Managerial Power, Stock-Based Compensation, and Firm Performance: Theory and Evidence

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Abstract

We study theoretically and empirically the relation among CEO power, CEO pay and firm performance. Our theoretical model follows the rent extraction view of CEO compensation put forward by the managerial power theory. We test our theoretical findings using the sample of S&P1500 firms. The predicted relation between power and pay is largely supported. However, the relation between power and firm performance has mixed support, suggesting that, while the managerial power theory has relevance in explaining the relation between power and pay, the scope of power needs to be broadened for better understanding of how managerial power affects firm performance.

KEY WORDS: Managerial power, agency theory, stock-based compensation, firm performance, pay-performance sensitivity.

JEL CLASSIFICATION: D82, G32, J33.

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Abstract

We study theoretically and empirically the relation among CEO power, CEO pay and firm performance. Our theoretical model follows the rent extraction view of CEO compensation put forward by the managerial power theory. We test our theoretical findings using the sample of S&P1500 firms. The predicted relation between power and pay is largely supported. However, the relation between power and firm performance has mixed support, suggesting that, while the managerial power theory has relevance in explaining the relation between power and pay, the scope of power needs to be broadened for better understanding of how managerial power affects firm performance.

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1. Introduction

The compensation for corporations' chief executive officers (CEOs) continues to attract interests from academics, the business press as well as the general public. Of particular interest in recent times has been the growth in the level of CEO compensation that is beyond the increase in firm size or corporate earnings. For example, Bebchuk and Grinstein (2005) report that, during the period of 1993-2003, the average total CEO compensation for S&P500 firms increased by 166 percent, of which only 66 percent is explained by an increase in firm size measured by sales and performance measured by return on assets with the rest remaining unexplained.[(1)(2)] The growth in CEO pay, against the backdrop of corporate scandals and governance failures that plagued corporations around the world, has put executive compensation in the center of the debate on corporate governance.

Among the many issues that relate to executive compensation is a debate on whether the leading paradigm of agency theory is adequate in explaining the observed practice of executive pay. In the standard agency theory, executive compensation is viewed as a solution to shareholders' optimal contracting problem: the contract is designed by shareholders or their representatives to maximize shareholder value subject to the CEO's incentive and participation constraints. In a series of articles and an influential book, Bebchuk and his co-authors (Bebchuk et al., 2002; Bebchuk and Fried, 2003, 2004) challenge this view. Their main thesis is that observed practice of executive pay is explained better by the managerial power theory whereby CEOs effectively set their own pay by influencing the pay-setting process.[(3)] Bebchuk and Fried (2004) provide ample evidence in support of this view. The interest in the managerial power theory

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[(1)] According to *Forbes* ("Big paychecks", March 5, 2007), the collective total CEO pay for the largest 500 firms in the US increased by 38 percent during 2005-2006. During the same period, the S&P500 index rose by 15.79 percent. Numerous articles in the media report high-profile cases of 'excessive' CEO pay despite mediocre firm performance. For example, see *The Economist* (November 24, 2005), "Too many turkeys"; *The Economist* (January 18, 2007), "Power pay"; *Fortune* (June 30, 2006), "The real CEO pay problem"; *The New York Times* (January 4, 2007), "An ousted chief's going-away pay is seen by many as typically excessive".

[(2)] An alternative explanation for the growth of CEO pay is offered in a recent study by Gabaix and Landier (2008). Based on the data on CEO pay in the US between 1980 and 2003, they find that the the six-fold increase in CEO pay during the period can be attributed to the six-fold increase in market value of firms.

[(3)] The managerial power theory, broadly defined, can be traced back at least to Berle and Means (1932, pp 80-82). They describe the mechanism whereby the management, even with negligible share ownership, can assume effective control of the firm through the appointment of the proxy committee, which they dub management control. It is also found, although without formalization, in the more recent management literature. For example, Finkelstein (1992) describes various dimensions of managerial power. The ability to affect one's own pay is one dimension of managerial power, closely related to what Finkelstein called structural power, which is also the definition of power adopted by Lambert et al. (1993). How managerial power influences CEO pay has been the subject of many studies from legal, organizational and sociological perspectives, as Bebchuk and Fried (2004) acknowledge.

and the controversies surrounding CEO power and pay can be witnessed by a host of the critiques of, and the support for Bebchuk and Fried's book.[4]

The central implication of the managerial power approach is simple. Rather than a solution to shareholders' optimal contracting problem, executive compensation is viewed as a mechanism through which powerful, entrenched CEOs extract rent from shareholders. As a consequence, the more powerful CEOs are, the more pay they award themselves with less strings attached. In doing so, the only constraint CEOs face is what Bebchuk and Fried called the 'outrage constraint', which curbs pay that is considered too excessive.[5] If one takes the implication of the managerial power theory literally, then the corollaries are that the total CEO pay should increase in managerial power, pay-performance sensitivity of CEO compensation should decrease in managerial power and, consequently, managerial power should lead to worse firm performance. While the first corollary seems hardly disputable, the other two are not entirely clear. If more power renders the CEO more room for rent extraction, then it would be rational for the CEO to try to maximize firm value, which he can extract through channels that are incentive-neutral. In other words, one needs to be more clear about how managerial power affects the structure of CEO compensation and how it affects firm performance in turn. For example, what is the mechanism whereby managerial power is used for rent extraction? Does managerial power lead to larger stock-based compensation for CEOs and, if so, does this destroy firm value? Or is the 'excessive pay' purely a distributional issue?

This paper has two main objectives. First, we provide a simple, theoretical analysis of how managerial power affects CEO compensation and firm performance. To focus on the main thesis of the managerial power theory, we restrict our attention to one aspect of power, namely the CEO's power to influence his own pay. Specifically we ask two related questions. If the manager has the power to design his own compensation contract, how is the resulting contract different from the one that is designed by the board in an arm's length way? And does this increase agency costs and lead to poorer firm performance? Second, we provide empirical analyses of our theoretical findings in a unified framework using a comprehensive data set encompassing CEO power, CEO pay, and firm performance. The working hypothesis in the majority of existing empirical studies is that more

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[4] Various academic responses, critical as well as supportive, are listed on http://www.pay-without-performance.com. Weisbach (2007) offers a more 'balanced' review of the book.

[5] As Weisbach (2007) points out, the weakness of the managerial power approach is that the 'outrage' constraint is not well-specified. One possible interpretation is that the constraint imposes some upper bound either on the size of total CEO pay or on the element of pay that is highly visible to public, such as cash salary and bonus. In this paper, we take the second interpretation as it is also more in line with what Bebchuk and Fried called the 'camouflage' aspect of CEO compensation.

CEO power leads to higher CEO pay, which in turn leads to poorer firm performance. We contend that this link from CEO power to firm performance needs to be examined more carefully. In particular, one needs to be clear about whether performance is measured in gross terms or in net terms, the latter accounting for the dilution effects of the CEO's stock-based compensation.[6] When performance is measured in gross terms, more CEO power can lead to better firm performance, although it can lead to poorer performance in net terms. This distinction is not made explicit in the existing literature.

Our theoretical analysis is based on a simple principal-agent model in which a firm consists of a representative shareholder, or the board, and a risk- and work-averse manager. The manager's private effort randomly affects the firm's stock price, which is the only performance signal available. As for the form of managerial contract, we focus on the contract that is linear in stock price. The managerial contract is determined through bargaining between the board and the manager. In one polar case where the board has full bargaining power, the board designs a compensation contract for the manager to maximize the shareholder's residual return subject to the manager's incentive compatibility, individual rationality, and limited liability constraints. In the other polar case where the manager has full bargaining power, the manager designs his own compensation contract to maximize his expected utility subject to the shareholder's individual rationality constraint, his own limited liability and incentive compatibility constraints. The solution to a general bargaining problem lies between the above two polar cases, varying continuously in some proxy of the manager's bargaining power.

We show that the optimal contracts in the two polar cases have the same size of stock-based compensation for the manager, providing the manager with the same effort incentives and, consequently, resulting in the same firm performance gross of managerial compensation. The intuition is simple. When the manager designs a compensation contract for himself, he would do so to motivate himself to exert a (second-best) efficient level of effort that would maximize the gross expected return less the cost of his effort. He can then extract the entire surplus from the shareholder through a lump-sum base salary for himself, making the shareholder's individual rationality constraint binding in the process. If the board designs the managerial contract, it would again motivate the manager to exert the efficient level of effort, although the manager in this case would not enjoy the entire surplus. Therefore whoever designs the contract faces the same optimization problem except for a lump-sum wealth transfer that does not

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[6] The distinction between gross and net performance measures is discussed formally in Section 4. Oft-used measures such as Tobin's Q and ROA are both gross measures, while total shareholder return used by Jensen and Murphy (1990b) is a net measure.

have any incentive effect.[7] In short, managerial power does not lead to a distortion in efficiency, but only results in wealth transfer from the shareholder to the manager. Managerial power in this case is thus efficiency-neutral. This generates several testable hypotheses. In firms where the manager's base salary is positive and unconstrained, (i) the size of the manager's stock-based compensation and the pay-performance sensitivity of management compensation are independent of managerial power, (ii) the size of the manager's salary increases in managerial power, (iii) firm performance gross of the manager's compensation is independent of managerial power, and (iv) firm performance net of the manager's compensation decreases in managerial power.

The above result is valid as long as the manager can set his own salary without any constraint. In this case, the manager's salary is used as a vehicle through which the manager extracts rent from the shareholder without distorting his own incentives. However, the case of unconstrained salary may be unrealistic at least for three reasons. First, firm size may limit the amount of salary that can be paid. It is both unrealistic and infeasible for small firms to match salaries paid by their larger counterparts. Indeed in our sample of S&P1500 firms, small and medium size firms pay much lower salaries than S&P500 firms. Second, cash salary is highly visible to shareholders and other investors. Too high a salary level could be viewed excessive and backfire by breaking what Bebchuk and Fried (2004) called the outrage constraint. Third, in the US, the Internal Revenue Code Section 162(m) that became effective in 1994 limited the tax deductibility of executive compensation in excess of one million dollars, unless the compensation was performance-related.[8] Of the various components of executive compensation, salary is the most prominent part that is not performance-related.[9] Empirical evidence suggests that a large number of firms respect the so-called million dollar rule (e.g., Hall and Liebman, 2000; Perry and Zenner, 2001; Rose and Wolfram, 2002; Graham and Wu, 2007). Our data also show that, in two thirds of S&P500 firms during 2001-2005, the salary for CEOs was less than $1 million. Given that the non-tax deductibility of salary

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[7] This is a direct consequence of duality.

[8] The rule is applicable to the CEO and four highest paid top executives of the company other than the CEO. The $1 million cap applies to all forms of compensation if a firm has an insider on its compensation committee.

[9] The rule may also apply to other forms of compensation such as restricted stock, discretionary bonus, perks, etc. According to an IRS private ruling (PLR 121582-04), however, restricted stock should most likely be treated as performance-related compensation, thus not subject to the $1 million limit of tax deduction. Bonuses should also sometimes be treated as performance-related compensation, thus not subject to the million dollar rule. Even if some portion of bonus may not be treated as performance-related, it is not possible to separate various types of bonuses from the data. Other compensation items, such as perks or insurance, though not performance-related, should not be a substantial component of CEO pay. Over our sample period of 2001-2005, salary + bonus + options + restricted stock together account for about 92% of CEO total compensation on average.

above $1 million represents only small costs for large firms paying their CEOs salary above $1 million,[10] the clustering of firms around $1 million needs more plausible explanation than just the tax consideration. One possible explanation put forward by Rose and Wolfram (2002) is that the million dollar rule may have created a focal point for salary compensation, enabling firms to coordinate on the 'non-excessive' level of salary, given the shareholders' outrage constraint.

Motivated by the above discussions, we look at the next case where there is an upper bound on the manager's salary.[11] In those firms with effective salary ceiling, the manager's ability to extract rent through salary is limited. Thus the manager uses stock-based compensation as an additional channel for rent extraction. As a consequence, the manager awards himself more stock-based compensation than when there is no salary ceiling. Therefore, in firms with effective salary ceiling, the size of the manager's stock-based compensation and the pay-performance sensitivity of managerial contract both increase in managerial power. Interestingly, managerial power in this case improves firm performance gross of the manager's pay simply because the manager's stock-based compensation increases in managerial power, which in turn increases the manager's effort incentives. However the return to outside shareholders decreases because the salary ceiling induces the powerful manager to 'over-incentivize' himself with stock-based compensation, leading to the dilution of firm value for outside shareholders.

Our theoretical findings suggest that care should be taken in empirical studies that relate managerial power to firm performance, whether performance is measured based on accounting profits or stock price. In particular, one needs to distinguish between gross and net performance measures in regards to the extent to which shareholder value has been diluted by stock-based compensation awarded to executives but not yet vested. For example, consider return on assets, which is often used to measure firm performance based on accounting profits. Since executive stock options are not typically expensed against corporate earnings under the US accounting practice, such an accounting measure tends to overstate true corporate performance.[12] Evidence suggests that market-based

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[10] In about one third of our sample of S&P500 firms, the CEO's salary was above $1 million with median salary at $1.235 million, implying the tax cost of only $70,000 at the 30% corporate tax rate.

[11] Of course the million dollar rule does not literally imply there is a cap on salary; it only implies a non-linear change in the cost of executive salary to the firm, which can be incorporated by a minor extension of our analysis in Section 3. As discussed above, we abstract away the tax consideration and posit that some firms believe they face an effective constraint on CEOs' salary. This is also the approach we take in our empirical analyses: we divide our sample of firms to two groups, those with CEO salary above $1 million and those with CEO salary below $1 million.

[12] The U.S. Federal Reserve Board estimates that such accounting practice has led to the overstatement of corporate profits by an average of 2.5% a year over the past 5 years (*The Economist*, A survey of international finance, May 14-28, 2002). It should be noted, however, that a majority of companies

performance measures are not free from such an overstatement either. Although efficient markets should impound such a favorable accounting treatment of stock-based compensation into stock price, Garvey and Milbourn (2002) show that stock markets tend to undervalue the costs of stock-based compensation until they are realized. In our empirical analyses, we take this distinction into account.

Before closing the introductory section, we stress that our theoretical model is focused only on one aspect of managerial power, namely, the power to influence one's own pay. As has been pointed out by many (e.g., Finkelstein, 1992; Pfeffer, 1992; Adams et al., 2005), managerial power has diverse dimensions. In our theoretical model, we abstract away other aspects of managerial power, not because they are not relevant but because our main objective is to understand more rigorously the central implications of the managerial power theory. Defining power in this way leads to clear theoretical predictions regarding the relation between power, pay and firm performance. On the other hand, not all of these theoretical predictions are supported by our empirical findings. Although the predicted relation between power and pay is largely supported by our empirical findings, the relation between power and firm performance as predicted by theory has mixed support. This suggests that, while the managerial power theory has clear relevance in explaining the relation between power and pay, the scope of power needs to be broadened to have better understanding of how managerial power affects firm performance.

The rest of the paper is organized as follows. Section 2 reviews the relevant empirical studies. Section 3 describes the basic theoretical model and solves for the optimal contracts. Section 4 develops testable hypotheses based on the results from Section 3, and describes variables and models used for empirical analyses. Section 5 contains the description of data used in this study and offers preliminary descriptive statistics while Section 6 reports our empirical findings. Section 7 concludes the paper.

2. Related Empirical Studies

There is a vast literature that empirically examines the relation among CEO power, CEO pay and firm performance. The central hypothesis tested in most of these studies is that more CEO power leads to higher CEO pay, which in turn leads to poorer firm performance. The first part of the hypothesis is hardly disputable although what is

in our sample start adopting the fair-value method in reporting expenses of stock options from 2004. The adjusted earnings figure, or the Compustat variable OPTFVGR, should be close to our net performance measure while the conventional ROA can be considered as a gross performance measure. This is discussed more in Section 4.2.4.

more important in our view is how CEO power affects the structure of CEO pay since, as Jensen and Murphy (1990a) put it aptly, 'it's not how much you pay, but how'. This also has important bearings upon the the second part of the hypothesis, depending largely on how firm performance is measured. To put the contribution of our paper in perspectives, we divide existing studies into two groups: those that focus on the relation between CEO power and CEO pay; and those that focus on the relation between CEO power and firm performance. The relation between CEO pay and firm performance can be inferred from these two.

