEO also chairs the board.[6] Mehran (1995) approximates the independence of the board by the fraction of outside directors on the board and finds that the percentage of annual compensation that is equity based increases with the fraction of outside directors. He interprets this finding as evidence that outside directors understand the importance of incentive compensation and enforce it through the compensation committee. Yermack (1996) and Cyert, Kang, and Kumar (2002) find no evidence of an association between CEO compensation and the fraction of outside directors. Core, Holthausen, and Larcker (1999) find that boards with more executives of the firm as directors pay their CEOs less. I calculate the percentage of non-employee directors on the board as a proxy for board independence.[7]

I use two indices of shareholder rights to identify the level of a firm's anti-takeover provisions. Gompers, Ishii, and Metrick (2003) construct a corporate governance index (G-index) to measure the overall balance between shareholder and management rights. Some of the components of the index measure the effectiveness with which managers can resist hostile takeovers (e.g., poison pills, classified boards,

[6] In a similar spirit, Adams, Almeida, and Ferreira (2005) use the accumulation of titles in the hands of the CEO as a measure of concentration of power and find that firm performance is more variable for firms with powerful CEOs. Morck, Shleifer, and Vishny (1989) use a variable "Boss" if an executive holds the titles Chairman, President, and CEO and is the sole signer of the annual report and find that firms with a "Boss" have significantly lower turnover and a higher probability of being targeted in a hostile takeover.

[7] Other researchers (e.g., Mehran (1995)) have calculated the number of outside directors by removing both employee directors and directors affiliated with the firm. My board data is extracted from CompactDisclosure, which does not report the number of affiliated directors (so called "gray" directors). However, as a robustness check, I have re-estimated all regressions on a shorter time period with the board independence measure that removes affiliated directors, using data from the Investor Responsibility Research Center's (IRRC) director database. The coefficients on the IRRC board independence measure are qualitatively and quantitatively similar to the board independence measure I use.

directors' duties); others provide liability protection (e.g., indemnification contracts, limited liability provisions); and still others provide severance protection to managers or directors. Bebchuk, Cohen, and Ferrell (2004) develop an entrenchment index (the E-index), which is based on a more selective set of six anti-takeover provisions according to findings in the law and economics literature. Both the G-index and E-index increase for each additional provision that restricts shareholder rights. The two indices have recently been used to study the effects of shareholder rights on valuation, the cost of debt, and the announcement-return effects of mergers and acquisitions (e.g., Cremers and Nair (2005), Chava, Dierker, and Livdan (2005), and Masulis, Wang, and Xie (2006)).

I use the institutional ownership concentration measure of Hartzell and Starks (2003) and the level of public pension fund ownership as proxies for monitoring by a large shareholder. Hartzell and Starks (2003) calculate institutional ownership concentration as the aggregate holdings of the five institutional investors with the largest number of shares divided by the total holdings of all institutional shareholders. Cremers and Nair (2005) provide a list of large public pension funds, which I use to construct the aggregate holdings of pension funds as a fraction of shares outstanding.

It has also been argued that a CEO with a long tenure may have more managerial power, owing, e.g., to having helped select the majority of the current board members, both dependent and independent, who are then loyal to him or her (e.g, Baker and Gompers (2003), Lorsch and Maciver (1989)). Furthermore, Gibbons and Murphy (1992) suggest that early in their career CEOs have proper incentives to work hard for the firm because they need to demonstrate their quality to the labor market, while later in their career, when their quality is established, they need additional equity incentives to align

their interests with those of other shareholders. To capture this dimension of governance, I include CEO age and CEO tenure in the regression framework.

3.2 Measures of pay-for-performance sensitivity

I follow the literature and use two different measures of overall pay-for-performance sensitivity: percentage ownership (e.g., Jensen and Murphy (1990), Yermack (1995)), and dollar equity incentives (e.g., Core and Guay (1999), and Baker and Hall (2004)). The Jensen and Murphy (1990) percentage ownership measure is defined as the CEO's fractional ownership from all stock and option holdings, multiplied by $1,000. Fractional ownership is measured by the number of shares owned and the portfolio of options held, appropriately weighted by the options' respective sensitivity to the stock price, divided by the total number of shares outstanding. Following the literature, I adopt the practice of using the logarithmic transformation, i.e., log (percentage ownership / (1 – percentage ownership)), in my regressions because the variable is substantially skewed (e.g., Himmelberg, Hubbard, and Palia (1999)).

The dollar equity incentives measure is defined as the dollar change in the stock and options portfolio for a 1% change in stock price. Haubrich (1994), Hall and Liebman (1998), and Core and Guay (1999) argue that a wealth-constrained and risk-averse manager can obtain powerful incentives from a large dollar equity portfolio, even when his or her fractional ownership is relatively low. Baker and Hall (2004) suggest that the dollar measure is the relevant measure if the CEO's actions affect the firm's percentage returns rather than the allocation of resources (as through the consumption of perquisites). Both the percentage ownership and dollar equity incentives measures have intuitive appeal as measures of pay-for-performance sensitivity. I report empirical results

using dollar equity incentives, and demonstrate robustness of the results using percentage ownership.[8]

I calculate CEO pay-for-performance sensitivity from both the stock and flow of equity grants. Hall and Liebman (1998) and Core and Guay (1999) show that CEO pay-for-performance sensitivity is significantly underestimated if only new equity grants are considered.

The calculation of the pay-for-performance sensitivity from options requires the partial derivative of the option with respect to the stock price. As in prior studies (e.g., Jensen and Murphy (1990), Yermack (1995), and Core and Guay (1999)), I use the Black-Scholes formula to calculate the sensitivity of the option value with respect to the underlying stock.[9] The Black-Scholes formula requires as additional inputs the standard deviation of the stock return, the dividend yield, and the risk-free interest rate. I use the standard deviation of monthly stock returns over the three years preceding the end of the fiscal year in which the grant was made. The expected dividend yield is the total cash dividend paid in the fiscal year of the grant, divided by the closing stock price at the fiscal year-end. The standard deviation and dividend yield are obtained from the Center for Research in Security Prices (CRSP). For the risk-free rate, I use the ten-year Treasury yield prevailing on the day of the grant.

Implicit in my measures of total pay-for-performance sensitivity is the assumption that firms are able to influence the overall pay-for-performance sensitivity of their

8 I have re-estimated the principal regressions with a third measure, a relative incentive measure (e.g., Core and Larcker (2002)). The relative incentive measure is constructed by dividing the total dollar portfolio equity incentives by the executive's annual total compensation. The results are quantitatively and qualitatively similar.

9 The proxy statement does not contain detailed information on the strike prices and grant dates of all options in the executive's portfolio, so it is impossible to calculate the Black-Scholes partial derivative of these options directly. To estimate the sensitivity of previously granted options, I use the algorithm outlined in Core and Guay (2002).

executives' compensation. Yet the pay-for-performance sensitivity of an executive's overall holdings depends on the executive's management of his or her personal portfolio. While boards of directors and compensation committees can structure vesting schedules for stocks and options such that equity grants have longer-term pay-for-performance consequences, executives are able to trade away or hedge some of their exposure. Bettis, Bizjak, and Lemmon (2001) demonstrate that some executives hedge part of their equity portfolio, and Ofek and Yermack (2000) show that managers sell some shares whenever they receive new grants. However, Core and Guay (1999) calculate that managers sell the equivalent of only 20% of the new equity grants they receive. While incentives from new equity grants may be more easily and directly influenced by directors or shareholders, they typically represent only a very small fraction of overall incentives (e.g., Hall and Liebman (1998)). Furthermore, there are potentially confounding effects with the level of compensation, as a firm may pay an executive a higher wage using a larger portion of stock-based compensation — due, e.g., to the $1 million limit on the tax deductibility of cash pay or, in the case of entrenched managers, because an increase in stock-based compensation with short vesting schedules may appear more innocuous to shareholders and could be the only politically feasible way for CEOs to extract rents from the firm.[10] For these reasons, I choose to study overall pay-for-performance sensitivity.

