DAN ZHANG

Essays in Executive Compensation

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DAN ZHANG
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Doctoral Committee

Promoter: Prof.dr. I. Dittmann

Other members: Prof.dr. A. de Jong
Prof.dr. P.G.J. Roosenboom
Prof.dr. D.L. Yermack

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謹以此論文獻給我的父母！

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Chapter 1

Introduction

Over the past two decades, the dramatic increase in executive compensation has attracted enormous attention in public as well as in academics. Although the managerial labor market is small and specialized, the publicly available data on executive compensation offers great opportunities to analyze many major aspects of financial market and labor economics. My research focuses on how executive compensation is designed and its implications for corporate finance and government regulations. My goal is to identify whether the design of executive compensation has an influence on managerial decisions, such as corporate payouts and risk-taking, and the effect of executive compensation on firm performance.

In Chapter 2, we analyze several proposals to restrict CEO compensation and calibrate two models of executive compensation that describe how firms would react to different types of restrictions. We find that many restrictions would have unintended consequences. Restrictions on total realized (ex-post) payouts lead to higher average compensation, higher rewards for mediocre performance, lower risk-taking incentives, and the fact that some CEOs would be better off with a restriction than without it. Restrictions on total ex-ante pay lead to a reduction in the firm's demand for CEO talent and effort. Restrictions on particular pay components, and especially on cash payouts, can be easily circumvented. While restrictions on option pay lead to lower risk-taking incentives, restrictions on incentive pay (stock and options) result in higher risk-taking incentives.

Chapter 3 examines how dividend protection on executive compensation affects corporate payout policy. With manually collected data for S&P 500 firms between 2000 and 2009, I show that less than 1% of firms provide a dividend protection on executive option grants while more than 70% of firms pay dividends on unvested restricted stock grants.

I find that the dividend protection on executive compensation is associated with higher dividend payouts and lower share repurchases. Using the 2003 tax reform as an exogenous change in dividend payouts, I provide further evidence that dividend protection on executive compensation cause changes in dividend payout policies.

In Chapter 4, we find evidence consistent with the view that $1 CEO salaries are camouflage for the rent-seeking pursuits of CEOs adopting these pay schemes. CEOs with these arrangements, despite the drastic cuts in salary, have total compensation that is similar to that at comparable firms, making up lost salary through not-so-visible forms of equity-based compensation. There is greater likelihood of a $1 CEO salary when the CEO is rich, overconfident, owns a sizeable ownership stake, and institutional ownership is relatively low. These CEOs are in a position to draw significant private benefits, and need not replace certain salary dollars with risky future income. However, we find that they are at risk of engendering public outrage over their private benefits, against which the $1 salary constitutes valuable deflection of attention. Shareholders of firms with $1 CEO salaries do not fare well in the aftermath of these adoptions. Thus, rather than being the sacrificial acts they are projected to be, our findings suggest that some adoptions of $1 CEO salaries are opportunistic behavior of the wealthier, more overconfident, influential CEOs. Overall, these findings support the Managerial Power Hypothesis in the literature, which claims that CEOs employ camouflage in compensation schemes to reduce the likelihood of public outrage over private benefits.

Chapter 2

Restricting CEO Pay

2.1 Introduction

In this chapter, we analyze proposals to restrict CEO compensation[1]. Demands for regulating executive pay are regularly put forward at times of economic crisis when voters express stronger concerns about inequality and fairness. The financial crisis after 2007 is no exception to this rule, and several governments recently considered or even passed laws to rein in compensation packages deemed to be excessive. We provide an overview of restrictions currently proposed or enacted in several developed countries and identify three types of restrictions on executive pay: restrictions on the total level of realized pay, restrictions on components of pay, such as fixed salary, option pay, or incentive pay, and restrictions on the ex-ante value of pay.