Although the variables used to measure firm performance and CEO pay are quite standard, there is a long list of proxies used to measure CEO power. We first describe these variables before reviewing the empirical literature. Firm performance is usually measured by total shareholder return (TSR), Tobin's Q, or return on assets (ROA) while CEO pay is measured by salary, cash compensation (salary + bonus), or total compensation, the latter including the dollar value of the CEO's stock-based compensation. Most empirical studies proxy CEO power along three dimensions: board characteristics, shareholder rights and ownership structure. As for board characteristics, the following five variables, or a combination of them, are used: (1) size of the board, (2) how busy an average outside director is, (3) number of executive directors on the board, (4) whether the CEO is also the chairman of the board, and (5) executive representation on nomination or compensation committees, with implied CEO power increasing in each of these five variables. Another measure of CEO power is based on some indices of the firm's corporate governance and shareholder rights such as the GIM index due to Gompers, Ishii and Metrick (2003), and the BCF entrenchment index due to Bebchuk, Cohen and Ferrell (2009), with a poorer governance score of either measure associated with larger CEO power. The third measure of CEO power is based on the CEO's share ownership and the existence of large outside shareholders, the latter implying smaller CEO power.

2.1. CEO power and CEO pay

The studies on the relation between CEO power and CEO pay generally report that the level of CEO pay is higher when the CEO is more powerful whether CEO pay is in terms of salary, cash, or total compensation. However, the relation between CEO power and the structure of CEO compensation contract, the size of stock-based compensation in particular, is less clear.

The positive relation between CEO pay and CEO power in relation to boards is reported in Core et al. (1999) when CEO power is measured by all five board characteristics discussed above, and in Newman and Mozes (1999) when at least one insider sits on

the compensation committee. The positive influence of CEO power in relation to boards extends to other components of CEO compensation such as golden parachutes. Wade et al. (1990) find that the CEO is more likely to secure a golden parachute as the percentage of outside board members appointed after the CEO takes office increases. Such a link between power and pay is shown to be robust for other measures of CEO power such as the CEO's share ownership (Holderness and Sheehan, 1988), the presence of institutional investors (Hartzell and Starks, 2003), and the presence of large blockholders (Benz et al., 2001; Bertrand and Mullainathan, 2001; Core et al., 1999).

As for the relation between CEO power and the CEO's stock-based compensation, the empirical evidence is mixed. In the first set of studies, less CEO power leads to more incentive-based compensation for the CEO. Harzell and Starks (2003) find that the presence of large institutional investors results in more performance-sensitive compensation for the CEO, implying that institutions serve a monitoring role in mitigating the agency problem between shareholders and managers. Conyon and He (2004) find that the CEO's equity compensation is larger if equity ownership of the members on the compensation committee is larger, the latter being interpreted to imply less CEO power. Newman and Mozes (1999) also report that the sensitivity of the CEO's pay to performance is lower when at least one insider sits on the compensation committee.

The second set of studies report the opposite findings. Cyert et al. (2002) use the 1992-1993 data from large US firms to show that the CEO's equity compensation is negatively related to equity ownership of the largest external shareholder, and equity ownership of the members on the compensation committee. The interpretation by Cyert et al. is that the CEO's equity-based compensation is seen as the sign of CEO power: more powerful CEOs enjoy the profligacy of awarding themselves more equity-based compensation since the dilution effect outweighs incentive effects. Benz et al. (2001) report similar findings in relation to stock option awards to top executives. This is largely consistent with Bebchuk and Grinstein (2005), who show that total compensation for CEOs in large US firms has risen considerably during the period of 1993-2003, with much of the increase due to an increase in equity-based compensation, without a reduction in cash compensation. One explanation offered by Bebchuk and Fried (2004, Chapter 5) is that the increase in equity-based pay is a consequence of managerial power: outsiders' enthusiasm for incentive-based compensation provided executives and directors with opportunities to raise pay levels substantially in ways that appear acceptable to outsiders.

2.2. CEO power and firm performance

The studies on the relation between CEO power and firm performance report that the expected negative relation between the two is significant for some measures of CEO power, but not so for others.

As for board characteristics, majority of studies find that firm performance is positively related to smaller boards (Yermack, 1996; Eisenberga et al., 1998; Conyon and Peck, 1998) and boards with less busy outside directors (Core et al., 1999; Fich and Shivdasani, 2006). Lipton and Lorsch (1992) also argue that "the norm of behaviors in most boardrooms are dysfunctional" as directors often do not criticize the policies of executives, and this problem increases with size of the board. However, Coles et al. (2008) challenge the notion that restrictions on board size and management representation on the board necessarily enhance firm value. They find that complex firms have larger boards with more outside directors, compared to simpler firms, and that Tobin's Q increases in board size for complex firms but decreases in board size for simple firms, and such relation is driven by the number of outside directors.

Evidence on the relation between performance and the other three board variables is mixed. As for the number of outside directors on the board, which may be taken as a measure of board independence, Hermalin and Weisbach (1991), Yermack (1996), Bhagat and Black (2002) find no association between the percentage of outside directors and firm performance while Agrawal and Knoeber (1996) and Core et al. (1999) report a negative effect of a large fraction of outside directors on firm performance. Moreover, based on a system of simultaneous equations that takes into account endogeneity and causation issues, Bhagat and Bolton (2008) report that board independence is negatively and significantly related to contemporaneous and future operating performance. On the other hand, Borokhovich et al. (1996) find that board independence can add firm value while Helland and Sykuta (2005) find a negative relation between the proportion of outside directors and the probability a firm will be sued by shareholders, suggesting that boards with higher proportions of outside directors do a better job in monitoring management.

In regards to the relation between firm performance and the duality of CEO as board chairman, Brickley et al. (1997) argue that the separation of CEO and board chairman has potential costs as well as potential benefits. Their evidence suggests that the costs are larger than the benefits for most large firms. However, Core et al. (1999) and Bhagat and Bolton (2008) report a negative relation between such duality and firm performance while Adams et al. (2005) find no significant relation between the two.

Finally, Klein (1998) finds no significant relation between the composition of board audit committee and firm performance, and between the composition of board com-

pensation committee and firm performance, although Larcker et al. (2005) report that CEO's closeness to members of the compensation committee is shown to increase CEO compensation, suggesting an indirect negative impact on firm performance. On the other hand, Callahan et al. (2003) find a positive relation between management participation in the director selection process and corporate performance.

A growing number of studies have created alternative index measures of corporate governance, and examined whether these measures have a systematic relation with firm performance. Gompers, Ishii and Metrick (2003; GIM henceforth) construct an index of corporate governance, based on 24 provisions measuring shareholder rights. They report that stock returns for firms with strong shareholder rights (low governance index score) outperform returns for firms with weak shareholder rights. Bebchuk, Cohen and Ferrell (2009) created an 'entrenchment index' based on 6 out of the 24 GIM provisions, arguing this subset leads to a sharper negative relation between poor governance and lower firm valuation. As another governance index, Bebchuk, Cremers and Peyer (2007) measure CEO power as the percentage of aggregate top-five executives' total compensation captured by the CEO, which they called CEO centrality. They show that CEO centrality is negatively related to firm performance. Brown and Caylor (2004) created another index, Gov-Score, based on 52 governance factors encompassing eight categories such as executive and director compensation, corporate charter/bylaws, and board structure and processes. Their evidence supports the notion that better-governed firms are relatively more profitable, more valuable, and have higher shareholder returns than poorly governed firms. Bhagat and Bolton (2008) report that better governance as measured by the GIM-index, among others, is significantly positively correlated with better contemporaneous and subsequent operating performance but not correlated with future stock market performance measures.

As for the relation between the firm's ownership structure and performance, Demsetz (1983) and Demsetz and Lehn (1985) argue that the ownership structure - whether concentrated or diffused - is an endogenous outcome optimally chosen to maximize firm value, which leads to a two-way causality and endogneity problem between the ownership structure and firm performance. Not surprisingly, evidence on the relation between insider ownership and firm performance is also mixed. Ang, Cole and Lin (2000) and Singh and Davidson (2003) report evidence in support of Jensen and Meckling (1976) and Jensen and Murphy (1990b) that increased insider ownership lowers agency costs while Agrawal and Knoeber (1996), Himmelberg et al. (1999), and Demsetz and Villalonga (2001) find no significant relation between insider ownership and firm value after controlling for endogeneity of ownership. Morck et al. (1988) and McConnell and Ser-

vaes (1990) report that insider ownership influences firm value in an inverse U-shaped fashion. As for the influence of outside ownership, especially that of institutional shareholders, Pound (1988) argues that institutional investors may affect firm value either positively (effective monitor) or negatively (conspirer with management). Clay (2000) and Mehran (1995) find evidence supporting the positive effect of institutional ownership on firm value. Hartzell and Starks (2003) find a positive relation between institutional ownership concentration and the pay-for-performance sensitivity of a firm's executive compensation, implying an indirect positive relation between institutional ownership and firm performance.

3. A Bargaining Model of Managerial Contract

The structure and level of the CEO's compensation contract can depend on a variety of factors such as the CEO's talent and the demand-supply interactions in the CEO labor market (Gabaix and Landier, 2008), as well as the extent to which the CEO can influence the process whereby his compensation contract is determined. The gist of managerial power theory is that the CEO's influence on the pay-setting process can lead to the CEO's compensation contract that favors the CEO at the cost to outside shareholders. To focus on this, we present a simple bargaining model in which the owner and the manager bargain over the manager's compensation contract.

Consider a firm consisting of an owner, or the representative shareholder, and a manager.[13] The manager is risk averse whose preferences are represented by a CARA utility function $u(x, e) = -exp[-r(x - c(e))]$, where r is the coefficient of constant absolute risk aversion, x is his monetary payoff, and $c(e)$ is the monetary cost when he exerts effort e. The effort cost function satisfies $c'(e) > 0$ and $c''(e) > 0$. The manager's reservation utility is denoted by $\bar{U}$. To simplify notation, we assume that the owner is risk neutral. All our qualitative results can be shown to hold even when the owner is risk averse. The owner's reservation utility is denoted by $\bar{V}$.

The firm's stock price (gross of managerial compensation) follows a random process $y = \bar{y}(e) + \epsilon$, where the error term ϵ has a normal distribution with mean 0 and variance $\sigma(e)$. We assume that $\bar{y}'(e) > 0, \bar{y}''(e) \leq 0, \sigma'(e) \leq 0$ and $\sigma''(e) \geq 0$. That is, managerial effort increases the mean and weakly reduces the variance of stock price but the marginal effects are diminishing.[14] Note that $\bar{y}'(e) > 0$ implies the usual monotone likelihood

[13] We will use the female gender pronoun for the owner and the male gender pronoun for the manager.

[14] That managerial effort also affects the variance of stock price is for the sake of generality, and the assumed signs of derivatives are to ensure that the second-order conditions hold. All our results hold if $\sigma'(e) = 0$.

ratio condition. We focus on linear contracts in designing an optimal incentive scheme for the manager, which has a natural interpretation of salary plus stock-based compensation. However our results can be shown to hold for general contractual forms if the manager has mean-variance preferences. Since managerial compensation given any linear contract also has a normal distribution, we can express his expected utility from any linear contract as its certainty equivalent.

In determining the optimal managerial contract,[15] we consider a bargaining game between the owner and the manager. One can think of either a generalized Nash bargaining game or a noncooperative Rubinstein bargaining game. The bargaining game proceeds given the two reference points, one based on agency theory and the other based on managerial power theory. If the owner has all the bargaining power making a take-it-or-leave-it offer to the manager as is typically assumed in agency theory, the resulting contract is the one that maximizes the owner's expected utility subject to the manager's individual rationality and incentive compatibility constraints. If the manager has all the bargaining power in contract design, then the resulting outcome is the contract that maximizes the manager's expected utility subject to the owner's individual rationality constraint and the manager's incentive compatibility constraint.[16] These two outcomes serve as the reference points for the bargaining game. Then it is well known that the generalized Nash bargaining solution is a weighted average of the two outcomes with the weights depending on the players' bargaining power, which is also approximated by the subgame-perfect equilibrium of a Rubinstein bargaining game where the bargaining power is inversely related to individual discount rate. Thus, as the manager's (owner's, resp.) bargaining power increases, the solution converges to the one designed by the manager (owner, resp.).[17] In what follows we first solve for the two reference point contracts.

3.1. Optimal contract when the owner has full bargaining power

Let the manager's compensation contract be given by $\omega(y) = \alpha y + \beta$, where $\alpha \in [0, 1]$ is the incentive component, or the manager's share of the firm, and β is the base salary.

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[15] The term 'optimal' does not imply the usual second-best efficient contract for the owner. It refers to a contract that is optimal from the viewpoint of the contract designer. If the owner designs the contract for the manager, then the optimal contract is the one that minimizes agency costs as in Jensen and Meckling (1976). If the manager designs the contract for himself, then the optimal contract is the one that maximizes his utility subject to the relevant constraints.

[16] The manager's incentive compatibility constraint is necessary; otherwise, the contract cannot credibly satisfy the owner's individual rationality constraint.

[17] For example, see Binmore (1992), Chapter 5.

Then the manager's expected utility can be written as

$$U(\alpha, \beta, e) \equiv \alpha \bar{y}(e) + \beta - c(e) - 0.5r\alpha^2\sigma(e) \tag{1}$$

while the owner's expected utility is

$$V(\alpha, \beta, e) \equiv (1-\alpha)\bar{y}(e) - \beta. \tag{2}$$

The managerial contract needs to satisfy the manager's incentive compatibility (IC), individual rationality (IR), and limited liability (LL) constraints. Thus the optimal contracting problem for the owner is

$$\text{Maximize}_{\alpha,\beta,e}\ V(\alpha, \beta, e) \ \text{ subject to}$$

$$\text{(IC): } e \text{ maximizes } U(\alpha, \beta, \cdot),\ \text{(IR): } U(\alpha, \beta, e) \geq \bar{U},\ \text{(LL): } (\alpha, \beta) \geq 0. \tag{3}$$

We start by analyzing (IC). Given (α, β), the first-order condition for the optimal effort is determined by

$$\alpha \bar{y}'(e) - c'(e) - 0.5r\alpha^2\sigma'(e) = 0. \tag{4}$$

Our assumptions ensure that there is a unique solution to (4) so that we can define the optimal effort as a function of α, which is denoted by $e(\alpha)$. Clearly e is independent of β. Moreover, e is an increasing function of α: totally differentiating (4) leads us to $\frac{de}{d\alpha} = -\frac{\bar{y}' - r\alpha\sigma'}{\alpha\bar{y}'' - c'' - 0.5r\alpha^2\sigma''} > 0$. Next, note that, in any optimal contract, α should be smaller than 1. Otherwise, the owner's expected utility will be negative. Also α should be larger than 0. If $\alpha = 0$, then the only way to ensure the manager's (IR) is to make β positive. Since β does not affect the manager's effort, it is in the owner's interest to increase α while reducing β, if she wishes to induce any effort from the manager. This will be optimal for the owner unless the manager's cost of effort is too large. Thus we assume that the optimal α is in the interior.

To characterize the solution to (3), note first that either (IR) or (LL) should be binding in any optimal contract. If none of them is binding, then the owner can reduce β further until either (IR) or (LL) binds. This will increase V without changing e. This leaves us three possible cases to consider: (Case 1) $U(\alpha, \beta, e) > \bar{U}$, $\beta = 0$; (Case 2) $U(\alpha, \beta, e) = \bar{U}$, $\beta > 0$; (Case 3) $U(\alpha, \beta, e) = \bar{U}$, $\beta = 0$. Since the case of zero salary is unrealistic, however, we only consider (Case 2).[18] In this case, the manager's (IR) is binding: $U(\alpha, \beta, e) = \bar{U}$. Solving this for β and substituting it into $V(\alpha, \beta, e)$, we

[18] Analyses of the remaining cases are straightforward and omitted here.

have $V(\alpha, e(\alpha)) = \bar{y}(e(\alpha)) - 0.5r\alpha^2\sigma(e(\alpha)) - c(e(\alpha)) - \bar{U}$. The first-order condition for maximizing $V(\alpha, e(\alpha))$ with respect to α is

$$\left[\bar{y}'(e(\alpha)) - 0.5r\alpha^2\sigma'(e(\alpha)) - c'(e(\alpha))\right]e'(\alpha) - r\alpha\sigma(e(\alpha)) = 0. \tag{5}$$

Denote the solution to (5) by α_a. Then the base salary is given by $\beta_a \equiv \bar{U} - \alpha_a\bar{y}(e_a) + c(e_a) + 0.5r\alpha_a^2\sigma(e_a)$ where $e_a \equiv e(\alpha_a)$. This is the case much analyzed in the literature. For example, if $\bar{y}'(e) = 1$ and $\sigma'(e) = 0$, then we are led to a familiar expression, $\alpha_a = \frac{1}{1+r\sigma c''}$ (e.g., Murphy, 1999).