Recent evidence on the practice of option backdating (e.g., Heron and Lie (2007)) potentially affects the pay-for-performance sensitivity of new option grants. If CEOs' option grants are systematically backdated, I overestimate the pay-for-performance sensitivity that is derived from these grants. Bizjak, Lemmon, and Whitby (2007)

[10] If the primary purpose of the new grants was additional compensation, it would be reasonable to assume that these options and stocks would be sold as soon as they vest and not be retained in the CEO's portfolio, which I use to measure pay-for-performance sensitivity.

estimate that during most of my sample period (i.e., prior to 1999 and post 2002), the fraction of firms that backdated was between 7 and 20%. My measure of pay-for-performance sensitivity is derived from all past and current stock and option grants, and the option backdating problem appears to be most prevalent for new annual option grants, which are only a small fraction of total pay-for-performance. Furthermore, because of the long time to expiration of executive stock options, a misclassification of an option that is 10% in-the-money as an at-the-money option has only a relatively small effect on the option's delta.

3.4 Measures of excess compensation

Total CEO compensation is measured as salary, bonus, current stock and stock option grants, and other annual compensation such as life insurance benefits and country club memberships. I construct two measures of excess compensation based on previous studies. Baker and Hall (2004) and Bebchuk and Grinstein (2005) suggest that firm size is strongly correlated with the level of executive compensation, and Bizjak, Lemmon, and Naveen (2004) find significant industry and size benchmarking in the level of executive compensation. I report both industry-adjusted compensation, which removes the logarithm of median industry total CEO compensation from the logarithm of total CEO compensation, and size-adjusted compensation, which removes the logarithm of median total CEO compensation for the same firm-size decile from the logarithm of total CEO compensation.[11] These adjustments can capture possible nonlinearities in both size and industry better than control variables.

[11] The results are quantitatively and qualitatively similar if I use industry or size-decile *means* to adjust the level of compensation.

3.5 Additional data

In addition to my measures of pay-for-performance sensitivity and compensation and the variables proxying for governance, I use a large set of independent variables to control for the expected level of pay-for-performance sensitivity. These variables are designed to capture the environment the firm operates in and the scope of managerial discretion, based on the results of the prior literature (e.g., Aggarwal and Samwick (1999), Core and Guay (1999), Demsetz and Lehn (1985), Himmelberg, Hubbard, and Palia (1999), and Smith and Watts (1992)). Detailed definitions of the variables are in the Appendix. In all regressions, I control for industry affiliation using 48 industry indicator variables from the classification suggested by Fama and French (1997).

3.6 Summary Statistics

Table 1 shows summary statistics of the compensation variables for the entire sample and snapshots of the three years 1994, 1998, and 2002. Average total cash compensation increases over each four-year period by approximately 20%. Consistent with previous findings (e.g., Hall and Liebman (1998) and Bebchuk and Grinstein (2005)), total compensation including equity grants increases significantly from 1994 to 1998, with a more moderate increase from 1998 to 2002.

Across all years, the average (median) CEO holds 3.6% (1.2%) of the firm's equity. A one percentage point change in the stock price of the firm changes the average (median) CEO's dollar incentives by approximately $1.5 million ($210,000). In 77% of all firm-years, CEOs receive new grants of equity that translate into a mean (median) dollar incentive of $56,000 ($20,100) for a one percent change in the stock price.

However, the sensitivity of these new grants corresponds on average to only 3.7% ($56,000/$1.5M) of the sensitivity of the CEO's total equity portfolio, which emphasizes the importance of taking the overall equity incentives into account (e.g., Hall and Liebman (1998), and Core and Guay (1999)).

Table 2 presents summary statistics on the proxies for firm governance and on the firm characteristics used as control variables in the regressions. The table contains cross-sectional means and medians of firm time-series averages. The average firm has 9.8 directors; 73.2% are non-employee directors. Most firms (67.5%) have CEO/chair duality. Average CEO tenure is 7.3 years, and the average CEO is 55.6 years old. These numbers are close to the statistics reported in previous studies (e.g., Core, Holthausen, and Larcker (1999)). Pension funds hold on average 2.8% of all outstanding shares, and the five largest institutional shareholders hold 43.6% of all institutional holdings. The average value of the shareholder rights index (G-index) is 9, and the average value of the E-index of Bebchuk, Cohen, and Ferrell (2004) is 1.5. Sample firms are large: firms have a mean (median) market value of $4.2 billion ($1.1 billion) and mean (median) total net sales of $3.2 billion ($1.0 billion). Sample firms have been listed an average of 21 years on a U.S. stock exchange.

Panel A of Table 3 shows correlation coefficients for the governance and compensation variables as well as for firm age and firm market capitalization. The largest correlations in the sample are between board size and market capitalization (ρ=0.33), board size and firm age (ρ=0.33), and firm age and the G-index (ρ=0.30). From Panel A of Table 3 it is evident that firm age and size are important determinants of the governance environment. Larger and older firms have more anti-takeover provisions, larger boards with more independent directors, less institutional ownership concentration,

and exhibit more often CEO-chairman duality. Perhaps not surprisingly, CEOs of larger firms have more dollar pay-for-performance sensitivity and higher compensation. These results appear consistent with the findings of recent studies in which the determinants of governance structures are tracked in large panels (e.g., Boone, et al. (2006), Gompers, Ishii, and Metrick (2003), and Linck, Netter, and Yang (2007)).

To shed some light on the interactions of corporate governance characteristics controlling for firm size and age, I orthogonalize the governance characteristics with respect to firm age and market capitalization and then study their correlations. The results are contained in Panel B of Table 3. Interestingly, several strong correlations among the different governance mechanisms prevail. For example, the pairwise correlations of Panel B suggest that firms with larger boards have more independent directors, have more often a CEO who is also the chairman of the board, have lower institutional ownership concentration and have more anti-takeover provisions. Larger boards do not seem to correlate with dual class firm status or pension fund ownership.

The largest correlations among the proxies for governance (once I correct for size and firm age) are between the G-index and board size (ρ=0.23), suggesting that firms with large boards have more anti-takeover provisions; CEO tenure and CEO-chair duality (ρ=0.18), suggesting that CEOs with a long tenure are more often also chairmen of the board; and, perhaps surprisingly, the fraction of non-employee directors and CEO/chair duality (ρ=0.16), suggesting that the CEO is more often the chairman of the board when the board consists of a higher fraction of non-employee directors.

Finally, Panel B of Table 3 also shows the pairwise correlations between the different governance mechanisms and pay-for-performance and total CEO pay. The largest positive correlations suggest that CEOs with a long tenure have significantly more

pay-for-performance sensitivity (consistent with the arguments of Gibbons and Murphy (1992)), CEOs who are also chairman have both higher pay and higher pay-for-performance sensitivity, and CEOs with more anti-takeover provisions are paid more. The largest negative correlations suggest that in firms with high institutional ownership concentration, CEOs have less pay-for-performance sensitivity and are paid less. Firms with more independent boards exhibit less pay-for-performance sensitivity.