The objective of our analysis is to investigate the consequences of restrictions on executive compensation, particularly unintended consequences, and to quantify them. As such, we conduct a counterfactual analysis of how compensation contracts would look if restrictions on CEO pay had already been in place. We fit a contracting model to observed pay, and predict from the model how contracting would change if restrictions on pay were introduced. Our analysis uncovers a number of indirect consequences of restrictions on pay that may not be intended by the proponents of these restrictions. Depending on the

[1]This chapter is based on the paper "Restricting CEO Pay", co-authored with Ingold Dittmann and Ernst Maug, and is published in Journal of Corporate Finance. We thank David Yermack and seminar participants at the Erasmus University in Rotterdam, the University of Frankfurt, Humboldt University in Berlin, the University of Mannheim, at the Cardiff Conference on Managerial Compensation, and at the 8th International Conference on Corporate Governance in Birmingham for feedback and discussions. Ingolf Dittmann and Dan Zhang acknowledge financial support from NWO through a VIDI grant.

type of restriction, risk-taking incentives can substantially decrease or increase, CEOs can be rewarded more for mediocre performance, and the value of the firm can drop when the restriction forces firms to reduce managerial talent or effort. We also identify those types of restrictions that firms can easily circumvent and that are therefore ineffective.

There is a heated and ongoing debate in the literature on whether executive compensation is efficient or not. While some studies produce evidence that observed pay is by and large efficient, other papers argue that contracting is inefficient and point out pay arrangements that are difficult to reconcile within the efficient contracting paradigm.[2] Our model combines these two aguments. We analyze the effect of restrictions on CEO pay for those firms where the pay setting process is efficient in the sense of Pareto efficiency. Hence, we allow for the possibility that CEOs are powerful, capture the pay-setting process, and extract rents, but we assume that they extract rents efficiently so that CEOs and boards maximize the joint value of the firm to shareholders and to the CEO. Put differently, in our model the structure of the contract provides the correct level of incentives and implements efficient risk-sharing, but the level of pay may reflect some transfer of value from the firm to the CEO.

We recognize that our argument does not fully capture the perspective of the rent-extraction view and the potential rationales of the proponents of pay regulation. In particular, our presumption of efficient rent extraction rules out interventions intended to address market failures. For example, Acharya and Volpin (2010) model an economy in which firms can provide incentives either through compensation contracts or through improved governance, but firms do not internalize the fact that opting for weaker governance and more incentive pay increases CEOs' outside options and therefore the economy-wide level of compensation. Outside interventions may address such governance externalities and general equilibrium effects, but they are outside the scope of our analysis, which considers each firm in isolation.[3] Market failures may also result from turnover costs or from the limited disclosure of executive pay.[4] None of these arguments, however, gives rise to a

[2] In a highly influential book, Bebchuk and Fried (2004) argue that executive compensation in the United States is dysfunctional as managers capture the pay-setting process and use ever more complex compensation arrangements to camouflage the excessive size of their pay packages. See also Bebchuk and Fried (2003), Bebchuk, Cremers, and Peyer (2007), and Bebchuk, Grinstein, and Peyer (2009). Kuhnen and Zwiebel (2007) provide an explicit economic model of the pay process that also incorporates the Bebchuk-Fried notion of "camouflage" and "hidden pay," and Kuhnen and Niessen (2009) document that public opinion affects executive compensation. On the other hand, Core, Guay, and Thomas (2005) and Edmans and Gabaix (2009) provide a critical review of Bebchuk and Fried's reading of the literature. They argue that many controversial contracting practices as well as general pay levels can be reconciled with the efficient contracting paradigm.

[3] See also Dicks (2010) for a similar model of governance externalities and general equilibrium effects in the managerial labor market.

[4] Limited disclosure is the basis of Bebchuk and Fried's (2004) argument that CEOs extract rents through "hidden compensation," i.e., benefits that are not visible to outside observers and that result in efficiency losses.

calibratable model of executive compensation. We therefore cannot quantify the potential efficiency gains from mitigating market failures through pay restrictions. We partially address this limitation by excluding poorly governed firms from our analysis. In these firms, contracting may not just transfer value to the CEO but may also be inefficient. Bertrand and Mullainathan (2000a, 2000b, 2001) and Kim and Lu (2009) produce evidence that contracting is efficient for firms with good corporate governance and we therefore restrict our analysis to firms where contracting is likely to be efficient. More specifically, we follow Bebchuk, Grinstein, and Peyer (2009) and require that all members of the compensation committee are independent directors.