3.2. Optimal contract when the manager has full bargaining power

Denote the manager's contract by $w(y) = ay + b$. Then the optimal contracting problem in this case is to maximize the manager's expected utility subject to the owner's (IR): $V(a, b, e) \geq \bar{V}$, and the same (IC) and (LL) for the manager as before. Given $w(y) = ay + b$, the manager's (IC) is the same as (4) with (α, β) replaced by (a, b). Thus we have the same effort function $e(\cdot)$ as before. Clearly, the manager's effort choice is again independent of the base salary b. Therefore the manager will set b as large as possible. This will make the owner's (IR) binding at any optimal contract designed by the manager. That is, the optimal contract designed by the manager will not leave any rent to the owner and the owner receives exactly the market rate of return on her capital. Then the manager's optimal contracting problem can be written as

$$\text{Maximize}_{a,b}\ U(a, b, e(a)) \ \text{ subject to } \ V(a, b, e(a)) = \bar{V}. \tag{6}$$

Solving $V(a, b, e(a)) = \bar{V}$ for b and substituting it into $U(a, b, e(a))$ leads to $U(a, e(a)) = \bar{y}(e(a)) - 0.5ra^2\sigma(e(a)) - c(e(a)) - \bar{V}$. Maximizing this with respect to a leads to the same first-order condition as (5) with α replaced by a:

$$\left[\bar{y}'(e(a)) - 0.5ra^2\sigma'(e(a)) - c'(e(a))\right]e'(a) - ra\sigma(e(a)) = 0. \tag{7}$$

Denote the solution to (7) by α_p. Then the solution to the manager's optimal contracting problem is (α_p, β_p, e_p) where $e_p = e(\alpha_p)$ and $\beta_p = (1 - \alpha_p)\bar{y}(e_p) - \bar{V}$.

3.3. Comparison of the optimal contracts and bargaining

We now compare the optimal contracts in the two cases. We start by noting that the manager's (IC) is the same in both contracts. This implies that managerial power

does not lead to an additional efficiency loss if the manager's optimal share of the firm is the same regardless of who designs the contract. In the owner-designed contract, the manager's optimal share of the firm is α_a determined from (5). In the manager-designed contract, the manager's optimal share of the firm is α_p determined from (7). Since (5) is the same as (7), we must have $\alpha_a = \alpha_p$, from which follows $e_a = e_p$.

Proposition 1: If the manager receives a positive base salary in the owner-designed contract, then the manager's optimal share of the firm is the same regardless of who designs the managerial contract. As a result, the manager exerts the same level of effort in both contracts.

An implication of the above proposition is that allocation of power in contract design is irrelevant as long as efficiency is concerned. Shifting power from the owner to the manager changes only the distribution of rent in favor of the manager, without having any impact on the manager's effort. The intuition is simple. Given the power to design a contract for himself, the manager would not distort efficiency, but rather try to maximize the size of the pie, which he can fully extract from the owner through the vehicle that does not distort his own incentives. The vehicle for rent extraction is the base salary if the level of salary can be chosen without any upper bound. As long as there is no cap on the base salary, managerial power is reflected in the size of the manager's salary, rather than the incentive component of managerial compensation.

To see how managerial power affects firm performance, let us consider a bargaining game where $\gamma \in [0, 1]$ is a proxy for the manager's bargaining power. The generalized Nash bargaining problem can be written as

$$\begin{aligned} &\text{Maximize}_{\alpha,\beta}\ [U(\alpha, \beta, e(\alpha)) - \bar{U}]^{\gamma}[V(\alpha, \beta, e(\alpha)) - \bar{V}]^{1-\gamma} \\ &\text{subject to}\ \ U(\alpha, \beta, e(\alpha)) \geq \bar{U},\ V(\alpha, \beta, e(\alpha)) \geq \bar{V} \end{aligned} \tag{8}$$

where the manager's (IC) has been incorporated in $e(\alpha)$. If $\gamma = 1$, then the solution to (8) is (α_p, β_p) and, if $\gamma = 0$, then the solution is (α_a, β_a). The general solution to (8) is given by $(\alpha_\gamma, \beta_\gamma) \equiv \gamma(\alpha_p, \beta_p) + (1 - \gamma)(\alpha_a, \beta_a)$. Given this the manager's effort level is determined as $e_\gamma = e(\alpha_\gamma)$. Define now gross firm performance as the expected stock price, $\bar{y}(e_\gamma)$, and net firm performance as the expected return to the owner, $V(\gamma) \equiv (1 - \alpha_\gamma)\bar{y}(e_\gamma) - \beta_\gamma$. Then it is immediate that gross firm performance and the manager's stock-based compensation are both independent of managerial power since, from Proposition 1, both $\alpha_\gamma = \alpha_p = \alpha_a$ and $e_\gamma = e(\alpha_\gamma)$ are independent of γ. However, net firm performance decreases in managerial power since β_γ increases continuously in γ.

An additional implication of the above proposition is related to the pay-performance sensitivity of managerial contract: an increase in the manager's pay in response to an increase in shareholder value. In our model it is reflected in the manager's optimal share of the firm, α_γ. Since it is independent of managerial power, the pay-performance sensitivity is observationally equivalent whether the firm's governance fits agency theory or managerial power theory. Summarizing these discussions, we obtain the following hypotheses.

Corollary 2: In firms where the manager's base salary is positive and unconstrained, (i) both the size of the manager's stock-based compensation and the pay-performance sensitivity of management compensation are independent of managerial power, (ii) the size of the manager's salary increases in managerial power, (iii) firm performance gross of the manager's compensation is independent of managerial power, and (iv) firm performance net of the manager's compensation decreases in managerial power.

3.4. Optimal contracts with salary constraint

So far we have assumed that there is no upper bound on the manager's base salary. This enabled the powerful manager to extract rent through the base salary without distorting his own incentives. However, the case of unconstrained salary may be unrealistic for reasons discussed in the introduction. In this section we consider the case where there is a ceiling on the manager's base salary, denoted by $\bar{\beta}$. Since the manager's salary is larger under the manager-designed contract, a meaningful case is where the salary constraint is binding only under the manager-designed contract. That is, we look at the case where $\beta_p > \bar{\beta} > \beta_a$. This is the only additional constraint to the manager's optimal contracting problem in (6). The manager's incentive compatibility constraint remains the same, leading to the same optimal effort function $e(\alpha)$ as before. Thus the manager's optimal contracting problem can be written as

$$\text{Maximize}_{a,b}\ U(a,b,e(a)) \ \text{ subject to } \ V(a,b,e(a)) \geq \bar{V} \ \text{ and } \ b \leq \bar{\beta}. \tag{9}$$

In this section we maintain the following assumption, which states that the manager's expected utility increases if he is given a larger share of the firm for free.

Assumption 1: $\frac{\partial U(\alpha,\beta,e)}{\partial \alpha} = \bar{y}(e) - r\alpha\sigma(e) > 0$ for all $\alpha \in [0,1]$ and e.

Denote the solution to problem (9) by (α_c, β_c, e_c) where $e_c = e(\alpha_c)$. The following lemma shows that both constraints are binding at the solution to (9).

Lemma 3: At the solution to (9), $\beta_c = \bar{\beta}$ and $V(\alpha_c, \beta_c, e_c) = \bar{V}$.

Proof: See Appendix A.

The above lemma suggests that, when the salary constraint limits the manager's ability to extract rent, the additional channel of stock-based compensation is used for full extraction of rent. Therefore the owner's (IR) is binding under the manager-designed contract with or without the salary constraint. The implication is that the salary constraint should increase the manager's stock-based compensation.

Proposition 4: Given the salary constraint $b \leq \bar{\beta} < \beta_p$, the manager's stock-based compensation is larger and the effort level is higher under the optimal manager-designed contract than those under the optimal manager-designed contract without the salary constraint. That is, $\alpha_c \geq \alpha_p$ and $e_c \geq e_p$.

Proof: See Appendix A.

Proposition 4 implies that, in the realistic case where the manager's salary has an upper bound, we are led to empirical predictions different from the ones in Corollary 2. First, the manager's stock-based compensation should be larger in firms where the manager has more power. This is because salary is no longer the vehicle through which the powerful manager can fully extract rent from the owner. Instead stock-based compensation is used as an additional channel for rent extraction. The manager awards himself more stock-based compensation when there is a salary ceiling, which increases his income risk and effort incentives. This implies that the manager exerts more effort, higher than the (second-best) optimal level, which translates into better firm performance when performance is measured in stock price. In addition, larger stock-based compensation for the manager implies that the pay-performance sensitivity of managerial contract should also be higher in firms where the manager has more power. On the other hand, this over-incentivization is detrimental to outside shareholders when performance is measured net of the manager's compensation.

Again we consider the bargaining game between the owner and the manager where the manager's bargaining power is represented by $\gamma \in [0, 1]$ and denote the solution by $(\alpha_\gamma, \beta_\gamma)$. If $\gamma = 1$, then the solution to the bargaining problem is $(\alpha_c, \bar{\beta})$ and, if $\gamma = 0$, then the solution is (α_a, β_a). Since $\alpha_c \geq \alpha_a$ and $\bar{\beta} > \beta_a$, both α_γ and β_γ are increasing in γ. Thus, unlike the case without salary constraint, the manager's stock-based compensation increases in managerial power. As before, let us define gross

firm performance as the expected stock price, $\bar{y}(e_\gamma)$, and net firm performance as the expected return to the owner, $V(\gamma) \equiv (1-\alpha_\gamma)\bar{y}(e_\gamma) - \beta_\gamma$. Then it it is immediate that gross firm performance and the manager's stock-based compensation are both increasing in managerial power. However, net firm performance decreases in managerial power as the following lemma shows.

Lemma 5: $V(\gamma) \equiv (1-\alpha_\gamma)\bar{y}(e_\gamma) - \beta_\gamma$ decreases in γ.

Proof: See Appendix A.

The discussions so far lead us to the following hypotheses.

Corollary 6: In firms where the manager's salary constraint is binding, (i) the size of the manager's stock-based compensation and the pay-performance sensitivity of management compensation increase in managerial power, (ii) firm performance gross of the manager's compensation increases in managerial power, and (iii) firm performance net of the manager's compensation decreases in managerial power.

4. Hypotheses, Regression Models and Variable Description

4.1. Summary of testable hypotheses

Our theoretical results of the previous section, Corollaries 2 and 6 in particular, lead us to several hypotheses regarding the relation among CEO power, CEO's stock-based compensation, and firm performance, depending on whether there is a constraint on the CEO's salary. The first step in our empirical analyses is to divide our sample of firms into two groups: those that perceive that there is no constraint on the CEO's salary and those that perceive that there is a constraint. As discussed earlier, the 1994 change in the tax treatment of executive compensation in the US allows us a natural experiment in which \$1 million can be considered as a threshold level of CEO's salary. Plotting CEOs' salary for S&P500 firms for our sample period of 2001-2005 produces Figure 1. As shown, the largest number of observations are around the salary band of \$0.95 - 1.05 million. Although this is not a definitive proof, one can reasonably argue that some firms do seem to perceive \$1 million as an important constraint.[19]

— Figure 1 goes about here. —

[19] Although our full sample covers S&P1500, the main empirical analyses are for the S&P500 subsample since the million dollar rule seems more meaningful for these firms.

Consequently we divide our sample of firms into two groups: those with the CEO's salary above $1 million, called the 'unconstrained' group, and those with the CEO's salary below $1 million, called the 'constrained' group. The firms in our 'constrained' group pay salaries less than $1 million either because their size limits the amount of salaries that can be paid or because they *perceive* that the salary constraint is important and, as a result, they do not violate the so-called 'outrage constraint'.[20] Thus our hypotheses are:

(H1) *The size of the CEO's stock-based compensation is independent of CEO power in the unconstrained group but increases in CEO power in the constrained group.*

(H2) *The pay-performance sensitivity of the CEO's stock-based compensation is independent of CEO power in the unconstrained group but increases in CEO power in the constrained group.*

(H3) *Gross firm performance is independent of CEO power in the unconstrained group but increases in CEO power in the constrained group.*

(H4) *Firm performance net of management compensation decreases in CEO power in both groups of firms.*

4.2. Description of variables

Central to our empirical analyses are the proxy variables for CEO power and the measurement of firm performance in gross as well as net terms. Following the existing studies reviewed in Section 2, we measure CEO power in relation to various governance mechanisms: board characteristics, ownership structure, and shareholder rights. As for firm performance, we choose the commonly used performance measures such as market value of equity, Tobin's Q, and accounting return on assets. One innovation of our paper is that we consider both gross and net performance measures, as will be detailed later. The definition of all the variables is given in Appendix B.

4.2.1. Measuring CEO power: board of directors

To measure CEO power based on board structure, we first consider the following five variables: (1) board size, which is the number of directors on the board; (2) duality, which is a dummy variable that equals one if the CEO also serves as the board chair,

[20] Note that firms paying strictly less than $1 million are perfectly consistent with our analysis because the compensation data we observe should show the weighted average of the two polar cases we have analyzed where the weight depends on CEO power. Unless the CEO has full bargaining power, salary can be less than $1 million, increasing continuously in CEO power. In the 'constrained' firm, the CEO's salary will be equal to $1 million only if the CEO has full bargaining power.

and 0 otherwise; (3) executive representation on the compensation committee, which is the percentage of executive directors on the compensation committee; (4) board independence, which is the proportion of directors who are independent; and (5) busy directors, which is the proportion of directors with bad attendance records (less than 75 percent attendance) according to the ExecuComp database.[21] While these original variables are informative of board structure, they are not in the same scale for construction of a composite variable used for our empirical analyses, nor do they reflect possible inter-industry differences.

We thus construct four additional indicator variables based on all but the duality variable so that all five variables assume values of 0 or 1: the indicator for board size equals 1 if board size is above the industry median, and 0 otherwise; the indicator for executive representation on the compensation committee equals 1 if at least one executive sits on the compensation committee, and 0 otherwise; the indicator for non-independent board equals 1 if the board does not have majority independent outside directors, and 0 otherwise; and the indicator for busy board equals 1 if the proportion of directors with bad attendance records is above industry median, and 0 otherwise. Consistent with the literature reviewed in Section 2, we posit that CEO power is larger if the board size is too big, if the CEO is also the board chair, if the CEO or the CEO's top lieutenants sit on the compensation committee, if fewer directors are independent, and if directors are too busy to properly monitor the firm. A CEO would have an original score between 0 (i.e. the least powerful CEO) and 5 (i.e. the most powerful CEO). Finally we form a single measure of CEO power, $Power\_BOD$, as the first principal component of these five indicators, whose value is scaled to lie between 0 and 1. $Power\_BOD$ is essentially a weighted average of the above five indicators, with 'optimal weights' determined through a principal component analysis, which takes into account the correlation (i.e. information redundancy) among the five variables.[22] We also consider an alternative single measure, $Power\_BOD2$, which is the equal-weighted average of these five indicators.

4.2.2. Measuring CEO power: concentrated ownership

To measure CEO power on the dimension of ownership concentration, we start with the following four variables: (1) CEO ownership, which is the CEO's percentage share

[21] We thank Paul Grout for suggesting this variable. In the previous draft of the paper, we measured busy directors based on the number of outside boards each non-executive director sits on. However, more outside board membership may reflect a director's superior ability rather than ineffectiveness to monitor CEOs.