While the above analysis only controls for firm age and firm size as the two most prominent firm characteristics, it is instructive to study the pairwise correlations and learn how the different governance characteristics interact. This analysis may provide some guidance to theoretical researchers interested in modeling the stylized facts of governance systems in large U.S. public firms.

4. Empirical Results

To test the hypotheses outlined in Section 2, I now examine the relationships between pay-for-performance sensitivity, excess compensation, and the governance variables. Section 4.1 briefly lays out the empirical strategy. Section 4.2 examines the relation between overall pay-for-performance sensitivity and the governance variables. Section 4.3 relates the level of excess compensation to the governance variables.

4.1 Empirical strategy

Most of the literature on the determinants of the level of compensation and pay-for-performance sensitivity uses the following model. The substantial skewness of the dependent variables (see Table 1) is accounted for by taking logarithms of those

variables. It is then assumed that the transformation removes any non-linearities from the sample so that a linear model specification is correct. This yields the following regression model:

$$\ln(m_{it}) = \alpha_i + x_{it}^{\mathrm{T}}\beta + \varepsilon_{it,} \quad (1)$$

where i = 1, …, N is a firm index, t = 1, …, T is a year index, m_{it} is the observed compensation variable, α_i is a firm-specific and time invariant constant, x_{it} is a vector of firm-specific determinants of the compensation variable and of the variables proxying for corporate governance.

I estimate two different regression models. First, I follow the literature and use a two-way fixed effects regression model with both year and industry dummy variables. The two-way fixed effects model assumes that unobservable firm-specific factors are reasonably well captured by the industry affiliation. The model can be written as:

$$\ln(m_{it}) = \alpha + \sum_{j=1}^{J-1}\theta_j D_{ijt} + \sum_{t=t_0}^{T-1}\delta_t Z_t + x_{it}^{\mathrm{T}}\beta + \varepsilon_{it,} \quad (2)$$

where θ_j is the coefficient of industry j measured relative to the benchmark industry J and D_{ijt} is a dummy variable which is one if firm i at time t belongs to industry j and zero otherwise, δ_t is the coefficient of year t relative to the benchmark year T and Z_t is one if the observation is from year t and zero otherwise. I expect the firm-level observations across years to be correlated. Rogers (1993) and Petersen (2007) suggest an extension of the White (1980) heteroskedasticity consistent variance-covariance estimator by allowing for clustering of observations (the Huber-White-Sandwich estimator). I use the sandwich estimator of variance and allow for clustering on a firm-level.

One criticism of the above model is that unobservable firm-specific factors are not adequately captured by industry-fixed effects and the other regression control variables. If that was the case, a relation between compensation and governance variables could be driven by the unobserved firm-specific factor (such as degree of agency problems) and thus could be spurious. A possible econometric remedy is to estimate a firm-fixed effects model.[12] This approach eliminates the unobservable time-invariant firm-fixed effects by differencing sample observations around the time-series sample means before estimating the β vector in equation (1). Unfortunately, caution needs to be exercised if governance variables are largely time-invariant (e.g., Zhou (2001)). The differencing of the sample observations around the time-series mean effectively cancels out the time-invariant variables before estimating the β coefficients, permitting no statement of the relationship between the dependent and the time-invariant variable. For example, the shareholder rights index is updated approximately every three years, and at each update, the median change is zero. A firm-fixed effects regression would attempt to identify the coefficient for the shareholder rights index from very few observations.

I address the important issue of whether unobservable firm heterogeneity explains my results by estimating a firm-fixed effects model with a select group of governance characteristics. I include a governance variable if it is sufficiently time-variant, which I define as a 25^{th} and 75^{th} percentile annual change that is different from zero. I include board size, board independence, pension fund ownership and institutional ownership concentration in the firm-fixed effects regression. I exclude the G-index, the E-index, the dual-class firm indicator, and the indicator variable for CEO-Chairman duality.

[12] Such a model has been used previously in managerial ownership regressions. E.g., Aggarwal and Samwick (1999) and Himmelberg, Hubbard, and Palia (1999).

If the coefficients of the governance variables are economically and statistically similar in the firm-fixed effects regressions and the pooled time-series cross-sectional regressions, it is reasonable to assume that the industry-fixed effects and control variables capture a large portion of the firm-specific heterogeneity.[13]

Finally, one additional argument against unobserved variation in the propensity for agency problems causing spurious results can be made based on the observed correlation coefficients (Table 3). If both the compensation contract and governance variables are driven by unobserved variation in the degree of agency problems, one would expect the different governance mechanisms to respond in a similar way (for example, stricter governance in firms with more agency problems). Thus, under this scenario, one would expect pay-for-performance sensitivity and the other governance mechanisms to have positive correlation coefficients. Yet, Table 3 documents that several of the correlation coefficients between pay-for-performance sensitivity and other governance mechanisms are negative.

4.2 Governance characteristics and pay-for-performance sensitivity

Table 4 shows the results of an ordinary least squares estimation of the logarithm of total dollar portfolio equity incentives (columns 1 to 3) and percentage ownership (column 4) on the governance variables and the firm-specific control variables. The first model includes all firm-specific control variables; the second model adds total contemporaneous

[13] It is still possible that firm-specific, unobservable firm characteristics drive the relation between compensation variables and the excluded governance characteristics. However, the argument has to be more refined. To explain all evidence, the unobservable firm characteristic would have to be correlated with the governance characteristics excluded from the firm-fixed effects regression, but uncorrelated with the included characteristics, although many governance characteristics have significant correlations among themselves (for example, the correlation between board size (included) and the G – index (excluded) is 0.28).

CEO compensation as an additional variable, because total incentives and compensation may be jointly determined. The third model uses alternative specifications for some of the governance mechanisms; it replaces institutional ownership concentration with pension fund ownership and the G – index with the E – index. The fourth model uses the alternative pay-for-performance measure, CEO percentage ownership, as the dependent variable. The R-squared varies between 43% and 49% for the regressions, indicating that the model specification explains a large portion of the variation of CEOs' pay-for-performance sensitivity.

The results show that the governance mechanisms are significantly related to overall pay-for-performance sensitivity, with economically large effects. Most of the coefficients on the governance mechanisms are consistent with the predictions of the substitution hypothesis. Weaker governance — approximated by less independent boards, CEO/chair duality, low institutional ownership concentration, low public pension fund holdings, and longer CEO tenure — is associated with higher pay-for-performance sensitivity.

More precisely, a one-standard-deviation increase in the number of non-employee directors means 11.2% lower equity incentives. Chief executives who also chair the board have 37% higher pay-for-performance sensitivity. CEOs with longer tenure have substantially higher equity incentives, which is consistent with both the substitution hypothesis and the career concerns argument of Gibbons and Murphy (1992).[14] Institutional ownership concentration is weakly negatively significant; pension fund ownership is strongly negatively significant. These results suggest that if the potential for

[14] However, this result may also partially reflect the fact that equity incentives for new CEOs of large firms need to be brought incrementally to the equilibrium level.

monitoring by large or important shareholders is greater, executives have lower pay-for-performance sensitivity.[15] The economic effect appears large — a one-standard-deviation increase in pension fund ownership is associated with 14.8% lower pay-for-performance sensitivity, consistent with the predictions of the substitution hypothesis.