The analysis of the chapter has two parts, each of which discusses a model that is tailored to a particular purpose. In the first part of the chapter, we analyze restrictions on ex post payouts and on the structure of compensation contracts. We calibrate a principal-agent model with a loss-averse CEO to each of the 796 CEOs in our data set, so that the model predicts observed compensation contracts if no restrictions on pay are imposed. Dittmann, Maug, and Spalt (2010) show that this model can generate meaningful option holdings, and we extend this result by showing that the model can be calibrated for most CEOs such that it *exactly* reproduces stylized observed contracts. When we analyze restrictions with this model, we assume that firms want to provide the same effort incentives as before and that externally imposed restrictions on compensation do not change the balance of power between the board and the CEO. Consequently, we assume that restrictions on CEO pay do not affect the effort choice of the CEO or the rents the CEO might obtain. These assumptions are plausible for restrictions on pay that are externally imposed, for example through legislation. If restrictions are imposed by large shareholders, then the bargaining power between the board and the CEO may also change.

We first address restrictions of the total level of realized CEO pay. This rule is based on the notion that the total payout to the CEO when she leaves the firm and sells all her shares and options should not exceed a certain dollar amount in order to avoid public outrage. Restrictions of this type are in line with public demands, now enshrined in legislation in some countries, that boards should "stress test" compensation plans to avoid ex post high realizations of pay. Since compensation that involves restricted stock or standard stock options is potentially unlimited, such a cap can be implemented only with stock appreciation rights or phantom stock that includes a limited upside, but is otherwise identical to standard securities used to pay executives. Our results indicate that such a restriction has three, probably unintended consequences. First, on average, pay increases.

We know of no satisfying model of hidden compensation and the efficiency losses it entails. Similarly, turnover costs may lead to managerial rents when firms find it difficult to replace their current CEOs. Taylor (2010) estimates these turnover costs and shows that they are large.

If firms wish to prevent extremely large payouts for extreme performance, then incentive provision requires more high-powered compensation contracts for mediocre performance and therefore a higher risk-premium. For example, if firms limit ex-post pay to three times its expected ex-ante value, average compensation costs increase by 3.1%, and pay for mediocre performance increases by 14.9%.

Second, in some cases CEOs may be better off and extract higher rents if pay is restricted compared to the case where no restrictions are in place. The reason is that pay restrictions result in more high-powered contracts below the cap. As the downside of CEO pay is limited due to limited liability, contracts can often be high-powered only if the CEO earns a rent and is better off than without a cap. In the above example, 8.5% of all CEOs are better off and on average extract an additional rent worth 13.2% of their observed pay.

Third, risk-taking incentives decline as restrictions become more severe. Intuitively, restricted contracts are more concave because of their limited upside. For the observed contracts in our sample we estimate that CEOs would accept projects that increase the firm's annual standard deviation of stock returns by one percentage point as long as firm value increases by at least 0.2%. For restricted contracts this threshold would increase more than fourfold to 0.9% and we argue that many realistic projects that have a positive net present value but increase firm volatility would not be realized if restrictions on realized compensation were in place. We suspect that this consequence is also unintended for firms outside the financial industry. For these firms, concerns about insufficient entrepreneurial risk-taking incentives seem to be just as legitimate as concerns about excessive risk-taking.

We then analyze proposals to levy penalty taxes on particular components of pay and show that even in our highly stylized model, firms and CEOs have sufficient flexibility to contract around such taxes. Taxes on cash payments (salary and bonus) can be circumvented entirely at little cost by using more stock and less options, because stock is more valuable per unit of incentives than options. A tax on option pay can likewise be circumvented to a large extent by replacing options by more stock while cutting cash payments. Only a penalty tax on all forms of incentive compensation (stock and options) cannot be avoided easily. If stock and options are both taxed, firms will provide incentives through options only, because their value per unit of incentives is lower than for stock. As a consequence, risk-taking incentives increase to the point where most CEOs in our sample would be willing to take on risky projects even if these projects destroy some firm value.