[22] The first principal component explains 38 percent of total variation of the original five board variables.

ownership; (2) CEO voting, which is the CEO's percentage voting power; (3) director ownership, which is non-executive directors' percentage share ownership; and (4) institutional ownership, which is the percentage share ownership of the firm's institutional investors. Next we construct three indicators based on these four variables: the indicator for the ratio of CEO voting power to CEO ownership equals 1 if the CEO's voting power is at least 1.5 times his share ownership, and 0 otherwise;[(23)] the indicator for director ownership equals 1 if non-executive directors as a group hold shares less than the industry median, and 0 otherwise; and the indicator for institutional ownership equals 1 if institutional investors collectively hold shares less than the industry median, and 0 otherwise. We posit that CEO power is larger if the CEO has more voting power and if fewer blockholders exist to monitor the CEO. To mitigate the problem of multicollinearity, we again employ a principal component analysis and define the first principal factor as $Power\_OWN$, whose value is scaled to lie between 0 and 1.[(24)] As before, we also consider an alternative composite measure, $Power\_OWN2$, which is the equal-weighted average of these three indicators.

4.2.3. Measuring CEO power: shareholder rights

For the measurement of CEO power along the dimension of shareholder rights, we consider both the GIM-index created by Gompers, Ishii and Metrick (2003), and the BCF-index constructed by Bebchuk, Cohen and Ferrell (2009). The GIM-index is based on 24 firm-level anti-takeover provisions and the measures of officer and director protection. The BCF-index, based on only 6 out of the 24 provisions used in the GIM-index, includes four constitutional provisions that prevent a majority of shareholders from having their way, and two takeover readiness provisions that boards put in place to be ready for a hostile takeover. Bebchuk, Cohen and Ferrell find that this 'entrenchment index' fully drives the relation between the GIM-index and firm performance. One could argue that the BCF-index is a better proxy for CEO power than the more comprehensive GIM-index, which can be considered as a proxy for a firm's overall governance. We use both indices in this study. Our $Power\_BCF$ equals a firm's original BCF-index divided by 6, and our $Power\_GIM$ equals a firm's original GIM-index divided by 18.[(25)] Both measures thus also lie between 0 and 1. We posit that the CEO of a firm is more likely

(23) In our S&P1500 sample, the median voting-to-ownership ratio is about 1.5 for CEOs with both ownership and voting rights information. For those CEOs with only ownership information, we assume their voting rights are the same as their equity ownership in the firm.

(24) The first principal component alone explains 40 percent of total variation of the original three ownership variables.

(25) In our sample, the BCF-index ranges between 0 and 6 while GIM-index ranges between 2 and 18.

and able to influence the level and structure of his compensation package if the firm has more restrictions on investors and/or has a more entrenched executive team.

4.2.4. Firm performance measures

As we have argued previously, care should be taken in measuring firm performance. Some performance measures commonly used in the literature do not adequately account for the extent to which shareholder value is diluted by executives' stock-based compensation. As a consequence, they can exaggerate the incentive effects of CEO pay even though it can be detrimental to outside shareholders, suggesting that the distinction needs to be made between gross and net performance measures.

In distinguishing between gross and net performance measures, we need to calculate the value of compensation for the CEO (or a team of senior executives who can be reasonably regarded to exercise control over their own pay and significantly affect overall performance of the firm) in the current contractual period if it is not already reflected in the reported performance measure such as ROA or the available performance information such as stock price. For example, cash salary and bonus are subtracted from reported earnings but restricted stock or options are not often accounted for as expenses. The net performance measure should capture the value that accrues to only those shareholders existing at the time a new contract is offered to the CEO. What matters here is the value of stock-based compensation for the CEO during the current contractual period that is not already reflected in the performance measure. The net performance measure is derived after accounting for the value of such stock-based compensation. This does not mean, however, that the value of all stock-based compensation for the CEO should be accounted for. The CEO may already own shares or options in the beginning of a contractual period. For that portion of share ownership, the CEO should be legitimately considered to be one of the existing shareholders whose interest should be served just like any other shareholders.

Our first two performance measures are based on stock price. The net return to shareholders at time t is defined as:

$$NTSR_t = \frac{P_t \times Shares_{t-1} - P_{t-1} \times Shares_{t-1} + Dividend_t}{P_{t-1} \times Shares_{t-1}} \tag{10}$$

where P_t is stock price at time t, $Shares_{t-1}$ is the number of shares outstanding at time $t-1$, and $Dividend_t$ is the dollar value of dividend paid between time $t-1$ and t. This is the usual definition of total shareholder return (TSR) and only captures the change in the value of shares outstanding at time $t-1$. As this does not include any stock-based

compensation for the CEO newly awarded during the period, it is our net performance measure.

The next performance measure is Tobin's Q. As discussed earlier in relation to the findings by Garvey and Milbourn (2002), market value of equity does not fully reflect the dilution effect until stock options and restricted stock are vested and exercised. Thus Tobin's Q can be considered as a gross performance measure:

$$GAVQ_t = \frac{P_t \times Shares_t + Debt_t}{Asset_t}. \tag{11}$$

The last performance measure is return on assets (ROA). Since 2005, most firms are required to take an accounting charge for stock options granted to employees. During our sample period of 2001-2005, some firms do report separately the expenses related to employees' options using the fair value method, which would contaminate the interpretation of ROA. To identify the extent of this problem, we first use fair value of options granted during the year (Compustat variable OPTFVGR) as an indicator of whether a firm used the fair value method in reporting the adjusted income in a particular year. Virtually no sample firms reported OPTFVGR during 2001-2003. Given that these firms did not take accounting charges of options in reporting income, ROA can be considered as a gross performance measure. During 2004-2005, however, about 80 percent of our S&P500 sample firms reported OPTFVGR. For these firms, the reported income has taken into account option expenses. To be consistent with ROA for the 2001-2003 subsample and those firms that did not report OPTFVGR during 2004-2005, we need to make an adjustment to income for firms that reported OPTFVGR. Compustat variable XINTOPT represents the decrease in income attributed to the added expense of stock-based compensation that are not fully recognized on the income statement. Thus we add XINTOPT back to income, based on which ROA is calculated. This again gives us a gross performance measure for firms that reported OPTFVGR during 2004-2005. Thus our gross performance measure is

$$GROA_t = \frac{EBITDA_t}{Asset_t} \tag{12}$$

where $EBITDA_t$ is income for $t = 2001, 2002, 2003$ and, for $t = 2004, 2005$, income for firms that did not report OPTFVGR, and income plus XINTOPT for the remaining firms that reported OPTFVGR.

In sum, we have one net performance measure (NTSR) and two gross performance measures (GAVQ, GROA).

4.2.5. Instruments and control variables

The issue of endogeneity has been widely acknowledged in empirical corporate finance. To capture the endogenous nature of the relation among managerial power, firm performance, and CEO ownership, we use a system of simultaneous equations. Critical to the consistent estimation of the system of equations is the choice of instrumental variables. Following Bhagat and Bolton (2008), we construct three instrumental variables (IV) for power, performance, and CEO ownership: as an IV for CEO power, we use the percentage of directors who are currently active CEOs as a measure of network among CEOs; as an IV for firm performance, we use the ratio of stock repurchase to total assets as a measure of the CEO's perception of firm performance[(26)]; as an IV for CEO ownership, we use the ratio of CEO tenure to CEO age as a measure of CEO quality. In addition, we use the CEO's age as an instrument for the size of CEO's stock-based pay.

We control for firm-level variables that may affect the CEO's stock-based compensation, firm performance, and the relation between compensation and firm performance. These variables include (1) firm size, measured as logarithm of total sales (or total assets), (2) leverage, defined as the ratio of total liabilities to total assets, (3) growth, measured as the sales growth rate in the past three years, or growth opportunity measured as the market-to-book equity ratio, and (4) risk, measured as the standard deviation of stock returns over the previous 60 months.

4.3. Model specification

To test (H1), we first consider a simple multivariate regression model, in which the dependent variable is either the dollar value of CEO's stock-based compensation, or the value of CEO's stock-based compensation as a percentage of his total pay. Independent variables are measures of CEO power. We control for firm characteristics, industry fixed effects and time trends.

$$(Stock\_based\_Pay)_{i,t} = \alpha + \beta_0(Dmil)_{i,t} + \beta_1(Power)_{i,t}$$

$$+\beta_2(Dmil \times Power)_{i,t} + \ \beta_3(Controls)_{i,t} \tag{13}$$

where $Dmil$ is an indicator variable that equals one for the constrained group and zero for the unconstrained group. The extent to which CEO power affects his stock-based

(26) The idea is the same as that of Palia (2001) and Bhagat and Bolton (2008): a firm is most likely to buy back its shares when managers of the firm believe that its shares are underpriced. Bhagat and Bolton (2008) use the ratio of treasury stock to total assets as the instrument for performance.

compensation is measured by β_1 in the unconstrained group and $\beta_1+\beta_2$ in the constrained group.

To address potential endogeneity of the CEO's stock-based pay and managerial power, we also run a 2-stage least squares (2SLS): we first find the predicted values of the CEO's stock-based pay and CEO power using their respective instruments, after which we re-evaluate equation (16). Under (H1), we expect β_1 to be equal to zero and $\beta_1 + \beta_2$ to be positive.

To test (H2), we estimate the sensitivity of the change in the value of CEO's stock-based compensation to the change in shareholder value. This is similar to pay-performance sensitivity estimated by Jensen and Murphy (1990b) except that we use the value of CEO's stock-based compensation, instead of total compensation, as the dependent variable. We regress the change in the value of CEO's stock-based compensation on the change in shareholder value, interaction between CEO power and the change in shareholder value, and an additional interaction term to distinguish between the two groups of firms. We control for fixed effects.

$$\Delta(Stock\_based\_Pay)_{i,t} = \gamma \ + \ \delta_0(\Delta Shareholder\_Value)_{i,t}$$

$$+ \ \delta_1(Power \times \Delta Shareholder\_Value)_{i,t} + \delta_2(Dmil \times Power \times \Delta Shareholder\_Value)_{i,t} \tag{14}$$

where $(\Delta Shareholder\_Value)_t = (P_t - P_{t-1}) \times Shares_{t-1} + Dividend_t$ is the dollar value of returns to shareholders during period t and $Dmil$ is again the indicator variable that equals one for the constrained group and zero otherwise. $Power$ is a variable measuring CEO power, which ranges from 0 to 1. The pay-performance sensitivity for a firm in the unconstrained group equals $\delta_0 + \delta_1 \times Power$ where δ_1 represents the relation between the sensitivity coefficient and CEO power. Thus, in the unconstrained group, the pay-performance sensitivity for the least powerful CEO is δ_0 and that for the most powerful CEO is $\delta_0 + \delta_1$. Similarly, the pay-performance sensitivity for a firm in the constrained group equals $\delta_0 + (\delta_1 + \delta_2) \times Power$ with $\delta_1 + \delta_2$ representing the relation between the sensitivity and CEO power. Under (H2), we expect δ_1 to be equal to zero and $\delta_1 + \delta_2$ to be positive.

To test (H3) and (H4), we begin with a simple t-test on mean values of performance variables, both gross and net, between constrained and unconstrained groups. We then analyze the relation between performance and CEO power with the following system of simultaneous equations, similar to those in Bhagat and Bolton (2008):

$$Performance = f(Dmil, \ Power, \ Dmil \times Power, \ Ownership, \ Z_1, \ C_1),$$

$$Power = g(Performance,\ Ownership,\ Z_2,\ C_2),$$

$$Ownership = h(Performance,\ Power,\ Z_3,\ C_3) \tag{15}$$

where $Ownership$ represents the CEO's share ownership, Z_1, Z_2, Z_3 are instrumental variables, and C_1, C_2, C_3 represent firm-level control variables and industry fixed effects, all described in Section 4.2.5.

We estimate the system using a 2-stage least squares (2SLS) procedure. In the first stage, we estimate the endogenously determined CEO power, firm performance, and CEO ownership with their instruments. In the second stage, we regress dependent variables on the predicted values from the first stage, firm-level controls and fixed-effect variables. Within this system of equations, we focus on the performance equation, as we are interested in the impact of CEO power on firm performance. Under (H3), we expect the coefficient of CEO power on performance to be zero in the unconstrained group, and positive in the constrained group. Under (H4), we expect the coefficients to be negative in both groups of firms.

5. Data

Our sample consists of S&P1500 firms over the period of 2001-2005. We require all sample firms to be in the S&P1500 list in any of these years, to have CEO compensation data from the Compustat ExecuComp database,[(27)] and to have assets and market value data in the Compustat database over the sample period. According to ExecuComp, total compensation is measured as the sum of cash compensation including salary and cash bonus, stock-based compensation including restricted stock and stock options granted during the year, long-term incentive payments, and other compensation payout not separately disclosed anywhere else. We exclude firms in financial services (SIC 60-67) and utilities (SIC 49). We also exclude firms that are deemed as 'foreign' entities for tax purposes, classified using Compustat incorporation code, FINC.[(28)] Our sample includes a panel of 4,727 firm-year observations representing 1,036 different firms.

[(27)] The SEC expanded and enhanced disclosure rules for U.S. executives in 1992, with requirements on disclosing on stock ownership, stock options, and other compensation components for the top five corporate executives. Some perquisites and deferred payments, however, are not required for disclosure.

[(28)] Our argument here echoes that of Chhaocharia and Grinstein (2006). Companies deemed as 'foreign' entities for tax purposes are not subject to the US tax rules, including those regarding executive compensation. Within our S&P1500 sample, we identify 12 foreign companies based on Compustat incorporation code, FINC (FINC = 0 for US companies). Some of these companies, such as Nabors Industries and Tyco International, were US companies for business purposes but had renounced their US corporate citizenship and moved, on the paper, offshore for tax purposes. We exclude all 12 companies from our sample.

Table 1 provides descriptive statistics of our sample. Panel A summarizes salary, stock-based compensation and total compensation of CEOs in our sample. Since our main focus is on stock-based compensation with sample firms divided into two groups based on CEOs' salary, we do not report other components of CEO compensation such as bonus or long-term incentive payments. All figures in Panel A are skewed, consistent with existing empirical literature. The median total compensation (stock-based compensation, resp.) for CEOs increased from \$2.93 million (\$1.383, resp.) in 2001 to \$3.6 (\$1.547, resp.) million in 2005.

In Panel B we report CEO compensation separately for firms whose CEO salary is no more than \$1 million, and for firms whose CEO salary is above \$1 million. As discussed earlier, we call the first group of firms the 'constrained' group, and the second, the 'unconstrained' group. The constrained group accounts for 86% of our sample, or 4,055 firm-year observations from 924 different firms. In dollar terms, firms in the constrained group pay much less total and stock-based CEO compensation than those in the unconstrained group. As a percentage of total pay, however, firms in the constrained group pay more stock-based compensation than those in the unconstrained group. For small-cap firms, stock-based compensation as a percentage of total CEO compensation is 31% in the unconstrained group and 40% in the constrained group. For medium-size firms, it is 36% in the unconstrained group and 44% in the constrained group. For S&P500 firms, it is 53% in the unconstrained group and 54% in the constrained group.

Next, we observe that CEOs of S&P500 firms receive more total compensation than their counterparts in S&P SmallCap and S&P MediumCap firms. This echoes the well-documented positive relation between executive compensation and firm size when size is measured by market capitalization (e.g., Gabaix and Landier, 2008) or by accounting figures. In both groups of S&P 500 firms, the difference in total pay according to firm size is largely due to various incentive components including stock-based compensation, with salary contributing to only a small difference in total pay. The fact that the median salary is quite close \$1 million in the unconstrained group seems to suggest that a significant number of firms still perceive the \$1 million rule as an important factor to consider in designing their CEO compensation. Outright abuse of CEO power in extracting rent through salary seems to be an exception, rather than a rule.

— Table 1 goes about here. —

Table 2 reports the t-test results on CEO power measures related to board characteristics, ownership concentration, and shareholder rights. CEO power variables are extracted from the Investor Responsibility Research Center (IRRC), Board Analyst (now

Corporate Library), ExecuComp databases, and Professor Lucian Bebchuk's website.[29] However, shareholder rights scores such as the GIM-index and BCF-index are not available every year. Consistent with other studies such as Gompers, Ishii and Metrick (2003), we assume that, between any two available adjacent index scores, a firm's score is the simple average of these two.