The coefficients on board size and the G-index of shareholder rights are consistent with either the entrenchment or complementarity hypothesis. Firms with larger boards have a significantly smaller pay-for-performance sensitivity. A one-standard-deviation increase in board size is associated with 17.4% lower equity incentives, which corresponds to a dollar amount of $260,000. The G-index of shareholder rights has a significantly negative relation with total pay-for-performance sensitivity. A one-standard-deviation increase in the G-index (signifying reduced shareholder rights) is associated with a decline of $140,000 in equity incentives. The evidence on board size and the G – index is consistent with the complementarity hypothesis if relatively stronger governance, measured by a small board and more shareholder rights, is required to establish pay-for-performance sensitivity. The evidence is consistent with the entrenchment hypothesis, if weaker governance allows CEOs to reduce their pay-for-performance sensitivity. Recall from Figure 1 that the analysis of the total CEO compensation in the next section can help distinguish between the two hypotheses.

The positive coefficients and large t-statistics on firm size (log sales) confirm the findings of previous studies that CEOs of large companies have a substantially higher dollar exposure to the stock price of their companies than do their peers in smaller firms (e.g., Core and Guay (1999). The coefficient on free cash flow (defined in the Appendix)

[15] Hartzell and Starks (2003) find that institutional ownership concentration is positively associated with new equity incentives. Note that the two results are not inconsistent, because they are related to different measures. I study the overall pay-for-performance sensitivity, while Hartzell and Starks (2003) study new equity grants.

is positive and highly significant. One explanation for this result is that firms recognize the free cash flow problem (e.g., Jensen (1986)) and require their CEOs to hold larger equity positions. Companies with lower book-to-market ratios also seem to create substantially more equity incentives for their CEOs. There is no evidence that the R&D, advertising, or capex ratios help explain dollar equity incentives during the sample period. Younger firms create greater dollar equity incentives for their CEOs, and older CEOs have a higher pay-for-performance sensitivity. The coefficient on total compensation is positive, suggesting that new equity grants increase incentives and are not completely offset through a sale of stock and options out of the portfolio.

The coefficients and signs of the governance mechanisms are robust across specifications; for example, the governance coefficients remain stable and have similar significance levels when I add the level of CEO compensation as an additional control variable (Table 4, Model II). When the G-index is replaced with the E-index (Table 4, Model III), the economic impact of a one-standard-deviation increase in the E-index is similar; it is associated with $135,000 lower equity incentives. The impact of large shareholders — with the presence of a large shareholder substituting for pay-for-performance sensitivity — remains the same when I replace institutional ownership concentration with pension fund ownership.[16]

[16] In additional, unreported tests, I have used the more detailed director database of the Investor Responsibility Research Center (IRRC) and a database of outside blockholders from Dlugosz, et al. (2006) to conduct a sensitivity analysis with additional governance variables. I have examined the number of outside 5% blockholders and the fraction of directors appointed by the current CEO. Due to a lack of complete time period overlap between the five databases necessary to assemble these data, only the years 1998 to 2001 are available. The coefficients of the additional variables, percentage owned by outside blockholders and percentage of directors appointed by the current CEO, are consistent with the substitution hypothesis. The conclusion drawn from the percentage holdings of outside blockholders is similar to the conclusion I draw from pension fund and institutional ownership, and the conclusion drawn from the percentage of directors appointed by the current CEO is similar to the conclusion drawn from the variables CEO tenure and board independence which also capture the power of the CEO over the board.

The G-index of Gompers, Ishii, and Metrick (2003) is an aggregation of 24 different charter and bylaw provisions as well as state laws. Some of the provisions are related directly to takeover defenses (such as poison pills, classified boards, supermajority voting) and can be changed relatively easily by management, while others are either difficult to change (e.g., state laws) or more indirectly related (such as measures of liability and severance protection. Gompers, Ishii, and Metrick (2003) divide their G-index into five subindices. I combine their 'voting', 'takeover delay' and 'other takeover defenses' subindices in a 'direct ATP' index, and re-estimate specification 2 of table 4 with three subindices of the G-index – the 'management protection' subindex which summarizes severance and liability protection, the 'state law' subindex, and the 'direct ATP' index. The (unreported) regressions show that the negative coefficient of the G-index is driven by the direct antitakeover provision index; the coefficients on the 'management protection' and 'state law' indices are not statistically significantly different from zero.

Model IV of Table 4 re-estimates model III using the percentage ownership measure as independent variable. The results are robust to the alternative specification; neither the signs nor the significance of the coefficients of the corporate governance mechanisms change across specifications. The coefficients on the control variables in the percentage ownership regressions are consistent with prior studies that use the percentage ownership measure (e.g., Himmelberg, Hubbard, and Palia (1999) and Yermack (1995)).

Table 5 shows the results of an estimation of a firm-fixed effects regression of the logarithm of total dollar equity incentives on selected governance characteristics and control variables. The left- and right-hand-side variables of Table 5 are identical to those in Table 4, with the exception that governance variables that exhibit almost no time-series

variation are excluded from the firm-fixed effects regressions. Table 5 shows that, overall, the coefficients on the governance variables are remarkably consistent across the different estimation methodologies in Table 4 and Table 5. The coefficients on board size, CEO tenure and institutional ownership concentration are similar in statistical and economic magnitude when I control for unobservable firm characteristics; the coefficient on board independence is statistically significant and negative as before, but smaller in magnitude. The exception is the coefficient on pension fund ownership. It is strongly significant in Table 4, but ceases to be significant in Table 5.

Overall, I conclude from the analysis of Table 5 that time-invariant unobservable firm characteristics that are correlated with both pay-for-performance sensitivity and the governance characteristics cannot explain my finding that most governance characteristics are consistent with the substitution hypothesis.

4.3 Governance characteristics and the level of compensation

The second test of my hypotheses deals with the interaction of the governance mechanisms and the level of compensation. Recall from Figure 1 that a prediction of the entrenchment hypothesis is that firms with weaker governance characteristics pay their CEOs more compensation. Under the complementarity hypothesis firms with stronger governance would pay their executives more if they had instituted a compensation plan with more pay-for-performance sensitivity. Under the substitution hypothesis, firms with weaker governance characteristics impose more equity incentives and therefore may have to pay the executive a higher salary, if their overall employment risk increases. I use three specifications to test the relation between corporate governance and excess

compensation, with excess compensation measured by the natural logarithm of total compensation, industry-adjusted compensation, and size-adjusted compensation, respectively. Using these three measures, I regress CEO compensation on the governance variables and a comprehensive list of control variables suggested by prior literature (e.g., Murphy (1985), Smith and Watts (1992), and Core, Holthausen, and Larcker (1999)).

Table 6 presents the regression results. Recall from Table 4 that board size and the G-index of shareholder rights had coefficients consistent with either the entrenchment or complementarity hypothesis in the pay-for-performance regressions, while the coefficients on board independence, institutional ownership concentration, pension fund ownership, CEO tenure, and CEO-Chairman duality were more consistent with the substitution hypothesis.

Board size enters the regressions with a significantly positive coefficient in one of the three specifications. The statistically significant coefficient of 0.013 in the industry-adjusted compensation is equivalent to $58,000 higher CEO compensation for each additional board member. Overall, the interaction between board size and the level of compensation does not appear economically large.

CEOs who are also board chairs receive approximately $325,000 higher total compensation. As CEO-chairmen also have higher pay-for-performance sensitivity, the higher compensation is consistent with the substitution hypothesis.[17] Institutional ownership concentration enters the regression significantly negatively, which is, together with the evidence of Table 4, consistent with the substitution hypothesis. Firms in which

[17] Note though that part of the higher compensation could also reflect compensation for the additional responsibilities of as chairman of the board.

institutional ownership concentration is lower impose more pay-for-performance sensitivity on their CEOs, and pay more compensation for this higher firm-specific risk.