In the second part of the chapter, we shift our attention to restrictions on the total value of compensation, which cannot be addressed with a model that holds effort and

talent constant. Faced with a restriction on the value of compensation, firms must decide on the optimal way to divide the value of compensation between variable compensation and fixed compensation. Variable compensation creates performance incentives, but is risky and therefore reduces the value of the contract to the CEO and will in all likelihood attract less talented CEOs. By contrast, a larger proportion of fixed compensation will make the contract more valuable and therefore potentially attract more talented CEOs, but will then induce less performance incentives. We therefore develop a model that is based on a simple production function where CEO talent and effort are the factors of production. We calibrate the model separately for each firm in our sample, and analyze the impact of a restriction on total CEO pay on firm value. Our model produces higher output elasticities of effort for firms where incentive provision is more important, in particular for firms with higher R&D expenditure. We show in a model with frictionless managerial labor markets that a realistic cap on the value of compensation has only a small impact on firm value: cutting CEO pay by 20% implies that firm value declines by 0.07%. In absolute terms, firm value declines by $0.12 for each dollar of the 20% cut in compensation.

Several other papers propose models for the executive labor market. Our model is closest in spirit to Murphy and Zabojnik (2004) and Gabaix and Landier (2008) who treat talent as a factor in the firm's production function. We extend their reasoning and also include incentive pay as a factor in the production function. To the best of our knowledge, we are the first to estimate the talent-effort trade-off empirically.[5] Our model is much simpler than the models in Edmans, Gabaix, and Landier (2009) and Sung and Swan (2009), because we do not model the moral hazard problem that gives rise to incentive pay. The simplicity of our model allows us to calibrate it for an individual firm and to generate predictions about the impact of pay restrictions on firm value.

There is an emerging literature on pay restrictions. The paper closest to ours is Llense (2010), who uses an assignment model and also finds that caps have only a moderate impact on shareholder value. Her model ignores effort choice and does not address restrictions that also affect the structure of compensation contracts. Garner and Kim (2010) provide evidence on a regulation in South Korea, where shareholders have to vote on the maximum amount of compensation that managers can receive. This regulation is more akin to say-on-pay rules and different from restrictions imposed by regulators or through legislation. Several papers address compensation in the financial services industry in the wake of the financial crisis. Bolton, Mehran, and Shapiro (2010) argue that linking executive pay to debt prices (credit default swaps) would improve (i.e., reduce) risk-taking

[5] In contemporaneous research, Edmans and Gabaix (2010) also formulate a model that includes effort incentives as well as talent and they calibrate their model to firms in the S&P 500.

incentives, but that such contracts may not be optimal from the perspective of shareholders. Thanassoulis (2010) develops a theoretical argument for caps on bankers' bonuses. Cadman, Carter, and Lynch (2010) show that TARP restrictions on pay deterred firms from participating in the government-sponsored bailout program in the US. None of these papers develops a model that incorporates effort choice and none of them addresses the impact of restrictions on realized compensation payments.

The remainder of the chapter is organized as follows. The next section discusses the institutional context and some of the proposals on regulating top executive pay. Section 2.3 presents our model of optimal compensation. Section 2.4 describes our data set and how we calibrate the model to the data. Section 2.5 analyzes the impact of caps and taxes on total realized payouts. Section 2.6 discusses restrictions on individual components of pay. Section 2.7 analyzes the impact of restrictions of the value of total compensation on the value of the firm, and Section 2.8 concludes.

2.2 Proposals on regulating executive pay

The public debate on executive pay

Demands to regulate and restrict top executive compensation recur, especially in times of economic crisis. Public commentators demanded curbs on executive pay in the Great Depression, complaining about "corporations in the red paying excessive salaries" (Sen. Burton Wheeler, 1934).[6] At the end, the US eschewed more radical proposals to legislate against excessive compensation and relied on market mechanisms instead. In particular, companies had to publicly disclose compensation, a requirement that was successively tightened in subsequent reforms. Between 1971 and 1973, executive compensation fell under general wage controls imposed by the Nixon administration to curb inflation.[7] After 1992, the Clinton administration taxed fixed compensation in excess of $1 million that is not performance related. Finally, the recent financial crisis produced a flurry of proposals to reform executive pay as well as concrete legislative proposals. We group proposals to restrict executive compensation into three groups, which we discuss in turn: (1) restrictions on ex post realized compensation, (2) restrictions on the ex ante value of

[6] One source for the historical debate on executive pay in the U.S. is an unpublished and untitled note by David Yermack. We are grateful to David Yermack for letting us have this note, from which we take this citation. He attributes the citation to Sen. Burton Wheeler, quoted by the New York Times March 5, 1934. See also Dew-Becker (2008) and Wells (2010), who review the history of executive compensation regulation.