The summary information offers a number of observations. First, firm size matters when it comes to board composition. Compared to small and medium-size firms, large firms tend to have larger and more independent boards, to be more likely to have combined CEO-chairs, and their outside directors tend to be busier and more likely to miss board meetings. These are consistent with the findings of Coles et al. (2008) that bigger (and complex) firms have larger boards with more outside directors. For small and medium-size firms, differences between the constrained and unconstrained groups in board characteristics are largely insignificant. For the S&P500 sub-sample, firms in the unconstrained group tend to have larger and more independent boards, and more likely to have CEOs also chairing the boards.[30] The above relation between firm size and board composition is reflected in the composite power index based on board composition. When CEO power is measured by $Power\_BOD$ or $Power\_BOD2$, the difference in CEO power between the constrained and unconstrained groups is largely insignificant for small and medium-size firms. For S&P500 firms, however, CEOs in the unconstrained group are more powerful than their counterparts in the constrained group.

Second, CEOs hold more voting rights than their cash flow rights, with an average voting-to-ownership ratio of roughly 1.5.[31] For small and medium-size firms, CEOs in the unconstrained group tend to hold more shares than those in the constrained group. Non-executive directors of S&P500 firms tend to own more shares in the unconstrained group. For small and medium-size firms, the differences in CEO voting rights, director ownership and institutional ownership between the two groups are largely insignificant. As a result, the difference in CEO power between the constrained and unconstrained groups is again insignificant for small and medium-size firms when CEO power is measured by $Power\_OWN$ or $Power\_OWN2$.

Third, for small and medium-size firms, there is little difference in CEO power

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[29] http://www.law.harvard.edu/faculty/bebchuk/data.shtml.

[30] Although not reported here, we also observe that US boards have become increasingly independent over time, with average percentage of executive directors on boards decreasing from 34.7% in 2001 to only 17.8% in 2005, average percentage of executives on compensation committees decreasing from 9.7% in 2001 to less than 0.1% in 2005. Such a trend is also reported in other studies such as Conyon (2006).

[31] We have information on the percentage of CEO voting rights for only 2,510 firm-year observations, roughly half of the total sample size. For the rest of firm-year observations of which we have information on CEO ownership, we assume that a CEO's voting power is the same as his equity ownership.

between the constrained and unconstrained groups when CEO power is measured by either indices of shareholder rights. For the S&P500 sub-sample, however, CEOs in the unconstrained group are more powerful than their counterparts in the constrained group when power is measured by the GIM-index.

In sum, Table 2 tells us that (1) for small and medium-size firms, there is little difference in CEO power between the constrained and unconstrained groups in all three composite indices of CEO power; (2) for the S&P500 sub-sample, CEOs of unconstrained group are more powerful than those in the constrained group when power is measured by $Power\_BOD$ and $Power\_GIM$, but less powerful when it is measured by $Power\_OWN$. Since $Power\_OWN$ is positively related to CEO ownership *ceteris paribus*, the latter is generally consistent with our story that, in the constrained group, powerful CEOs can use stock-based pay as an additional vehicle for rent extraction.

— Table 2 goes about here. —

Table 3 reports the gross and net performance measures and firm-level control variables, separately for the constrained and unconstrained groups, and across different size categories. All variables are constructed based on data obtained from the Compustat database. Compared to firms in the unconstrained group, those in the constrained group on average have lower accounting rates of return across all size categories, although the difference is insignificant for medium-size firms. When performance is measured in Tobin's Q or total shareholder return, S&P500 firms in the constrained group perform better in both measures while, for small and medium-size firms, there is little difference in performance between the constrained and unconstrained groups. In addition, firms in the constrained group are on average significantly smaller, with more volatile share prices, and have lower financial leverage.

— Table 3 goes about here. —

The general message from Tables 1-3 is the stark difference between the constrained and unconstrained groups of firms in CEO compensation, firm characteristics, firm performance in both accounting-based and market-based measures, and in CEO power reflected in the characteristics of their boards, ownership concentration and shareholder rights provisions. The difference is most pronounced and significant for the S&P500 subsample: firms in the unconstrained group pay their CEOs better both in total pay and in stock-based pay, although the proportion of stock-based pay is larger in the constrained group; CEOs in the unconstrained group are more powerful when power is measured by

board characteristics and shareholder rights provisions, although they are less so when power is measured by ownership concentration; firms in the unconstrained group perform better in accounting-based measures but not so in market-based measures; firms in the unconstrained group tend to be larger with less volatile share prices and higher financial leverage. For small and medium-size firms, the difference is often insignificant, largely due to the overwhelming presence of constrained group in these two sub-samples: 95% (99%, resp.) of S&P MediumCap (SmallCap, resp.) firms belongs to the constrained group. In the next section, we turn to our main empirical analyses, focusing only on the S&P500 sub-sample, which comprises 1,074 firm-year observations representing 350 different firms in the S&P500 index.

6. Main Findings

6.1. Do powerful CEOs receive larger stock-based compensation?

Our first hypothesis, (H1), is that the size of the CEO's stock-based compensation is independent of CEO power in the unconstrained group but increases in CEO power in the constrained group. To test (H1), we estimate equation (13). Table 4 reports the results of both OLS and 2SLS regression models of CEO's stock-based compensation on four different measures of CEO power, which are explained in Section 4.2. Panel A uses the level of stock-based compensation (measured in $1,000) as a dependent variable, while Panel B uses stock-based compensation as a percentage of total pay as a dependent variable. The key explanatory variables are the measure of CEO power whose coefficient is β_1 in equation (13), and the interaction term between *Dmil* and *Power* whose coefficient is β_2 in equation (13). (H1) implies $\beta_1 = 0$ and $\beta_1 + \beta_2 > 0$.

First, we observe that, after taking into account the effects of firm-level control variables and fixed effects, stock-based pay for CEOs in the two groups is similar both in dollar terms and as a percentage of their total compensation. This is reflected in the insignificant coefficients to *Dmil*.

Second, most results are consistent with the first part of (H1), $\beta_1 = 0$, whether stock-based pay is measured in dollar terms or as a percentage of total pay. After controlling for firm characteristics and fixed effects, the CEO's stock-based compensation is independent of CEO power in the unconstrained group. This is shown in Panel C: the regression coefficients to β_1 are all insignificant at the 5% level. The only exception is when CEO power is measured based on the GIM-index scores: stock-based pay decreases in CEO power. A possible explanation is that, as we argued previously, the GIM-index is

more a proxy for a firm's overall governance than a proxy for CEO power. Consequently one may interpret the negative relation between the CEO's stock-based pay and the GIM-index scores as reflecting the conventional agency theory: in firms with stronger governance (low GIM-index scores), CEOs tend to be provided with stronger incentives (more stock-based pay). With the BCF-index which we think is a better proxy for CEO power than the GIM-index, the relation between CEO power and the CEO's stock-based pay remains insignificant.

Third, we find weak support for the second part of (H1), $\beta_1 + \beta_2 > 0$. The regression coefficients are insignificant across all models when the dependent variable is the dollar amount of CEO's stock-based pay. With stock-based pay as a percentage of total compensation, we find only marginally significant results on $Power\_BOD$. This is shown in Panel C: the 2SLS result suggests that the most powerful CEO in the constrained group would receive 11.39 percent (p-value 0.053) more stock-based pay than the least powerful CEO in the same group. Given that the median value of CEO's total pay for our sample of S&P500 firms in the constrained group is around \$5.56 million, this difference corresponds to about \$633,000 in stock-based pay. Although the second part of (H1) does not have statistically significant support, our results indicate that the CEO's stock-based pay does increase more in CEO power in the constrained group than in the unconstrained group, i.e., $\beta_2 > 0$: when stock-based compensation is measured in dollar terms, the interaction term between $Power\_BOD$ and $Dmil$ is significantly positive; when stock-based compensation is measured as a percentage of total pay, the interaction term between $Power\_BCF$ and $Dmil$ is also positive and significant.

Finally, in both groups of firms, stock price volatility is positively related to the CEO's stock-based compensation, both in level and as a percentage of total pay. On the other hand, the CEO's existing share ownership is negatively related to subsequent stock-based pay he receives. A possible explanation is that, as the CEO's existing share ownership increases, additional stock-based pay provides less marginal (portfolio) incentives while imposing more risk on the CEO. There is also a positive and significant relation between firm growth and the CEO's stock-based pay, although the relation between firm size and the CEO's stock-based pay is more or less insignificant.

Overall, our results are different from those in Harzell and Starks (2003) and Conyon and He (2004). These authors found that less CEO power leads to more incentive-based compensation for CEOs, possibly because smaller CEO power implies a more effective role played by monitors such as institutional investors or the members of the compensation committee. More effective monitors would in turn make more use of incentive-based compensation. As our theoretical arguments demonstrated, however, it

is not rational for powerful CEOs to reduce their own incentives suboptimally if they can extract rent in an efficiency-neutral way. If the latter is not the case as in the constrained group of our sample, then CEO power can lead to more stock-based compensation as it can be used as an additional channel for rent extraction. In this sense, our results are consistent with Benz et al. (2001), Cyert et al. (2002) and Bebchuk and Grinstein (2005), who all found that CEO power is positively related to CEOs' stock-based compensation.

— Table 4 goes about here. —

6.2. Are powerful CEOs paid to perform?

Our second hypothesis, (H2), is that the pay-performance sensitivity of the CEO's stock-based compensation is independent of CEO power in the unconstrained group, but increases in CEO power in the constrained group. To test (H2), we estimate equation (14). Table 5 summarizes the OLS regression results.[32] The key explanatory variables are the interaction term between the measure of CEO power and the change in shareholder value, whose coefficient is δ_1 in equation (14), and the interaction term between $Dmil$ and the above variable, whose coefficient is δ_2 in equation (14). (H2) implies $\delta_1 = 0$ and $\delta_1 + \delta_2 > 0$. Consistent with the existing literature, we only control for fixed effects since firm-level control variables vanish on first-differencing.

We first observe that a CEO's stock-based compensation on average increases by 8.2 cents per thousand-dollar increase in shareholder value. In the constrained group, the pay-performance sensitivity is 20.1 cents per thousand dollars although, in the unconstrained group, the coefficient is insignificant. Pearson correlations, not reported here, also confirm a significantly positive (insignificantly negative, resp.) correlation between dollar change in CEO stock-based compensation and dollar change in shareholder value for the constrained (unconstrained, resp.) firms.

These pay-performance sensitivity estimates are not directly comparable to the widely cited estimates by Jensen and Murphy (1990b), where the pay-performance sensitivity varies from 3.29 cents (Table 1, p. 229) to \$2 (Table 2, p. 234) per thousand dollar increase in shareholder wealth. The former estimate is for CEO total pay that includes salary, bonus, value of restricted stock, and other benefits, while the latter estimate is for a broader definition of CEO wealth that includes additionally the value of stock held or controlled by the CEO and the value of stock options awarded during the period.[33]

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[32] To make interpretation easier, we scaled all the coefficients into dollar change in stock-based pay per thousand dollar change in shareholder value.

[33] The total pay-performance sensitivity in Jensen and Murphy (1999b), which includes additionally

Our estimates are based only on the value of CEO's stock-based compensation awarded during the period as reported in ExecuComp. While this would obviously underestimate the actual pay-performance sensitivity as shown by Hall and Liebman (1998), our focus is not on the estimation of the pay-performance sensitivity per se, but on whether CEO power affects it differently between the constrained and unconstrained groups.

Second, regression results are mostly consistent with (H2). Panel B shows that the relation between CEO power and the pay-performance sensitivity of his stock-based compensation is mostly insignificant in the unconstrained group, which is consistent with the first part of (H2). In the constrained group, the pay-performance sensitivity is positively related to CEO power in all measures of CEO power except $Power\_GIM$, which supports the second part of (H2). For example, when we measure CEO power using the BCF-index scores, the most powerful CEO's stock-based pay increases by \$1.06 more than that of the least powerful CEO in the constrained group.

— Table 5 goes about here. —

6.3. Are powerful CEOs better at improving firm performance?

Our final hypotheses, (H3) and (H4), concern the relation between firm performance and CEO power. First, when performance is measured in gross terms, firm performance should be independent of CEO power in the unconstrained group, but increase in CEO power in the constrained group. Second, when performance is measured net of executives' stock-based compensation, CEO power should lead to lower firm performance in both groups of firms. To test these hypotheses, we estimate the system of equations (15). Regression results are summarized in Table 6.

First, regression results on gross performance provide some support for (H3). In the unconstrained group, the relation between CEO power and gross firm performance is insignificant when performance is measured by GAVQ or GROA. In the constrained group, CEO power measured in terms of board composition is positively and significantly associated with GAVQ. Using this combination - $Power\_BOD$ and GAVQ - the most powerful CEO in the constrained group is associated with a 0.794 percentage point higher GAVQ than the least powerful CEO in the same group. When performance is measure by GROA, there is some indication of positive association between power and

incentives generated from the threat of dismissal, is \$3.25 for \$1,000 increase in shareholder wealth. Jensen and Murphy's estimates are much smaller than those from Hall and Liebman (1998), who found that large part of pay-performance sensitivity is explained by the value of stock and stock options awarded previously.

firm performance in the constrained group but the relation is not statistically significant at the conventional level.

Second, our results in Table 6 do not provide support for (H4), which examines the relation between CEO power and firm's net performance. When power is measured by *Power_BOD*, there is some indication of negative relation between CEO power and NTSR for both the unconstrained and constrained groups. But the coefficients are not significant. Moreover, there is even a positive association between net performance and CEO power when power is measured based on the BCF-index scores. A possible explanation could be that the scope of CEO power may need to be broadened to have better understanding of how CEO power affects firm performance. Our theoretical prediction was driven entirely based on one dimension of power, that is, the power the CEO has to influence his own pay. This was mainly to formalize the main tenet of the managerial power theory and put its implications under empirical scrutiny. Overall, our results on (H3) and (H4) suggest that the managerial power theory has limited relevance in explaining the relation between power and performance.

— Table 6 goes about here. —

6.4. Robustness checks

In this section, we check robustness of our results in Section 6.3 by performing additional tests. To save space, the results are not reported here, but available upon request from the authors.

6.4.1. Alternative measures of CEO power

In Tables 4-6, CEO power based on board characteristics is measured by the first principal component of the five indicator variables. Similarly CEO power based on ownership concentration is the first principal component of the three indicator variables. The main reason for using the first principal components was to avoid potential information redundancy. However, a possible criticism of this approach is potential loss of information. To address this, we used alternative power measures based on board characteristics and ownership concentration. Since *Power_BCF* and *Power_GIM* are both normalized simple counts of corporate provisions, we constructed *Power_BOD*2 and *Power_OWN*2 in the same way these counts are constructed. Specifically, we started with simple counts of the five indicators for board characteristics and the three indicators for ownership concentration, after which we normalized the counts by dividing them by 5

and 3, respectively. We re-ran all the regression models using these alternative measures of CEO power. Our main results remain qualitatively the same.

6.4.2. Contemporaneous performance and subsequent performance

Bhagat and Bolton (2008) document a positive relation between good corporate governance and the firm's subsequent operating performance. Our main empirical tests examined the relation between various measures of CEO power and contemporaneous firm performance. As a robustness check, we re-ran the regressions for (H3) and (H4) using firm performance measures of the following year as the dependent variable. We do not find significant difference from our main results.

6.4.3. Sub-sample effect

Our findings in Section 6.3 are based only on the S&P500 sub-sample. In the full S&P1500 sample we initially constructed, the constrained group consists of 73 percent of S&P500 firms and 96 percent of S&P MediumCap and S&P Smallcap firms. During the sample period of 2001-2005, the proportion of small and medium-size firms in the constrained group was more or less unchanged. But the proportion of large firms in the constrained group decreased noticeably from 73 percent in 2001 to 67 percent in 2005. This indicates that the dramatic increase in stock-based compensation might be predominately true for large firms. As a robustness check, we repeated all the analyses using the full S&P1500 sample. Again, our main results are qualitatively unchanged.

A second robustness check we performed along this line, related to Chhaocharia and Grinstein (2006), has to do with the potential bias associated with a firm's entry/exit in the sample. Excluding firms that are not in the sample over the entire five-year period reduces size of S&P500 sub-sample from 1,704 firm-year observations (350 different firms) to 1,650 observations (330 different firms). Our main results hold when we exclude these firms.