The smaller the number of employee directors on the board, the higher is CEO compensation. This result is inconsistent with the hypotheses, but in line with the findings of Core, Holthausen, and Larcker (1999). The level of equity incentives in year t-1 has a significantly positive effect on current total compensation. If the CEO had a high pay-for-performance sensitivity at the beginning of the fiscal year, his current compensation is higher. One possible interpretation of the positive association is that the CEO shares the ex-post gains stemming from better incentive alignment through his larger equity portfolio.

The coefficient on the G-index in the total compensation regression is positive and significant across all specifications, and the economic magnitude appears large. A one-standard-deviation increase in the G-index (signifying weaker shareholder rights) is associated with up to 6.75% higher total compensation. Across all sample years, this corresponds to an average increase in total compensation between, depending on the specification, $185,000 and $300,000 for a one-standard-deviation higher G-index.

Overall, of all governance variables, only the coefficients of the G-index are consistent with the entrenchment hypothesis; most governance variables have coefficients that are more in line with the substitution hypothesis.

The coefficients on the control variables have signs and magnitudes consistent with prior studies. For example, firm size (except for the size-adjusted specification in Column 2) has positive coefficients and large t-statistics; the results confirm the results of previous studies in executive compensation research (Murphy (1985), Smith and Watts (1992), and Core, Holthausen, and Larcker (1999)). Companies pay their CEOs

significantly more if the company has performed well. The contemporaneous stock return has a significantly positive impact on executive compensation.

In unreported results, I re-estimate the regressions of Table 6 using firm-fixed effects and governance variables that exhibit enough time-series variation (a 25th and 75th percentile change that is not equal to zero). Results appear robust across specifications. Of the significant coefficients for governance characteristics in Table 6 that are included in the firm-fixed effects regressions, those for institutional ownership concentration and past equity incentives remain strongly statistically and economically significant, and the coefficient for the fraction of independent directors remains economically large, but ceases to be statistically significant.

One corporate governance mechanism, the index of shareholder rights of Gompers, Ishii, and Metrick (2003), merits further study because its coefficients are potentially consistent with entrenchment. The results of Tables 4 and 6 indicate that firms with weaker shareholder rights have CEOs who are paid more and have less pay-for-performance sensitivity in their compensation contracts. In an additional test, I interact the index of shareholder rights with an indicator variable equal to one if management is particularly entrenched and estimate whether there are non-linearities in the relationship between shareholder rights and executive compensation. Under the entrenchment hypothesis, one would expect the coefficient on the G – index to be more positive for the 'high G' region, because in firms with a high G-index management is particularly entrenched. I set the entrenchment indicator variable 'high G' to one if the shareholder rights index is larger than its median of 9, and zero otherwise.[18] Table 7 contains the results of the additional regression. I re-estimate the total compensation regression of

[18] Recall that a higher G-index indicates more rights for management.

Table 6, Column 1, using the interaction term of high managerial power and the G – index instead of the G – index alone. I estimate the fully specified model, but for brevity I do not report the coefficients for the control variables, the other governance variables, and the fixed effects. Table 7 shows that the positive relationship between total pay and the G – index comes from firms with relatively less entrenched managers. The coefficient on the G – index for low entrenchment firms is 0.0403 and highly significant. Furthermore, Table 7 shows that the slope of G is statistically significantly higher over the low G region than the high G region. The estimated coefficient on the G – index when G is high can be calculated as the sum of the two coefficients of 0.0403 and -0.0456 in Table 7. It is -0.0053 and statistically indistinguishable from zero. In other words, in firms in which managers are relatively more entrenched, total compensation does not respond to increases in entrenchment. Figure 2 shows this relationship graphically – total compensation is flat for high values of G. These results appear inconsistent with an entrenchment explanation of the shareholder rights index, because it seems reasonable to assume that with increasing managerial entrenchment, the relationship between entrenchment and compensation should grow stronger, but not weaker.

5. Conclusion

I examine the interactions of a broad set of corporate governance mechanisms and the pay-for-performance sensitivity and total compensation of CEOs. I first provide basic correlations for the different governance mechanisms of my sample of large public U.S. firms. This analysis is of potential interest to theoretical researchers seeking to incorporate stylized facts of the interaction of different governance mechanisms into their models.

In the multivariate analysis, I find that firms with governance mechanisms that tend to give more power to management, such as CEO/chair duality, more employee directors, and little monitoring by large shareholders, tend to have greater CEO pay-for-performance sensitivity to maintain an overall alignment of incentives between managers and shareholders. Because the higher pay-for-performance sensitivity imposes more firm-specific risk on the executive, he is often paid more. My results are therefore consistent with pay-for-performance sensitivity being jointly determined with most governance mechanisms to mitigate the agency problems between shareholders and CEOs.

The index of shareholder rights is negatively correlated with pay-for-performance sensitivity and positively correlated with excess CEO compensation, which could potentially be consistent with the entrenchment hypothesis. However, when I split the index into weaker and stronger governance, and estimate the relation between the index of shareholder rights and compensation in these groups, I find that the sensitivity between the governance index and executive compensation is lower in firms with weaker governance. This result appears inconsistent with the entrenchment hypothesis.

Overall, my evidence suggests that for the average U.S. public firm, entrenched managers do not seem to considerably influence their pay-for-performance sensitivity and total pay.

Studying the evolution of governance within a firm over a long time-series and focusing on firms in which the balance of power shifts most from shareholders to managers is an avenue to potentially isolate managerial entrenchment and may shed light on whether documented cases of advantageous compensation contracts can be explained by managerial entrenchment.

Appendix: Data sources and variable definitions

The ExecuComp database provides information on CEOs' tenure, equity ownership, option holdings, equity and option grants and several other compensation items from 1993 to 2004. CEO age is inferred from the Execucomp database, the CompactDisclosure database as well as individual proxy statements.

Data on book equity, sales, research and development, advertising expenditures, capital expenditures, property, plant, and equipment and industry classifications are taken from Compustat's industrial annual database.

The CRSP monthly database is used to generate measures of the stock's volatility and return. In the regressions reported, I use a measure of volatility based on the annualized volatility of monthly stock market returns over the last three years, although the regression results are robust to different specifications of volatility, such as volatility from daily returns over the past six months or idiosyncratic volatility from a market model.

The governance data comes from several sources. The variables relating to the board of directors — board size, fraction of non-employee directors, and CEO/chair duality — are derived from CompactDisclosure filings. CompactDisclosure provides a list of directors and officers of publicly listed U.S. firms. I match the officer and director list to identify directors who were also employees of the firm. CompactDisclosure also contains job titles of the directors and officers. I use the job title field to identify whether the CEO chairs the board.

The Investor Responsibility Research Center (IRRC) provides data to calculate the governance indices of Gompers, Ishii, and Metrick (2003) and Bebchuk, Cohen, and Ferrell (2004). The same data is used to identify dual-class firms. Thomson Financial provides data to calculate the institutional ownership and pension fund ownership measures. Public pension funds are identified through the list in Cremers and Nair (2005).