[7] Crystal (1991) reports that the first version of pay controls imposed a 5% cap on all pay increases, even if executives changed firms, which reduced turnover. The second version allowed pay increases only if executives changed firms, which then increased managerial turnover.

compensation, and (3) restrictions on specific components of pay.

Proposals to restrict realized compensation

Realized compensation payments can be high if a significant part of compensation is paid in the form of stock or options. After unusual events, for example a CEO's departure, a takeover, or extreme changes in the company's stock price, shareholders and journalists typically scrutinize the realized value of the CEO's compensation. Large realized pay then often receives a lot of negative news coverage, with claims that these payments are unjustified. Boards of directors might therefore want to restrict such high terminal payouts. Politicians may also attempt to restrict realized pay, but due to legal and constitutional obstacles they can typically only appeal to the board of directors to implement restrictions. Some recent examples include:

- The "2009 Executive Compensation Principles" by the Canadian Coalition for Good Governance stipulate: "Boards should formally 'stress test' a number of possible scenarios to see how their compensation plan will react to future external and internal events to ensure that there are no windfalls for unsustainable performance."
- In the summer of 2009, the German parliament passed a law on the "Adequacy of management board compensation," which includes the requirement that the supervisory board should provide for the possibility of limiting pay in case of "exceptional developments." The law is ambiguous and does not specify what would qualify as "exceptional". It imposes a general norm that should be followed rather than concrete binding restrictions.
- The Dutch Corporate Governance Code, which follows the comply-or-explain principles, states: "The supervisory board shall determine the level and structure of the remuneration of the management board members by reference to the scenario analyses carried out and with due regard for the pay differentials within the enterprise." The requirement for scenario analysis indicates that boards should stress test compensation plans to ensure that "pay differentials" stay in line with acceptable norms.

Hence, regulation in Canada, Germany, and The Netherlands all require boards to pay explicit attention to the design of compensation plans with respect to scenarios that may lead to large payouts to executives. Boards should "stress-test" compensation plans and ensure that they avoid "windfalls" and "exceptional developments."

Legally binding standards may be difficult to implement. In *Rogers vs. Hill,* the U.S. Supreme Court ruled that total *ex post* pay was too high in American Tobacco in

1933. A shareholder complained against a company by-law that gave 10% of profits above a historical benchmark value to the six top executives of the firm and argued that the resulting amounts were too high. The court did not rule against the by-law but still in favor of the plaintiff when it argued: "But the rule prescribed by it [the by-law; the authors] cannot, against the protest of a shareholder, be used to justify payments of sums as salaries so large as in substance and effect to amount to spoliation or waste of corporate property." This decision was generally seen as an error and did not become a precedent for subsequent cases.[8]

Proposals to restrict the value of compensation

There is also a more general concern with the overall level of executive compensation, and several proposals address the total value of compensation:

- There are recurring proposals that compensation of top management should not exceed some multiple of the lowest-paid worker in the firm. Chrystal (1991) traces this argument back to Plato, who recommended that this multiple should not exceed five. In modern times, J. P. Morgan ordered that CEOs of Morgan firms should not be paid more than twenty times the wage of the lowest-paid worker (see Crystal, 1991, p. 24). Morgan's policy was endorsed more generally by Peter Drucker in an essay in 1984.[9]

- The American Recovery and Reinvestment Act, signed into law on Feb. 17, 2009, limits tax-deductible executive pay to $500,000 for all recipients of any Troubled Asset Relief Program (TARP) financial assistance, including both past and future recipients under the Capital Purchase Program. The limitation applies to any compensation that is earned in the current year, even if payment is deferred to a later tax year.[10]

- The German Financial Markets Stabilization Act (Finanzmarktstabilisierungsgesetz) that became effective on 18 October 2008 empowers the government to formulate and enforce restrictions on executive compensation for all firms that receive

[8] Lower courts argued in new cases that they are not comparable to this one and the supreme court did not accept any new cases. See Wells (2010) for more details and http://caselaw.lp.findlaw.com/scripts/getcase.pl?court=US&invol=582&vol=289 for the full ruling.