A third robustness check, again following Chhaocharia and Grinstein (2006), is related to the tightened disclosure regulation and governance standards in the second half of our sample period. The Sarbanes-Oxley Act came in effect in July 2002 and, in November 2003, both NYSE and NASDAQ introduced more stringent listing standards for corporate governance (on the dimension of board structure). In our main empirical tests, we control for year effects. As an alternative, we considered a dummy variable that equals one for years 2003 to 2005, and zero otherwise. Effectively, we examined potential structural changes post-SOX-regulation in comparison to pre-regulation. We

did not find strong indication that the introduction of tighter governance standards altered the relation between CEO power and their stock-based pay, or between CEO power and firm performance.(34)

6.4.4. Model specification and instruments

As discussed in Section 4.2.5, we control for the endogeneity issue by estimating a system of simultaneous equations with 2SLS models. We use the Hausman test to compare the 2SLS estimates with those from simple OLS models. Our test results are mixed: the 2SLS models are distinctly more efficient than the OLS models only half the time. However, given that endogeneity has been widely accepted in the literature, we still argue that the 2SLS models should be more robust than the OLS models. Three of our instrumental variables are based on Bhagat and Bolton (2008), and the first-stage F-statistics confirm that all these instruments are sufficiently strong.(35)

6.4.5. Non-linear risk measure

In our analysis, we have measured a firm's total risk by the standard deviation of stock returns over the previous 60 months, and used this as a firm-level control. This is consistent with existing empirical studies. To test whether our results are sensitive to non-linear risk measures, we also considered the logarithmic transformation of total risk.(36) This change has little impact on our main results, although the new risk measure is insignificant in most regression models.

7. Conclusion

This paper has studied theoretically and empirically the relation among CEO power, CEO compensation and firm performance. Our theoretical model is focused on one aspect of CEO power, namely, the power to affect one's own pay. Narrowing down the scope of CEO power in this way is to put in clearer perspectives some of the recent criticisms against CEO compensation and to critically examine the rent extraction view of CEO compensation put forward by the managerial power theory.

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(34) Our main results are somewhat changed from pre-regulation to post-regulation. However, we do not detect any general trend regarding whether CEO power has become more significantly associated with CEO pay or firm performance.

(35) We follow Bhagat and Bolton (2008) and compare the first-stage F-statistics to the critical value 9.53 of Stock and Yogo (2004). All our F-statistics are much larger than this critical value.

(36) We thank Ron Masulis for his comments on this issue.

The main theoretical results from this paper are that, although CEO power unambiguously leads to higher total pay for the CEO, it is the structure of the compensation contract that matters for firm performance, and that there needs to be a clear distinction between gross and net firm performance. Specifically the power-performance relation depends crucially on the channels - salary or stock-based pay in our model - through which the CEO can extract rent. Our first conclusion is that, when there is no constraint on the CEO's salary, both the size of the CEO's stock-based compensation and the pay-performance sensitivity of CEO pay are independent of CEO power. Power is efficiency-neutral in this case, only resulting in redistribution of rent from shareholders to the CEO. Because of rent extraction by the CEO, however, firm performance net of CEO pay would be worse in firms where the CEO has more power. Our second conclusion is that, when the CEO's salary has a binding cap, the CEO uses stock-based compensation as an additional channel for rent extraction. As a result, more CEO power leads to larger stock-based pay for the CEO and higher pay-performance sensitivity. While such over-incentivization leads to better firm performance gross of CEO pay, firm performance net of CEO pay is worse if the CEO has more power.

Our theoretical predictions on the relation between CEO power and CEO pay, and the relation between CEO power and pay-performance sensitivity of CEO's stock-base compensation are largely supported by our empirical findings for diverse measures of CEO power. However the predicted relation between CEO power and firm performance has mixed support: for some measures of CEO power and firm performance, more CEO power is shown to be detrimental to outside shareholders; for other measures, more CEO power is shown to improve return to outside shareholders. This suggests that, while the managerial power theory has clear relevance in explaining the relation between power and pay, the scope of power needs to be broadened to have better understanding of how CEO power affects firm performance.

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Appendix A

Proof of Lemma 3: We first show $\beta_c = \bar{\beta}$. Suppose $\beta_c < \bar{\beta}$. There are two cases to consider depending on the owner's (IR). First, suppose $V = \bar{V}$ and $\beta_c < \bar{\beta}$. Then the non-binding salary constraint and the binding (IR) imply that the solution to (9) must be equal to the solution to (6), the manager's optimal contracting problem without the salary constraint. But this is not possible since $\beta_p > \bar{\beta} > \beta_c$. Suppose next $V > \bar{V}$ and $\beta_c < \bar{\beta}$. Then the manager can increase his expected utility by increasing β_c without violating the owner's (IR). This implies that the solution to (9) cannot have $V > \bar{V}$ and $\beta_c < \bar{\beta}$. Combining these two, we conclude that $\beta_c = \bar{\beta}$.

Next we show that the owner's (IR) must be binding at the solution to (9). Using $\beta_c = \bar{\beta}$, we can rewrite (9) as

$$\text{Maximize}_a \; U(a, \bar{\beta}, e(a)) \;\; \text{subject to} \;\; V(a, \bar{\beta}, e(a)) \geq \bar{V}. \tag{A1}$$

with the Lagrangian $\mathcal{L}(a, \lambda) = U(a, \bar{\beta}, e(a)) + \lambda[V(a, \bar{\beta}, e(a)) - \bar{V}]$ where $\lambda \geq 0$. The first-order conditions for the Lagrangian are

$$\frac{\partial \mathcal{L}}{\partial a} = U_1 + U_3 e'(a) + \lambda[V_1 + V_3 e'(a)] = U_1 + \lambda[V_1 + V_3 e'(a)] = 0, \tag{A2}$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = V - \bar{V} \geq 0 \;\; \text{and} \;\; \lambda(V - \bar{V}) = 0 \tag{A3}$$

where the subscripts in (A2) denote partial derivatives with respect to the relevant arguments, and the second equality in (A2) follows from the manager's (IC). Suppose $V > \bar{V}$. Then from (A3), we must have $\lambda = 0$, which implies that (A2) is reduced to $\frac{\partial \mathcal{L}}{\partial a} = U_1 = 0$. This is not possible since $U_1 > 0$ by Assumption 1. Therefore we must have $V = \bar{V}$. Q.E.D.

Proof of Proposition 4: From Lemma 3, we have $V(\alpha_c, \bar{\beta}, e_c) = V(\alpha_c, 0, e_c) - \bar{\beta} = \bar{V}$ or $V(\alpha_c, 0, e_c) = \bar{V} + \bar{\beta}$. Without the salary constraint, we have $V(\alpha_p, \beta_p, e_p) =$

$V(\alpha_p, 0, e_p) - \beta_p = \bar{V}$ or $V(\alpha_p, 0, e_p) = \bar{V} + \beta_p$. Since $\beta_p > \bar{\beta}$, we have $V(\alpha_p, 0, e_p) > V(\alpha_c, 0, e_c)$. To show $\alpha_c \geq \alpha_p$, it is then sufficient to show that $V(\alpha, 0, e(\alpha))$ is a nonincreasing function of α in the neighborhood of α_p and α_c. Then we have $\alpha_c \geq \alpha_p$ since $V(\alpha, 0, e(\alpha))$ is concave in α, hence monotonic on the interval $[\alpha_p, \alpha_c]$.

Consider now the manager's optimal contracting problem (A1) in the proof of Lemma 3 where $\bar{\beta}$ is replaced by any β. Then the first-order condition (A2) can be written as

$$\begin{aligned} \frac{dV(\alpha_c, \beta, e(\alpha_c))}{d\alpha} &= V_1((\alpha_c, \beta, e(\alpha_c)) + V_3(\alpha_c, \beta, e(\alpha_c))e'(\alpha_c) \\ &= -\frac{U_1(\alpha_c, \beta, e(\alpha_c))}{\lambda} \leq 0 \end{aligned} \tag{A4}$$

for all β since $U_1 > 0$ by Assumption 1 and $\lambda \geq 0$. Since $\frac{dV(\alpha,0,e(\alpha))}{d\alpha} = \frac{dV(\alpha,\beta,e(\alpha))}{d\alpha}$ for all β, (A4) shows that $V(\alpha, 0, e(\alpha))$ is a nonincreasing function of α in the neighborhood of α_c. Next consider the manager's optimal contracting problem without the salary constraint, which is given in (6). Since the owner's (IR) is binding, the manager's objective function can be written as $U(a, b, e(a)) = U(a, 0, e(a)) + V(a, 0, e(a)) - \bar{V}$. Since α_p maximizes $U(a, b, e(a))$, we have $U_1 + U_3 e'(\alpha_p) + V_1 + V_3 e'(\alpha_p) = U_1 + V_1 + V_3 e'(\alpha_p) = 0$ where all derivatives are evaluated at α_p. This leads to $V_1 + V_3 e'(\alpha_p) = -U_1 < 0$, proving that $V(\alpha, 0, e(\alpha))$ is a nonincreasing function of α in the neighborhood of α_p.

Therefore $\alpha_c \geq \alpha_p$. Since $e(\cdot)$ is an increasing function of α, it follows that $e_c = e(\alpha_c) \geq e_a = e(\alpha_a)$. Q.E.D.

Proof of Lemma 5: Differentiating $V(\gamma) = V(\alpha_\gamma, \beta_\gamma, e(\alpha_\gamma)) = V(\alpha_\gamma, 0, e(\alpha_\gamma)) - \beta_\gamma$ with respect to γ leads to

$$\frac{dV(\gamma)}{d\gamma} = \left(\frac{dV(\alpha_\gamma, 0, e(\alpha_\gamma))}{d\alpha_\gamma}\right)\frac{d\alpha_\gamma}{d\gamma} - \frac{d\beta_\gamma}{d\gamma}. \tag{A5}$$

Following the similar step as in the proof of Proposition 4, it is easy to show that $V(\alpha, 0, e(\alpha))$ is a nonincreasing function of α in the neighborhood of α_a. Since $\alpha_\gamma \in [\alpha_a, \alpha_c]$ and $V(\alpha, 0, e(\alpha))$ is also nonincreasing in the neighborhood of α_c, $V(\alpha, 0, e(\alpha))$ is monotonic on the interval $[\alpha_a, \alpha_c]$ due to concavity. Since both $\frac{d\alpha_\gamma}{d\gamma}$ and $\frac{d\beta_\gamma}{d\gamma}$ are nonnegative, we must have $\frac{dV(\gamma)}{d\gamma} \leq 0$. Q.E.D.

Appendix B: Variable Definition

Variables	Definition
Compensation Variables	
Salary	Dollar value ('000) of of salary
Stock-based pay	Dollar value ('000) of stock-based pay, including restricted stock and stock options granted during the
Total pay	Dollar value ('000) of total compensation
Salary %	Percentage of total pay that is fixed salary
Stock %	Percentage of total pay that is stock-based
Performance Variables: Gross	
GAVQ	Gross average Q ratio: market value of assets over total assets
GROA	Gross return on assets: EBITDA over total assets for firms that did not report expenses related to stock-based compensation; EBITDA + XINTOPT (Compustat variable for implied expenses of stock-based compensation) over total assets for firms that reported expenses related to stock-based compensation
Performance Variables: Net	
NTSR	Net total shareholder return, change in market value of shares outstanding at the beginning of the year plus dividend paid, divided by market value of shares at the beginning of the year
CEO power determinants: Board of Directors	
Board size	Number of directors on the board
Duality	Dummy variable that equals 1 if the firm's CEO is also the board's chairperson, 0 otherwise
Exec. on Comp. Committee	Percentage of executive directors on the board's compensation committee
Board independence	Proportion of board directors who are independent
Busy directors	Proportion of board directors with less than 75% attendance record
Power_BOD	First principal component factor based on five indicator variables constructed from the above five
Power_BOD2	Sum of the five indicator variables, divided by 5
CEO power determinants: Ownership Concentration	
CEO ownership	CEO's percentage share ownership
CEO voting	CEO's percentage voting power
Director ownership	Non-executive director's percentage share ownership
Institutional ownership	Percentage share ownership of firm's institutional investors
Power_OWN	First principal component factor based on three indicator variables constructed from the above four
Power_OWN2	Sum of the three indicator variables, divided by 3
CEO power determinants: Shareholder rights	
Power_GIM	Gompers, Ishii & Metrick (2003) governance index score, divided by 18
Power_BCF	Bebchuk, Cohen & Ferrell (2009) entrenchment index score, divided by 6
Instruments	
IV for CEO power	Percentage of directors who are currently active CEOs
IV for firm performance	Ratio of stock repurchase to total assets
IV for CEO ownership	Ratio of CEO tenure to CEO age
IV for CEO stock-based pay	CEO age
Firm-level control variables	
Size	Logarithm of total sales
Size (alternative)	Logarithm of total assets
Leverage	Total debt over total assets
Risk	Standard deviation of stock prices over the previous 60 months
Growth	Sales growth rate over the past 3 years
Growth (alternative)	Market-to-book equity ratio to proxy for growth opportunity

Figure 1: Distribution of CEO Salary for S&P500 Firms

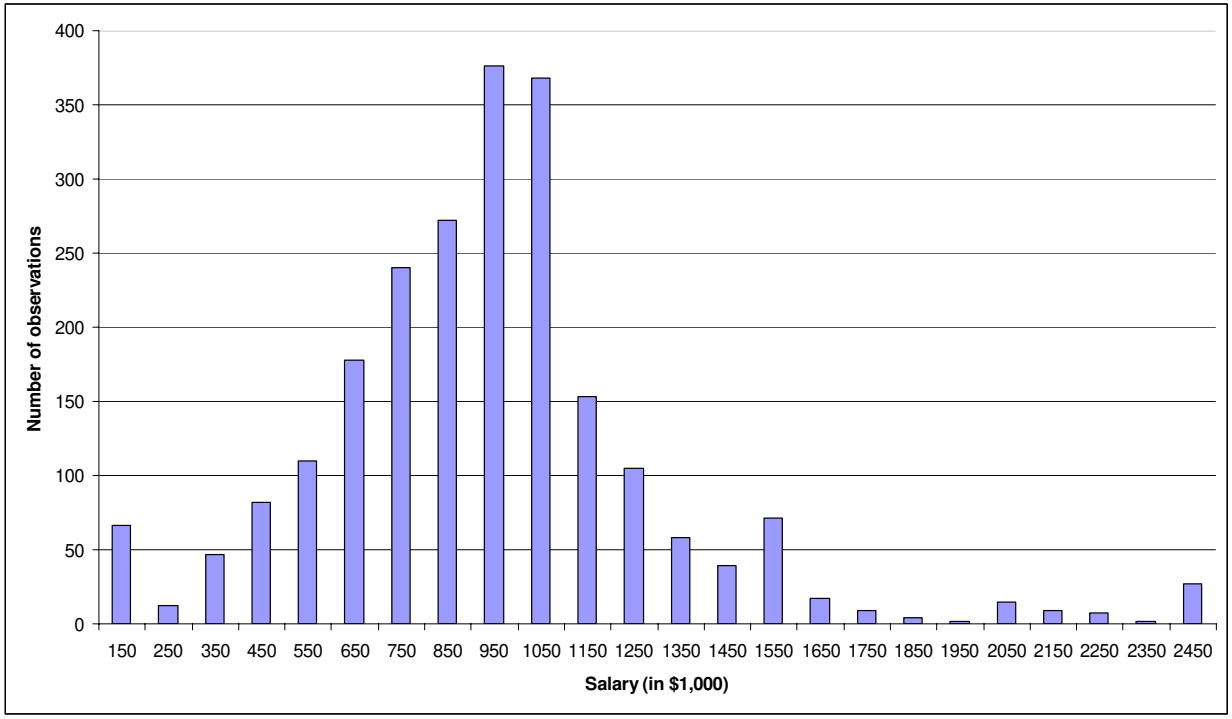

Table 1: Descriptive Statistics – CEO Compensation

The sample includes S&P1500 firms over the period of 2001-2005. CEO compensation data are extracted from the ExecuComp database. Total compensation includes salary, bonus, stock-based compensation including restricted stock and options granted, long-term incentive payments, and other compensation payout not separately reported anywhere else. In panel B, the sample is divided into two groups, those with CEO salary above $1 million (unconstrained group) and those with CEO salary below $1 million (constrained group).