Variables and Definitions

Advertising ratio	advertising spending (item 46) divided by net PPE (item 8). If advertising spending is missing, it is set to zero and an indicator variable is set to one (see Himmelberg, Hubbard, and Palia (1999))
Board size	number of directors in a given fiscal year
Board independence	fraction of all directors who are not employees of the firm
Book-to-Market	ratio of book value of common equity (item 60) plus deferred taxes (item 74) divided by the market value of common equity

Capex / PPE	capital expenditures (item 128) divided by net PPE (item 8)
Capital/sales ratio	net property, plant, and equipment divided by net sales (item 12)
CEO age	age of CEO in years, from annual reports
CEO duality	CEO is also board chair during the fiscal year
CEO tenure	natural logarithm of CEO tenure in months
Dual class	Indicator variable equal to one if the firm has two or more separate classes of stock with different voting rights
E– index	index of 6 anti-takeover provisions from bylaws and charter amendments, from Bebchuk, Cohen, and Ferrell (2004)
Firm age	natural logarithm of number of months since first listing on stock exchange
Free cash flow	ratio of operating income (item 13) over sales (item 12) (as in Himmelberg, Hubbard, and Palia (1999))
G – index	index of 26 different anti-takeover provisions from bylaws and charter amendments, from Gompers, Ishii, and Metrick (2003)
Institutional owner-ship concentration	shares owned by the five largest institutional owners, divided by the total number of shares held by all institutions (as in Hartzell and Starks (2003))
Institutional ownership	shares owned by institutional investors divided by shares outstanding (from CRSP)
Log (sales)	logarithm of total net sales
Net loss	indicator variable equal to one if net operating loss carry forward (item 52) larger than zero.
Pension fund ownership	shares owned by public pension funds divided by shares outstanding
R&D ratio	R&D spending (item 45) divided by net PPE (item 8). If R&D spending is missing, it is set to zero and an indicator variable is set to one (see Himmelberg, Hubbard, and Palia (1999))
Volatility	annualized standard deviation of monthly stock returns over the past three years

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Figure 1: Empirical predictions for CEO pay-for-performance sensitivity and total pay under the three hypotheses

Predicted sign of correlations between stronger governance and CEO…

	Pay-for-performance	Total pay (abnormal pay)
Substitution hypothesis	-	- / 0
Entrenchment hypothesis	+	-
Complementarity hypothesis	+	+

Figure 2: Total compensation and G – index allowing for non-linearities

The figure represents the coefficients of the G – index estimated in the regression of total CEO compensation on governance variables and controls (Table 7). The relation between total CEO compensation and the index of shareholder rights is estimated over two regions; a region with below median managerial entrenchment (G <= 9, solid blue line) and a region with above median managerial entrenchment (G > 9, purple dashed line).

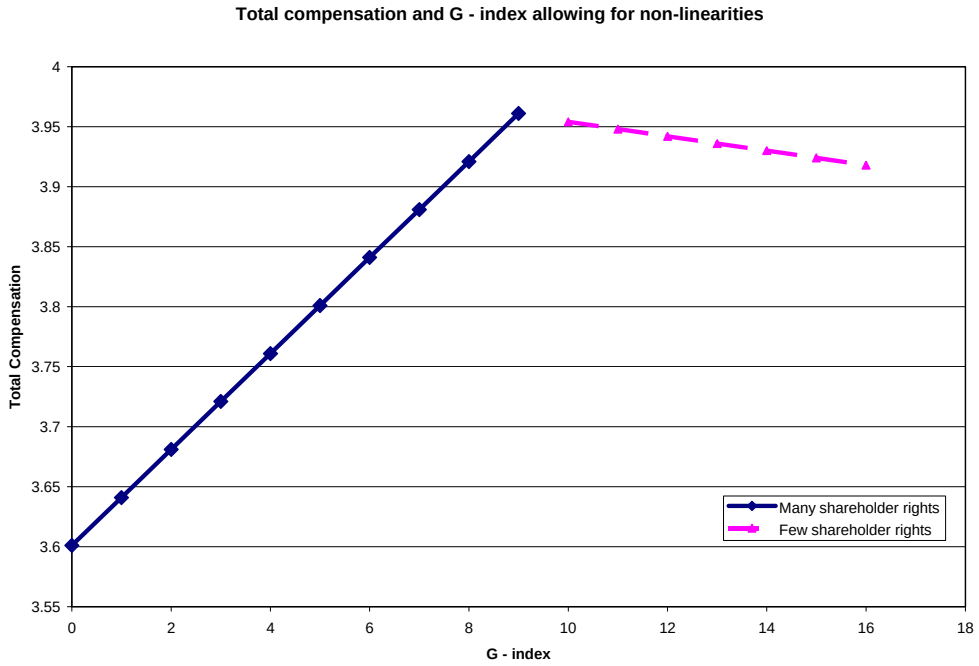

Table 1: Compensation Summary Statistics

The overall sample consists of 11,029 CEO-years from 1993 to 2004. *Total cash compensation* is salary and cash bonus (Execucomp item TCC). *Total Compensation including equity grants* is measured as salary and cash bonus plus the dollar value of restricted stock grants at date of grant plus the dollar value of option grants, calculated by the Black-Scholes formula, plus all other annual compensation (Execucomp item TDC1). *Percentage owned* is the percentage of common equity held by the CEO through stocks and options. *Portfolio of equity incentives* is the sensitivity of the total value of stock and options held by the CEO to a 1% change in market value. *Equity grant*$_t$ is an indicator variable equal to one if the firm gives either stock or option grants to the CEO in a given fiscal year. *Current equity incentives* is the sensitivity of the value of the current year's equity grants to a 1% change in market value. The calculations of the percentage owned and the dollar equity incentives is described in Section 2. All compensation numbers are measured in thousands of dollars.

	Mean	Median
1994 (782 observations)		
Total cash compensation	1,082.5	838.2
Total compensation (incl. equity grants)	2,260.9	1,500.7
Percentage owned	3.4%	0.9%
Portfolio of equity incentives	750.0	124.6
Equity grant$_t$ (indicator variable)	73.0%	
Current equity incentives (N=571)	22.5	11.4
1998 (1,165 observations)		
Total cash compensation	1,225.8	900.0
Total compensation (incl. equity grants)	4,710.6	2,062.7
Percentage owned	4.0%	1.4%
Portfolio of equity incentives	1,912.6	204.2
Equity grant$_t$ (indicator variable)	74.5%	
Current equity incentives (N=868)	65.1	22.0
2002 (1,246 observations)		
Total cash compensation	1,408.5	1,000.0
Total compensation (incl. equity grants)	4,957.2	2,651.4
Percentage owned	3.8%	1.5%
Portfolio of equity incentives	1,042.2	213.8
Equity grant$_t$ (indicator variable)	79.4%	
Current equity incentives (N=989)	61.0	27.1
All years pooled (11,029 observations)		
Total cash compensation	1,333.0	955.8
Total compensation (incl. equity grants)	4,416.6	2,108.9
Percentage owned	3.6%	1.2%
Portfolio of equity incentives	1,480.2	208.0
Equity grant$_t$ (indicator variable)	77.3%	
Current equity incentives (N=8,452)	56.0	20.1