[9] Drucker had agreed to a multiple of twenty-five in an earlier essay in 1977. See Byrne, John A.; Gerdes, Lindsey, Business Week, November 28, 2005, "The Man Who Invented Management." (http://www.businessweek.com/magazine/content/05_48/b3961001.htm). Year after year this proposal is introduced in the U.S. Senate by a democratic senator. Every year it is delegated to a committee and is voted down within the committee. It is never voted on in the Senate.

[10] Source: http://www.crowehorwath.com/crowe/Publications/detail.cfm?id=2041. Kim (2010) finds that TARP recipients experienced negative abnormal stock returns on the days when the restrictions were announced.

government aid from the stabilization fund. Subsequent government regulation from 20 October 2008 restricts total annual executive compensation to 500,000 Euro for these firms. The strict rules on executive compensation are probably the reason why many financial institutions (including Deutsche Bank) never accepted any money from the stabilization fund.

- BMW announced in October 2009 that they would increase CEO pay at the same rate as regular workers' pay in the future. This announcement is probably intended to reduce public pressure on the company and to win a particular group of customers.

The "multiple per lowest-paid worker" standard is legally difficult to implement because it can be avoided easily through outsourcing activities with low-paid workers. The TARP standard and the German Financial Markets Stabilization Act apply only to a small, though significant, subset of firms.

Proposals to restrict components of pay

Restrictions on pay components are popular, because they are often feasible. Over time, particular pay components have gained or lost popularity with politicians and the general public. Clinton's one-million-dollar rule demonstrates that in the 1990s the majority was concerned with high pay that is not linked to performance; this rule discriminates against fixed salary and restricted stock and made bonus payments and stock options more desirable.[11] The current debate shows that the public is concerned with risk-taking incentives, so they want to limit incentive pay, in particular option-like pay and bonus payments that are contingent only on short-term performance. High base salaries that were seen as problematic in the 1990s do not raise eyebrows in 2009. Severance pay is also often seen as problematic as it seems to provide a reward for poor performance, and has also been ruled out by TARP.

2.3 A model of contracting on CEO pay

We use the contracting model of compensation developed in Dittmann, Maug, and Spalt (2010) (henceforth DMS), which is a standard principal-agent model with unobservable effort where managers are loss averse. This model is particularly suitable for our

[11] Rose and Wolfram (2002) show that Clinton's rule had no effect on the growth of executive compensation or on incentives.

task because it incorporates options as part of the optimal contract and it is easy to calibrate to data.[12] We sketch the salient features of the model here and provide an intuitive description. DMS contains a more detailed analysis as well as formal proofs.

In this model, shareholders or the board make a take-it-or-leave-it offer to the CEO for a wage contract that consists of a fixed salary ϕ, a number of shares n_S, and a number of options n_O with a strike price K. The contract is for a period of T years, and this time horizon also represents the maturity of the stock options of the CEO. The wage $\tilde{w}$ of the CEO therefore depends on the end of period stock price as:

$$\tilde{w} = \phi e^{r_f T} + n_S P_T + n_O \max\left(P_T - K, 0\right). \tag{2.1}$$

The end of period stock price P_T depends on the CEO's effort $e \in [0, \infty)$ and on a random variable u, which is distributed standard normal:

$$P_T = P_0\left(e\right) \exp\left\{\left(r_f - \frac{\sigma^2}{2}\right) T + u\sqrt{T}\sigma\right\}, \tag{2.2}$$

where r_f is the riskfree rate of interest, σ is the annualized volatility of log stock returns, and P_0 is the current stock price. Hence, the stock price P_T is lognormally distributed and the log return $ln\left(P_T/P_0\right)$ over T years is distributed normal with mean $r_f T$ and variance $\sigma^2 T$. Our use of the lognormal distribution follows the prior literature (see Dittmann and Maug (2007) and the references they cite). We have not explored other distribution models. However, option pricing models that improve on distributional assumptions typically favor thick-tailed distributions and we conjecture that the impact of caps on CEO pay would become more pronounced with distributions that have more probability mass in the upper tail of the distribution.