Panel A: CEO compensation, all firms

			Salary		Stock-based Pay		Total Pay		Salary	Stock
Year	INDEX	OBS	Mean	Median	Mean	Median	Mean	Median	% of Total Pay	
2001	S&P1500	885	674	600	4,659	1,383	6,549	2,930	20%	47%
2002	S&P1500	906	690	631	3,394	1,294	5,289	2,915	22%	44%
2003	S&P1500	938	720	667	2,727	1,168	4,848	2,873	23%	41%
2004	S&P1500	970	740	690	3,173	1,502	5,592	3,427	20%	44%
2005	S&P1500	1028	762	700	3,117	1,547	5,762	3,600	19%	43%

Panel B: CEO compensation, by Group and by S&P Index

Unconstrained group			Salary		Stock-based Pay		Total Pay		Salary	Stock
Year	INDEX	OBS	Mean	Median	Mean	Median	Mean	Median	% of Total Pay	
2001	SM	2	1,046	1,046	1,095	1,095	3,928	3,928	27%	28%
2002	SM	4	1,122	1,119	1,557	691	3,551	3,141	36%	22%
2003	SM	5	1,123	1,100	1,225	1,116	3,374	3,037	36%	37%
2004	SM	7	1,227	1,140	1,496	678	3,901	2,803	41%	24%
2005	SM	9	1,139	1,055	2,695	2,368	5,421	5,366	20%	44%
Overall		**27**	**1,131**	**1,092**	**1,614**	**1,190**	**4,035**	**3,655**	**32%**	**31%**
2001	MD	10	1,521	1,186	2,818	2,709	14,740	6,497	18%	42%
2002	MD	14	1,412	1,300	4,312	2,120	11,719	6,686	19%	32%
2003	MD	17	1,372	1,237	3,398	2,241	10,594	7,976	16%	28%
2004	MD	18	1,374	1,250	4,033	2,887	10,683	7,580	16%	38%
2005	MD	22	1,503	1,165	5,236	3,896	11,893	9,705	12%	40%
Overall		**81**	**1,436**	**1,228**	**3,959**	**2,771**	**11,926**	**7,689**	**16%**	**36%**
2001	SP	92	1,385	1,238	5,805	5,112	15,820	11,141	11%	46%
2002	SP	97	1,358	1,250	8,459	6,162	13,290	9,949	13%	62%
2003	SP	106	1,391	1,240	5,923	5,282	11,301	9,847	13%	54%
2004	SP	131	1,366	1,224	6,579	5,691	11,805	10,438	12%	55%
2005	SP	138	1,417	1,249	6,624	4,991	12,906	10,092	12%	49%
Overall		**564**	**1,383**	**1,240**	**6,678**	**5,448**	**13,024**	**10,293**	**12%**	**53%**

Constrained group			Salary		Stock-based Pay		Total Pay		Salary	Stock
Year	INDEX	OBS	Mean	Median	Mean	Median	Mean	Median	% of Total Pay	
2001	SM	303	454	438	788	764	2,002	1,375	32%	56%
2002	SM	314	473	455	919	496	1,834	1,357	34%	37%
2003	SM	336	491	467	984	504	1,913	1,445	32%	35%
2004	SM	357	513	492	1,158	692	2,352	1,819	27%	38%
2005	SM	390	530	505	1,214	635	2,601	1,833	28%	35%
Overall		**1700**	**492**	**472**	**1,012**	**618**	**2,141**	**1,566**	**30%**	**40%**
2001	MD	235	584	575	2,616	1,257	3,928	2,502	23%	50%
2002	MD	236	599	600	2,151	1,238	3,671	2,892	21%	43%
2003	MD	239	640	654	1,571	1,063	3,115	2,522	26%	42%
2004	MD	245	647	651	2,012	1,467	3,872	3,256	20%	45%
2005	MD	260	664	676	2,139	1,454	4,075	3,441	20%	42%
Overall		**1215**	**627**	**631**	**2,098**	**1,296**	**3,732**	**2,923**	**22%**	**44%**
2001	SP	243	728	785	4,591	3,042	10,826	5,821	13%	52%
2002	SP	241	744	814	5,602	3,256	7,740	5,274	15%	62%
2003	SP	235	772	849	4,937	2,613	7,493	5,294	16%	49%
2004	SP	212	777	855	5,787	3,164	8,751	5,851	15%	54%
2005	SP	209	790	879	5,362	3,011	8,396	5,560	16%	54%
Overall		**1140**	**762**	**836**	**5,256**	**3,017**	**8,641**	**5,560**	**15%**	**54%**

Table 2: Measures of CEO Power

CEO power is measured in terms of board composition (*Power_BOD* and *Power_BOD2*), ownership concentration (*Power_OWN* and *Power_OWN2*), and shareholder rights (*Power_BCF* and *Power_GIM*). All data are sourced from Investor Responsibility Research Centre (IRRC), Board Analyst, and ExecuComp databases. The values of all three CEO power measures are scaled to range between 0 and 1, with 0 representing the least powerful CEO and 1, the most powerful CEO. The detailed definition of all the individual variables is in Appendix B.

Panel A: CEO power - board of directors

			Board Size		Board Independence		Exec. on Comp. Committee		Busy Directors		Duality	
Sub-sample	**INDEX**	**OBS**	**Mean**	**Stdev // t-value**	**Mean**	**Stdev // t-value**	**Mean**	**Stdev // t-value**	**Mean**	**Stdev // t-value**	**Mean**	**Stdev // t-value**
Constrained	SM	1700	8.017	1.81	0.651	0.18	0.776	0.42	0.084	0.27	0.492	0.50
Unconstrained	SM	27	8.333	1.65	0.603	0.17	0.852	0.22	0.020	0.16	0.429	0.51
t-test for mean difference			**-0.316**	**-0.83**	**0.049**	**1.25**	**-0.077**	**-1.94**	**0.064**	**1.90**	**0.063**	**0.58**
Constrained	MD	1215	8.820	2.03	0.662	0.18	0.797	0.40	0.126	0.33	0.593	0.49
Unconstrained	MD	81	9.690	2.35	0.625	0.18	0.730	0.45	0.064	0.25	0.565	0.50
t-test for mean difference			**-0.870**	**-2.85**	**0.037**	**1.51**	**0.066**	**1.15**	**0.062**	**1.91**	**0.029**	**0.45**
Constrained	SP	1140	9.819	2.34	0.672	0.19	0.782	0.41	0.140	0.35	0.622	0.49
Unconstrained	SP	564	11.282	2.09	0.720	0.17	0.810	0.39	0.126	0.33	0.775	0.42
t-test for mean difference			**-1.463**	**-11.89**	**-0.048**	**-4.88**	**-0.028**	**-1.28**	**0.014**	**0.78**	**-0.153**	**6.36**

Table 2: Measures of CEO Power (continued)

Panel B: CEO Power - ownership concentration & governance scores

			CEO ownership		CEO voting rights		Director ownership		Institutional ownership	
Sub-sample	**INDEX**	**OBS**	**Mean**	**Stdev // t-value**	**Mean**	**Stdev // t-value**	**Mean**	**Stdev // t-value**	**Mean**	**Stdev // t-value**
Constrained	SM	1700	2.914	6.97	4.580	10.31	9.814	13.97	60.880	26.09
Unconstrained	SM	27	7.099	10.14	8.413	10.09	7.469	9.66	59.010	33.33
t-test for mean difference			**-4.185**	**-2.14**	**-3.833**	**-1.92**	**2.345**	**0.87**	**1.870**	**0.29**
Constrained	MD	1215	2.778	6.83	4.183	10.09	9.306	13.34	61.326	27.42
Unconstrained	MD	81	4.758	9.22	8.322	17.50	13.149	19.58	59.892	28.59
t-test for mean difference			**-1.980**	**-1.90**	**-4.139**	**-2.10**	**-3.843**	**-1.74**	**1.434**	**0.39**
Constrained	SP	1140	1.026	3.58	1.814	5.93	8.436	13.19	60.190	26.84
Unconstrained	SP	564	0.872	4.38	1.378	5.81	5.937	10.89	62.102	25.62
t-test for mean difference			**0.154**	**0.78**	**0.436**	**1.39**	**2.499**	**3.75**	**-1.912**	**-1.35**

			Power_BOD		Power_OWN		Power_BCF		Power_GIM	
Sub-sample	**INDEX**	**OBS**	**Mean**	**Stdev // t-value**	**Mean**	**Stdev // t-value**	**Mean**	**Stdev // t-value**	**Mean**	**Stdev // t-value**
Constrained	SM	1700	0.278	0.24	0.392	0.32	0.419	0.21	0.502	0.14
Unconstrained	SM	27	0.203	0.24	0.352	0.28	0.435	0.23	0.484	0.14
t-test for mean difference			**0.075**	**1.60**	**0.040**	**0.66**	**-0.016**	**-0.36**	**0.018**	**0.59**
Constrained	MD	1215	0.354	0.27	0.382	0.30	0.423	0.19	0.519	0.14
Unconstrained	MD	81	0.308	0.25	0.362	0.32	0.464	0.15	0.544	0.14
t-test for mean difference			**0.046**	**1.50**	**0.020**	**0.55**	**-0.041**	**-1.65**	**-0.025**	**-1.35**
Constrained	SP	1140	0.425	0.28	0.288	0.27	0.403	0.22	0.533	0.14
Unconstrained	SP	564	0.525	0.27	0.242	0.26	0.388	0.22	0.557	0.13
t-test for mean difference			**-0.100**	**-6.95**	**0.046**	**3.40**	**0.015**	**1.24**	**-0.024**	**-3.30**

			Power_BOD2		Power_OWN2	
Sub-sample	**INDEX**	**OBS**	**Mean**	**Stdev // t-value**	**Mean**	**Stdev // t-value**
Constrained	SM	1700	0.239	0.20	0.388	0.31
Unconstrained	SM	27	0.206	0.19	0.358	0.29
t-test for mean difference			**0.033**	**0.67**	**0.030**	**0.50**
Constrained	MD	1215	0.300	0.22	0.390	0.30
Unconstrained	MD	81	0.264	0.22	0.354	0.30
t-test for mean difference			**0.036**	**1.41**	**0.036**	**1.05**
Constrained	SP	1140	0.360	0.23	0.308	0.27
Unconstrained	SP	564	0.432	0.22	0.264	0.27
t-test for mean difference			**-0.071**	**-6.06**	**0.044**	**3.17**

Table 3: Firm Performance Measures and Control Variables

Gross firm performance is measured by Tobin's Q (GAVQ) and return on assets (GROA) while net performance is measured by total shareholder return (NTSR). Control variables are firm size measured as logarithm of total sales or assets, leverage, growth measured as the sales growth rate over the past 3 years, growth opportunity measured as market-to-book-ratio of equity, and risk measured as the standard deviation of stock returns over the previous 60 months.

Panel A: Firm performance measures

			GROA		GAVQ		NTSR	
Sub-sample	**INDEX**	**OBS**	**Mean // diff.**	**Stdev // t-value**	**Mean // diff.**	**Stdev // t-value**	**Mean // diff.**	**Stdev // t-value**
Constrained	SM	1700	7.278	10.63	2.030	2.26	16.608	40.50
Unconstrained	SM	27	10.713	8.23	1.538	0.95	12.717	27.91
t-test for mean difference			**-3.435**	**-1.81**	**0.493**	**2.14**	**3.891**	**0.58**
Constrained	MD	1215	8.780	10.14	2.519	2.74	21.615	33.98
Unconstrained	MD	81	9.459	9.98	2.817	3.22	15.712	35.08
t-test for mean difference			**-0.679**	**-0.56**	**-0.298**	**-0.61**	**5.903**	**-1.35**
Constrained	SP	1167	10.171	10.68	3.149	3.73	13.327	31.04
Unconstrained	SP	581	10.937	9.67	2.238	2.87	9.318	23.79
t-test for mean difference			**-0.766**	**-0.72**	**0.912**	**4.74**	**4.009**	**2.63**

Table 3: Firm Performance Measures and Control Variables (continued)

Panel B: Firm-level control variables

Sub-sample	INDEX	OBS	Size (Log_assets) Mean // diff.	Size (Log_assets) Stdev // t-value	Size (Log_sales) Mean // diff.	Size (Log_sales) Stdev // t-value	Risk Mean // diff.	Risk Stdev // t-value	Leverage Mean // diff.	Leverage Stdev // t-value	Growth rate Mean // diff.	Growth rate Stdev // t-value	Growth opportunities Mean // diff.	Growth opportunities Stdev // t-value
Constrained	SM	1700	6.379	1.00	6.217	1.03	37.929	28.30	42.440	19.88	9.990	16.90	8.145	29.64
Unconstrained	SM	27	7.188	0.72	7.201	0.64	25.000	27.18	45.020	16.84	14.150	27.31	5.791	14.43
t-test for mean difference			**-0.809**	**-3.32**	**-0.984**	**-4.17**	**12.929**	**2.36**	**-2.580**	**-0.65**	**-4.160**	**-0.66**	**2.354**	**0.69**
Constrained	MD	1215	7.523	1.01	7.110	0.90	35.940	25.74	48.450	19.90	11.174	17.87	11.545	28.27
Unconstrained	MD	81	8.226	0.73	7.989	0.77	25.950	22.67	60.978	13.16	13.411	13.92	11.742	33.58
t-test for mean difference			**-0.703**	**-5.50**	**-0.879**	**-7.73**	**9.990**	**3.81**	**-12.528**	**-5.01**	**-2.237**	**-0.99**	**-0.197**	**0.05**
Constrained	SP	1167	8.321	1.31	8.313	1.00	35.690	24.61	52.590	20.52	11.721	19.60	19.460	49.23
Unconstrained	SP	581	9.995	1.02	9.539	1.05	27.399	18.05	61.499	16.34	9.387	14.98	23.780	64.07
t-test for mean difference			**-1.674**	**-22.11**	**-1.226**	**-22.40**	**8.291**	**7.11**	**-8.909**	**-9.52**	**2.334**	**2.45**	**-4.320**	**-1.35**

Panel C: Pearson correlation coefficients

	GROA	GAVQ	NTSR	Power_BOD	Power_OWN	Power_BCF	Power_GIM
GROA	**1.000**	**0.144**	**0.109**	**0.078**	-0.024	-0.018	0.017
GAVQ		**1.000**	**0.131**	**0.040**	-0.027	**-0.033**	-0.001
NTSR			**1.000**	**-0.054**	0.024	**0.045**	-0.002
Power_BOD				**1.000**	**0.130**	**0.154**	**0.236**
Power_OWN					**1.000**	**0.038**	**-0.039**
Power_BCF						**1.000**	**0.745**
Power_GIM							**1.000**

	Size_s	Risk	Leverage	Growth	Opportunity
Size_s	**1.000**	**-0.257**	**0.499**	-0.003	**0.087**
Risk		**1.000**	**-0.177**	**-0.043**	**0.033**
Leverage			**1.000**	**-0.127**	**0.034**
Growth				**1.000**	**0.035**
Opportunity					**1.000**

Table 4: Stock-based Compensation and CEO Power

Regression results of Hypothesis 1, or equation (13), are reported, showing the potential impact of CEO power on the CEO's stock-based compensation. The dependent variable is either the dollar value of CEO's stock-based pay, or stock-based pay as a percentage of total compensation. In the 2-stage least squares (2SLS) models, CEO age is used as an instrument for CEO's stock-based pay, and only the 2nd stage results are reported. For the unconstrained group, the coefficient for *Power* is β_1 in equation (18) and, for the constrained group, it is the sum of the coefficients for *Power* and *Dmil*Power*, or $\beta_1 + \beta_2$ in equation (13). In Panels A and B, regression coefficients and respective p-values are reported. In Panel C, β_1 and $\beta_1 + \beta_2$ and respective p-values are reported for Hypothesis 1: $\beta_1 = 0$, $\beta_1 + \beta_2 > 0$. Coefficients significant at the 5% level are highlighted in bold.