Table 2: Summary Statistics – Governance and Control Variables

The table contains cross-sectional averages, medians, and standard deviations of time-series means for 2,071 firms over the period 1993-2004. The last column shows the median time-series standard deviation of the governance variables. Board size is the number of directors, % non-employee directors is the number of non-employee directors divided by board size, and duality is an indicator variable equal to one if the CEO is also the board chair. Tenure is the number of years since the CEO took office. Pension fund ownership is the fraction of outstanding shares held by public pension funds. Institutional ownership concentration is the number of shares held by the five largest institutional investors, divided by the overall shares held by institutional investors, as in Hartzell and Starks (2003). The G-index is the value of the shareholder rights index of Gompers, Ishii, and Metrick (2003). The E-index is the value of the shareholder rights index of Bebchuk, Cohen, and Ferrell (2004). Market capitalization is the market value of common equity, measured at the calendar year-end. Sales is net sales (Compustat item 12). Assets is total firm assets (item 6). Firm age is the number of years since the firm was first listed on a U.S. stock exchange. The book-to-market ratio is the sum of common equity (item 60) and deferred taxes (item 74) divided by common shares outstanding times the closing price at the end of the calendar year. The capex ratio is the ratio of capital expenditures (item 128) divided by the stock of PPE (item 8). R&D ratio is R&D expenditures (item 45) divided by the stock of PPE, and the advertising ratio is advertising spending (item 46) divided by the stock of PPE. Missing values for these two ratios are set to zero, and an indicator variable for missing values is set to one. The capital / sales ratio is the net stock of PPE divided by sales. Free cash flow is approximated by operating income (item 13) divided by net sales (item 12). Volatility is the annualized monthly stock market volatility calculated over the past 36 months, and age is the age of the CEO.

	Mean	Median	Std. dev.	Median time-series std. dev.
Governance Variables				
Board size	9.8	9.3	3.1	0.84
% non-employee directors	73.2%	76.0%	14.2%	7.0%
CEO is board chair (duality)	67.5%		40.6%	0.0%
CEO tenure	7.3	5.2	6.6	1.87
Pension fund ownership	2.8%	2.5%	5.2%	1.4%
Institutional ownership concentration	43.6%	41.4%	12.6%	6.4%
G – Index	9.0	9.0	2.7	0.34
E – Index	1.5	1.4	1.1	0.0
Dual class firm	8.7%		28.0%	0.0%
Control Variables				
Market capitalization	4,197.8	1,134.2	9,958.4	
Sales	3,190.5	1,021.9	6,360.3	
Assets	8,986.8	1,219.8	4,202.5	
Firm age	21.2	15.4	17.8	
Book-to-market	0.6	0.5	0.4	
Capex ratio	0.2	0.1	0.2	
R&D ratio	6.1%		12.2%	
Advertising ratio	2.8%		9.6%	
Capital / sales ratio	0.7	0.5	0.6	
Cash flow	0.2	0.2	0.1	
Volatility	0.4	0.4	0.2	
CEO age	55.6	55.9	6.6	

Table 3: Correlation Coefficients of Governance Mechanisms

Panel A of the table contains Pearson correlation coefficients of the governance and compensation variables, market capitalization, and firm age. Panel B contains correlation coefficients for governance and compensation variables after orthogonalization with respect to market capitalization and firm age. The cross-sectional correlation coefficients are calculated from time-series averages. Coefficients with a value greater than 0.05 are statistically significant at the one percent level.

Panel A: Pearson correlation coefficients of governance variables

	Tenure	Pension	IO conc.	% non emp.	Board size	Duality	G-index	Dual class	Equity incent.	Total Comp.	Market cap	Firm age
CEO tenure	1.00											
Pension fund ownership	0.01	1.00										
Inst. ownership conc.	0.01	0.14	1.00									
% non-employee dir.	-0.13	-0.02	-0.09	1.00								
Board size	-0.09	0.02	-0.23	0.17	1.00							
CEO-chair duality	0.16	0.04	-0.14	0.18	0.14	1.00						
G-index	-0.12	0.05	-0.15	0.20	0.28	0.15	1.00					
Dual class firm	0.08	-0.01	0.02	-0.06	-0.01	-0.05	-0.16	1.00				
Total equity incent.	0.28	-0.10	-0.38	-0.06	0.11	0.19	-0.08	0.04	1.00			
Total compensation	-0.08	-0.02	-0.38	0.12	0.27	0.16	0.09	0.01	0.48	1.00		
Market capitalization	-0.07	-0.01	-0.27	0.08	0.33	0.10	0.00	0.02	0.37	0.43	1.00	
Firm age	-0.07	0.09	-0.16	0.20	0.33	0.15	0.30	-0.05	-0.05	0.12	0.24	1.00

Panel B: Pearson correlation coefficients of governance variables after orthogonalization with respect to market cap and firm age

	Tenure	Pension	IO conc.	% non emp.	Board size	Duality	G-index	Dual class	Equity incent.	Total Comp.
CEO tenure	1.00									
Pension fund ownership	0.01	1.00								
Inst. ownership conc.	-0.01	0.15	1.00							
% non-employee dir.	-0.12	-0.03	-0.06	1.00						
Board size	-0.06	-0.01	-0.14	0.10	1.00					
CEO-chair duality	0.18	0.03	-0.10	0.16	0.08	1.00				
G-index	-0.11	0.02	-0.14	0.15	0.23	0.12	1.00			
Dual class firm	0.08	0.00	0.01	-0.06	0.00	-0.04	-0.15	1.00		
Total equity incent.	0.33	-0.09	-0.33	-0.07	0.02	0.19	-0.04	0.04	1.00	
Total compensation	-0.05	-0.02	-0.30	0.09	0.15	0.13	0.10	0.01	0.39	1.00

Table 4: Pay-for-Performance Sensitivity and Governance Mechanisms

Regression results of a pooled time-series / cross-sectional multivariate regression of the logarithm of total portfolio equity incentives (Columns I – III) and percentage ownership (Column IV), calculated as outlined in Section 2, from 1993-2004. The sample is described in Section 3. Besides the reported control variables, year dummy variables and the 48 Fama-French (1997) industry dummy variables are used (see the Appendix for variable definitions). Model II includes concurrent compensation, and Model III uses pension fund ownership and the E-index instead of institutional ownership concentration and the G-index. Model IV estimates the regressions using the percentage ownership pay-for-performance measure as the dependent variable. Standard errors are in parentheses and are corrected for serial correlation with the Huber White Sandwich estimator for variance. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

	Model I	Model II	Model III	Model IV
Board size	-0.052***	-0.056***	-0.056***	-0.08***
	(0.012)	(0.012)	(0.012)	(0.01)
% non-employee directors	-0.75***	-0.81***	-0.82***	-0.81***
	(0.16)	(0.16)	(0.15)	(0.16)
CEO is board chair	0.37***	0.35***	0.35***	0.37***
	(0.05)	(0.05)	(0.05)	(0.05)
CEO tenure	0.13***	0.13***	0.13***	0.13***
	(0.02)	(0.02)	(0.02)	(0.02)
Institutional ownership	-0.46*	-0.37		
concentration	(0.24)	(0.24)		
Pension fund ownership			-2.96***	-2.96***
			(0.88)	(0.91)
G – Index	-0.031***	-0.035***		
	(0.012)	(0.012)		
E – Index			-0.085***	-0.062**
			(0.028)	(0.027)
Dual class firm	0.15	0.16	0.15	0.20
	(0.15)	(0.15)	(0.15)	(0.16)
Log (total compensation)		0.22***	0.22***	0.07*
		(0.05)	(0.05)	(0.04)
Book-to-market	-1.19***	-1.10***	-1.15***	-0.53***
	(0.07)	(0.07)	(0.07)	(0.07)
Log (sales)	0.52***	0.42***	0.44***	-0.40***
	(0.03)	(0.04)	(0.04)	(0.04)
Volatility	0.06	-0.05	-0.03	0.41
	(0.17)	(0.18)	(0.17)	(0.17)
Free cash flow	0.92***	0.8***	0.8***	0.15
	(0.21)	(0.20)	(0.20)	(0.18)
Capital / sales ratio	0.57***	0.50***	0.52***	0.11
	(0.06)	(0.07)	(0.06)	(0.06)
R&D ratio	-0.04	-0.15	-0.13	-0.62***
	(0.21)	(0.21)	(0.21)	(0.21)
Advertising ratio	-0.2	-0.26	-0.31	-0.25
	(0.23)	(0.22)	(0.22)	(0.22)
Capex ratio	-0.18	-0.16	-0.14	0.02
	(0.12)	(0.12)	(0.12)	(0.12)
Log (firm age)	-0.14***	-0.13***	-0.16***	-0.15***
	(0.04)	(0.04)	(0.04)	(0.04)
CEO age	0.02***	0.03***	0.03***	0.03***
	(0.00)	(0.00)	(0.00)	(0.00)
Net loss dummy	-0.11*	-0.09*	-0.09*	-0.08
	(0.06)	(0.06)	(0.06)	0.06
Year-fixed effects	Yes	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	Yes	Yes
Adj. R2	0.48	0.49	0.49	0.43