Panel A: Dollar value of CEO stock-based pay

	OLS (1)	2SLS (1)	OLS (2)	2SLS (2)	OLS (3)	2SLS (3)	OLS (4)	2SLS (4)
Dmil	-204.2	-337.4	-1971.5	-1882.9	-324.5	-516.9	879.7	1173.5
	0.86	0.71	0.20	0.21	0.79	0.57	0.66	0.61
Power_BOD	-2188.8	-2008.2						
	0.06	0.06						
Power_BOD * Dmil	**2239.8**	**2846.8**						
	0.05	0.02						
Power_OWN			-2117.8	-3908.0				
			0.08	0.34				
Power_OWN * Dmil			2962.0	1011.4				
			0.07	0.31				
Power_BCF					-2058.0	-2932.5		
					0.20	0.05		
Power_BCF * Dmil					1283.0	1334.8		
					0.80	0.39		
Power_GIM							**-5405.3**	**-5381.4**
							0.01	0.02
Power_GIM * Dmil							3866.2	4295.5
							0.25	0.23
Lag (CEO ownership)	**-170.0**	**-169.7**	-131.1	-130.7	**-184.4**	**-183.0**	**-194.1**	**-196.2**
	0.00	0.02	0.07	0.07	0.03	0.02	0.01	0.02
Firm Size	307.6	435.7	241.2	392.8	522.3	275.9	224.0	321.7
	0.20	0.06	0.30	0.10	0.11	0.25	0.31	0.18
Firm Risk	**26.8**	**28.6**	**28.0**	**31.9**	**27.2**	**28.7**	**25.2**	**26.8**
	0.03	0.01	0.03	0.01	0.04	0.03	0.04	0.02
Firm Growth	**86.0**	**82.0**	**83.2**	**85.6**	**98.6**	**103.0**	**94.7**	**96.6**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.114	0.113	0.103	0.112	0.113	0.113	0.113	0.110
Sample size	1280		1280		1223		1223	

Panel B: Stock-based pay as % of total pay

	OLS (1)	2SLS (1)	OLS (2)	2SLS (2)	OLS (3)	2SLS (3)	OLS (4)	2SLS (4)
Dmil	3.954	5.884	3.477	3.565	5.338	5.577	6.958	6.436
	0.28	0.08	0.84	0.08	0.54	0.13	0.35	0.38
Power_BOD	1.555	3.118						
	0.43	0.37						
Power_BOD * Dmil	5.660	8.276						
	0.25	0.11						
Power_OWN			-8.593	-9.575				
			0.11	0.07				
Power_OWN * Dmil			0.548	1.818				
			0.92	0.42				
Power_BCF					-4.701	-6.369		
					0.22	0.10		
Power_BCF * Dmil					5.444	**8.558**		
					0.13	0.04		
Power_GIM							**-10.379**	**-13.739**
							0.03	0.00
Power_GIM * Dmil							5.540	10.393
							0.53	0.22
Lag (CEO ownership)	**-0.787**	**-1.080**	**-0.809**	**-1.081**	**-0.806**	**-1.129**	**-0.868**	**-1.144**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Firm Size	-0.168	-1.440	**-1.789**	**-1.702**	-0.102	-0.661	-0.125	-0.728
	0.85	0.05	0.04	0.02	0.91	0.70	0.83	0.53
Firm Risk	**0.087**	**0.115**	**0.094**	**0.145**	**0.098**	**0.111**	**0.092**	**0.099**
	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.02
Firm Growth	**0.141**	**0.124**	**0.143**	**0.134**	**0.151**	**0.123**	**0.136**	**0.110**
	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.03
Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	0.105	0.103	0.103	0.103	0.105	0.103	0.105	0.104
Sample size	1278		1278		1222		1222	

Panel C: Coefficient estimate for power for constrained and unconstrained groups

	P_BOD	P_BOD	P_OWN	P_OWN	P_BCF	P_BCF	P_GIM	P_GIM
Unconstrained (β1)	-2188.8	-2008.2	-2117.8	-3908.0	-2058.0	-2932.5	**-5405.3**	**-5381.4**
p-value for 2-tailed test	0.061	0.062	0.077	0.340	0.203	0.054	0.010	0.020
Constrained (β1+β2)	51.0	838.6	844.2	-2896.7	-775.0	-1597.7	-1539.1	-1085.9
p-value for 1-tailed test	0.487	0.194	0.308	0.441	0.231	0.195	0.352	0.360

	P_BOD	P_BOD	P_OWN	P_OWN	P_BCF	P_BCF	P_GIM	P_GIM
Unconstrained (β1)	1.555	3.118	-8.593	-9.575	-4.701	-6.369	**-10.379**	**-13.739**
p-value for 2-tailed test	0.430	0.369	0.106	0.072	0.222	0.104	0.033	0.001
Constrained (β1+β2)	7.215	11.394	-8.045	-7.757	0.743	2.189	-4.839	-3.346
p-value for 1-tailed test	0.108	0.053	0.119	0.157	0.306	0.324	0.324	0.338

Table 5: Pay-performance Sensitivity of Stock-based Compensation

Regression results of Hypothesis 2, or equation (14), are reported, showing the relation between CEO power and the pay-performance sensitivity of the CEO's stock-based compensation. The dependent variable is the change in the dollar value of stock-based compensation. In equation (14), the pay-performance sensitivity is $\delta_0 + \delta_1$ for the unconstrained group and $\delta_0 + \delta_1 + \delta_2$ for the constrained group. The coefficient for Power is δ_1 for the unconstrained group and, for the constrained group, it is the sum of the coefficients for *Power* and *Dmil*Power*, or $\delta_1 + \delta_2$. In Panel A, regression coefficients and associated p-values are reported. In Panel B, δ_1 and $\delta_1 + \delta_2$ and respective p-values are reported for Hypothesis 2: $\delta_1 = 0$, $\delta_1 + \delta_2 > 0$. Coefficients significant at the 5% level are highlighted in bold.

Panel A: Dependent variable - dollar change in the CEO's stock-based pay

	Overall	Separate	OLS (1)	OLS (2)	OLS (3)	OLS (4)
$ Change in Mkt value	**0.082**	0.004	**0.193**	**0.084**	-0.035	-0.085
	0.01	0.92	0.00	0.02	0.37	0.49
Dmil * $ Change in Mkt value		**0.201**				
		0.00				
Power_BOD * $ Change in Mkt value			0.267			
			0.12			
Dmil * Power_BOD * $ Change in Mkt value			0.089			
			0.49			
Power_OWN * $ Change in Mkt value				-0.244		
				0.31		
Dmil * Power_OWN * $ Change in Mkt value				**0.675**		
				0.03		
Power_BCF * $ Change in Mkt value					0.239	
					0.22	
Dmil * Power_BCF * $ Change in Mkt value					**0.823**	
					0.01	
Power_GIM * $ Change in Mkt value						0.207
						0.43
Dmil * Power_GIM * $ Change in Mkt value						0.089
						0.48
Fixed Effects	YES	YES	YES	YES	YES	YES
Adjusted R-squared	0.102	0.101	0.101	0.101	0.101	0.100
Sample size	1353		1282	1282	1278	1278

Panel B: Coefficient estimates for power for the constrained and unconstrained groups

			P_BOD	P_OWN	P_BCF	P_GIM
Unconstrained (δ_1)			0.267	-0.244	0.239	0.207
p-value for 2-tailed test			0.117	0.314	0.217	0.431
Constrained ($\delta_1 + \delta_2$)			**0.356**	**0.431**	**1.062**	0.296
p-value for 1-tailed test			0.027	0.030	0.000	0.117

Table 6: Firm Performance and CEO Power

Regression results of Hypotheses 3 and 4, or equations (15), are reported, showing the potential impact of CEO power on firm performance. Dependent variables are gross or net performance measures including Tobin's Q ratio (GAVQ), accounting rate of return (GROA), and net total shareholder return (NTSR). Main independent variables are *Dmil*, an indicator that equals 1 for firms in the constrained group, and 0 otherwise; four measures of CEO power; and the interaction terms of *Dmil* and the measures of CEO power. In the 2SLS models, the ratio of stock repurchase to total assets is used as an instrument for firm performance and only the 2nd stage results are reported. For the unconstrained group, the coefficient relevant for Hypotheses 3 and 4 is that for *Power* and, for the constrained group, it is the sum of the coefficients for *Power* and *Power*Dmil*. Panel C reports these coefficients and their respective p-values. Coefficients significant at the 5% level are highlighted in bold.

Panel A: Dependent variable: GAVQ

	OLS (1)	2SLS (1)	OLS (2)	2SLS (2)	OLS (3)	2SLS (3)	OLS (4)	2SLS (4)
Dmil	**0.731**	**0.785**	0.247	0.199	-0.103	-0.154	-0.697	-0.512
	0.04	0.02	0.33	0.40	0.79	0.67	0.36	0.47
Power_BOD	-0.325	-0.401						
	0.33	0.21						
Power_BOD * Dmil	**1.174**	**1.195**						
	0.02	0.05						
Power_OWN			0.378	0.478				
			0.24	0.13				
Power_OWN * Dmil			0.187	0.028				
			0.74	0.91				
Power_BCF					0.332	0.613		
					0.47	0.15		
Power_BCF * Dmil					-0.168	-0.499		
					0.83	0.52		
Power_GIM							0.735	0.530
							0.30	0.42
Power_GIM * Dmil							-0.310	-0.710
							0.83	0.70
CEO Ownership	-0.019	-0.007	-0.019	-0.008	-0.019	-0.008	-0.018	-0.009
	0.38	0.73	0.37	0.71	0.40	0.69	0.44	0.70
Firm Size	-0.115	-0.116	-0.074	-0.086	-0.073	-0.060	-0.084	-0.077
	0.20	0.13	0.42	0.27	0.44	0.46	0.37	0.33
Firm Risk	0.006	0.003	0.006	0.003	**0.009**	**0.008**	**0.009**	0.007
	0.10	0.31	0.10	0.31	0.02	0.05	0.01	0.06
Firm Growth	**0.111**	**0.110**	**0.110**	**0.110**	**0.113**	**0.112**	**0.113**	**0.112**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Firm Leverage	**-0.045**	**-0.045**	**-0.047**	**-0.046**	**-0.045**	**-0.045**	**-0.046**	**-0.044**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Adjusted R-squared	0.446	0.428	0.436	0.428	0.461	0.440	0.463	0.440
Sample size	1400		1400		1303		1303	

Panel B: Coefficient estimates for Power for the constrained and unconstrained groups

	P_BOD	P_BOD	P_OWN	P_OWN	P_BCF	P_BCF	P_GIM	P_GIM
Unconstrained	-0.325	-0.401	0.378	0.478	0.332	0.613	0.735	0.530
p-value for 2-tailed test	0.328	0.210	0.240	0.126	0.470	0.146	0.298	0.422
Constrained	**0.849**	**0.794**	0.565	0.506	0.164	0.114	0.425	-0.180
p-value for 1-tailed test	0.022	0.024	0.116	0.133	0.404	0.441	0.150	0.389

Table 6: Firm Performance and CEO Power (continued)

Panel A: Dependent variable: GROA

	OLS (1)	2SLS (1)	OLS (2)	2SLS (2)	OLS (3)	2SLS (3)	OLS (4)	2SLS (4)
Dmil	1.086	1.125	1.236	-0.238	-0.641	-0.926	-1.372	-2.044
	0.24	0.20	0.06	0.24	0.54	0.38	0.50	0.13
Power_BOD	-0.065	-2.063						
	0.94	0.10						
Power_BOD * Dmil	1.749	2.872						
	0.26	0.07						
Power_OWN			-0.220	-0.850				
			0.80	0.53				
Power_OWN * Dmil			**3.643**	**2.659**				
			0.02	0.05				
Power_BCF					-0.963	-1.723		
					0.12	0.07		
Power_BCF * Dmil					1.385	0.285		
					0.51	0.90		
Power_GIM							2.972	2.133
							0.12	0.71
Power_GIM * Dmil							-2.560	-1.759
							0.15	0.37
CEO Ownership	0.068	0.101	0.091	0.119	0.073	0.093	0.089	0.109
	0.21	0.08	0.11	0.11	0.20	0.11	0.12	0.07
Firm Size	-0.090	**-0.813**	**-0.715**	**0.715**	-0.139	**-0.766**	-0.080	-0.612
	0.70	0.00	0.00	0.00	0.58	0.00	0.75	0.17
Firm Risk	**-0.077**	**-0.091**	**-0.077**	**-0.090**	**-0.078**	**-0.081**	**-0.075**	**-0.088**
	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00
Firm Growth	**0.005**	**0.005**	**0.004**	**0.006**	**0.004**	0.005	0.004	**0.005**
	0.00	0.00	0.00	0.00	0.01	0.11	0.06	0.00
Firm Leverage	**-0.058**	**-0.058**	**-0.057**	**-0.058**	**-0.067**	**-0.062**	**-0.074**	**-0.068**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Adjusted R-squared	0.124	0.130	0.127	0.130	0.131	0.134	0.131	0.134
Sample size	1501		1501		1393		1393	

Panel B: Coefficient estimates for Power for the constrained and unconstrained groups

	P_BOD	P_BOD	P_OWN	P_OWN	P_BCF	P_BCF	P_GIM	P_GIM
Unconstrained	-0.065	-2.063	-0.220	-0.850	-0.963	-1.723	2.972	2.133
p-value for 2-tailed test	0.942	0.102	0.800	0.533	0.119	0.074	0.122	0.714
Constrained	1.683	0.809	3.423	1.809	0.422	-1.438	0.412	0.374
p-value for 1-tailed test	0.167	0.371	0.064	0.211	0.390	0.125	0.447	0.449

Table 6: Firm Performance and CEO Power (continued)

Panel A: Dependent variable: NTSR

	OLS (1)	2SLS (1)	OLS (2)	2SLS (2)	OLS (3)	2SLS (3)	OLS (4)	2SLS (4)
Dmil	2.391	3.900	0.511	2.980	3.540	4.986	10.469	11.668
	0.47	0.23	0.83	0.19	0.34	0.15	0.15	0.09
Power_BOD	-3.745	-6.054						
	0.34	0.07						
Power_BOD * Dmil	2.670	4.102						
	0.61	0.30						
Power_OWN			3.956	4.614				
			0.20	0.13				
Power_OWN * Dmil			-1.144	0.844				
			0.83	0.88				
Power_BCF					7.360	**9.732**		
					0.09	0.02		
Power_BCF * Dmil					2.883	2.721		
					0.46	0.47		
Power_GIM							-2.113	-5.494
							0.76	0.40
Power_GIM * Dmil							12.233	16.161
							0.26	0.16
CEO_ownership	0.154	0.207	0.167	0.220	0.181	0.262	0.142	0.215
	0.46	0.31	0.42	0.28	0.40	0.22	0.51	0.31
Firm Size	**-2.244**	-1.368	**-2.116**	-1.104	-1.569	-0.607	**-1.852**	-0.985
	0.01	0.06	0.02	0.14	0.09	0.43	0.04	0.20
Firm Risk	-0.050	-0.034	-0.050	0.036	-0.033	0.014	-0.037	-0.024
	0.15	0.32	0.15	0.29	0.36	0.68	0.30	0.51
Firm Growth	**0.088**	**0.079**	**0.088**	**0.080**	**0.080**	**0.074**	**0.079**	**0.070**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Firm Leverage	0.011	0.048	-0.002	0.024	0.013	0.007	0.001	0.036
	0.84	0.23	0.96	0.56	0.78	0.88	0.89	0.40
Fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Adjusted R-squared	0.105	0.103	0.105	0.103	0.107	0.107	0.104	0.102
Sample size	1493		1493		1395		1395	

Panel B: Coefficient estimates for Power for the constrained and unconstrained groups

	P_BOD	P_BOD	P_OWN	P_OWN	P_BCF	P_BCF	P_GIM	P_GIM
Unconstrained	-3.745	-6.054	3.956	4.614	7.360	**9.732**	-2.113	-5.494
p-value for 2-tailed test	0.338	0.065	0.200	0.130	0.092	0.020	0.756	0.397
Constrained	-1.075	-1.952	2.811	5.458	10.243	**12.453**	10.120	10.667
p-value for 1-tailed test	0.408	0.333	0.267	0.146	0.112	0.048	0.218	0.166