Table 5: Pay-for-Performance Sensitivity and Governance Mechanisms (Fixed Effects)

Regression results of firm-fixed effects regressions of the logarithm of total portfolio equity incentives (Columns I – III) and percentage ownership (Column IV), calculated as outlined in Section 2, from 1993-2004. The sample is described in Section 3. All variables are as defined in Table 4. Governance variables are included if they are time-varying. Standard errors are in parentheses and are corrected for serial correlation with the Huber White Sandwich estimator for variance. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

	model 1	model 2	model 1	model 1
Board size	-0.045***	-0.044***	-0.044***	-0.055***
	(0.007)	(0.007)	(0.007)	(0.006)
% non-employee directors	-0.164**	-0.153**	-0.162**	-0.208***
	(0.078)	(0.074)	(0.074)	(0.068)
CEO tenure	0.121***	0.124***	0.127***	0.125***
	(0.011)	(0.010)	(0.010)	(0.010)
Institutional ownership	-0.486***	-0.444***		
concentration	(0.114)	(0.109)		
Pension fund ownership			-0.567	-0.393
			(0.582)	(0.518)
Log (total compensation)		0.279***	0.278***	0.141***
		(0.021)	(0.021)	(0.018)
Book-to-market	-0.639***	-0.532***	-0.587***	-0.259***
	(0.047)	(0.047)	(0.046)	(0.049)
Log (sales)	0.140***	0.078**	0.114***	-0.269***
	(0.036)	(0.034)	(0.034)	
Volatility	-0.492***	-0.467***	-0.513***	0.144
	(0.119)	(0.115)	(0.116)	(0.095)
Free cash flow	0.850***	0.685***	0.714***	0.107
	(0.146)	(0.139)	(0.137)	(0.114)
Capital / sales ratio	0.123***	0.084**	0.118***	0.029
	(0.041)	(0.039)	(0.039)	(0.033)
R&D ratio	0.090	0.075	0.059	-0.050
	(0.144)	(0.138)	(0.138)	(0.125)
Advertising ratio	-0.187	-0.146	-0.155	0.112
	(0.150)	(0.143)	(0.143)	(0.143)
Capex ratio	-0.056	-0.030	0.016	0.098
	(0.104)	(0.104)	(0.103)	(0.084)
Log (firm age)	-0.508***	-0.469***	-0.446***	-0.514***
	(0.071)	(0.069)	(0.069)	(0.059)
CEO age	0.024***	0.026***	0.026***	0.024***
	(0.003)	(0.003)	(0.003)	(0.003)
Net loss dummy	-0.011	-0.006	-0.010	0.004
	(0.035)	(0.034)	(0.035)	(0.031)
Year-fixed effects	Yes	Yes	Yes	Yes
Firm-fixed effects	Yes	Yes	Yes	Yes
R-squared (within)	0.22	0.26	0.26	0.18

Table 6: Excess Compensation and Governance Mechanisms

The table reports results of multivariate regressions of three level of compensation variables on proxies for managerial power as well as firm-specific control variables. The sample is described in Section 3. The proxies for managerial power are board size, % of non-employee directors, CEO/chair duality, CEO tenure, institutional ownership concentration, and the G – index. The first column uses as the dependent variable the logarithm of total compensation (including restricted stock and option grants, but excluding changes in the portfolio value of the executive). The second column uses as the dependent variable the size-decile-adjusted total compensation. For each year, the log of median total CEO compensation of firms in the same size-decile is deducted from the logarithm of total CEO compensation. The third column uses an industry-adjusted compensation, where, for each year, the log of median industry total CEO compensation is deducted from the log of total CEO total compensation. Standard errors are in parentheses and are corrected for serial correlation with the Huber White Sandwich Estimator for variance. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

	Log (Total compensation)		
	unadjusted	size-decile adjusted	industry-adjusted
Board size	0.010	0.011	0.013*
	(0.007)	(0.008)	(0.007)
% Non-employee directors	0.237***	0.208**	0.247***
	(0.077)	(0.081)	(0.082)
CEO is board chair	0.063**	0.094***	0.047
	(0.029)	(0.031)	(0.032)
Log (CEO tenure)	-0.004	-0.005	-0.003
	(0.003)	(0.003)	(0.003)
Institutional ownership	-0.524***	-0.378**	-0.550***
concentration	(0.115)	(0.148)	(0.129)
G-index	0.016***	0.025***	0.016**
	(0.006)	(0.007)	(0.006)
Book-to-market	-0.315***	0.118**	-0.296***
	(0.039)	(0.051)	(0.049)
Log (size)	0.388***	-0.024	0.395***
	(0.017)	(0.023)	(0.020)
Volatility	0.837***	0.746***	0.854***
	(0.103)	(0.112)	(0.115)
Return year t	0.238***	0.349***	0.249***
	(0.028)	(0.035)	(0.035)
Return year t - 1	0.160***	0.097***	0.135***
	(0.027)	(0.031)	(0.032)
Log (firm age)	-0.025	0.026	-0.021
	(0.021)	(0.025)	(0.025)
Past equity grants	0.055***	0.013	0.045***
	(0.013)	(0.017)	(0.017)
CEO age	-0.003	-0.002	-0.004
	(0.002)	(0.003)	(0.003)
Year-fixed effects	Yes	Yes	Yes
Industry-fixed effects	Yes	Yes	No
R-squared	0.481	0.100	0.352

Table 7: A further test of the entrenchment hypothesis

Regression results of a multivariate regression of the total annual CEO compensation on governance mechanisms, firm-specific control variables, and industry fixed-effects. The effect of the index of shareholder rights is estimated over two regions. The indicator variable 'high G' is equal to one if the index of shareholder rights is larger than 9, and zero otherwise. The specification below, in which the indicator variable is interacted with the level of the G-index, allows estimation of two different coefficients for the region of low shareholder rights and high shareholder rights. Standard errors are in parentheses and are corrected for serial correlation with the Huber White Sandwich estimator for variance. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

	Total Compensation
Intercept low G - index	3.601***
	(0.234)
Intercept high G - index minus	0.413**
intercept low G - index	(0.170)
G – index when G is low	0.0403***
	(0.014)
G – index when G is high minus	-0.0456**
G – index when G is low	(0.018)
Control variables	Yes
Other governance variables	Yes
Year-fixed effects	Yes
Industry-fixed effects	Yes
Observations	9709
R-squared	0.48