The managers' preferences are separable in income and effort and the manager is loss-averse. We denote the costs of effort by $C(e)$ and assume that these costs are increasing and convex in effort e. The CEO's payoff is $U(\tilde{w}) - C(e)$, with

$$U\left(\tilde{w}\right) = \begin{cases} \left(\tilde{w} - w^R\right)^\alpha & if \quad \tilde{w} \geq w^R \\ -\lambda\left(w^R - \tilde{w}\right)^\alpha & if \quad \tilde{w} < w^R \end{cases}, \text{ where } 0 < \alpha < 1 \text{ and } \lambda > 1. \tag{2.3}$$

[12] DMS show that the optimal contract in the loss aversion model is convex for all realistic levels of future stock prices. In contrast, in the traditional model with an effort-averse and risk-averse manager, optimal contracts are always concave (see Dittmann and Maug (2007)). As a consequence, the risk aversion model cannot explain why shareholders do not voluntarily restrict the high payouts for very good outcomes that are observed in practice. There are a few other extensions of the risk-aversion model that can explain option holdings. For instance, Oyer (2004) models options as a device to retain employees when recontracting is expensive, but neither this model nor several others have been calibrated to data.

This preference specification follows Tversky and Kahneman (1992). Here w^R denotes the reference wage and λ is the degree of loss aversion. If the wage $\tilde{w}$ is above the reference wage, the CEO regards the difference to the reference wage $\tilde{w} - w^R$ as a gain, whereas she recognizes a wage below the reference wage as a loss. The loss-aversion parameter $\lambda > 1$ reflects the notion that losses have a larger impact on the CEO's utility than gains of comparable size. U is concave over gains, but convex over losses. The parameter α describes the curvature of the payoff function and captures the diminishing sensitivity of the CEO to gains as gains become larger, and to losses as losses become larger.[13]

Given the payoff from the contract, the CEO will choose a certain effort level e. We assume that, in the initial setting without any restriction on CEO pay, the observed contract is optimal, i.e. it implements the optimal (second-best) effort level. Denote the observed contract by (ϕ^d, n_S^d, n_O^d), where the superscript 'd' stands for 'data.' The contract then provides the CEO with utility $E\left[U(\tilde{w}) - C(e) \middle| \phi^d, n_S^d, n_O^d, e\right]$ and with effort incentives $\frac{d}{dP_0} E\left[U(\tilde{w}) \middle| \phi^d, n_S^d, n_O^d, e\right]$. These effort incentives are the pay-for-performance sensitivity, adjusted for the preferences of the CEO. If we replaced $U(\tilde{w})$ simply with $\tilde{w}$, then we would obtain the standard, risk-neutral definition of the pay-for-performance sensitivity. This is equal to $n_S + n_O N(d_1)$ in our case, where $N(d_1)$ is the Black-Scholes option delta.

We introduce restrictions on CEO pay in two different ways: First, restrictions can change the functional form of the contract (2.1), for instance if we cap ex post realized payouts from above. Second, restrictions can take the form of a tax and therefore make contracting more costly and work through the shareholders' objective function. We assume that shareholders want to keep the current CEO and to implement the same effort level as before. Shareholders will therefore choose a new contract (ϕ^*, n_S^*, n_O^*) that is eligible and that provides the CEO with at least as much utility and effort incentives as the observed contract. More formally, the new contract must satisfy the incentive compatibility constraint

$$\frac{d}{dP_0} E\left[U(\tilde{w}) \middle| \phi, n_S, n_O\right] \geq \frac{d}{dP_0} E\left[U(\tilde{w}) \middle| \phi^d, n_S^d, n_O^d\right], \tag{2.4}$$

and the participation constraint

$$E\left[U(\tilde{w}) \middle| \phi, n_S, n_O\right] \geq E\left[U(\tilde{w}) \middle| \phi^d, n_S^d, n_O^d\right], \tag{2.5}$$

where the costs of effort, $C(e)$ drop out of the participation constraint as effort, and there-

[13] For our numerical calibrations, we rely on the experimental literature and use $\alpha = 0.88$ and $\lambda = 2.25$. These values have become somewhat of a standard in the literature, see for example Tversky and Kahneman (1992), Benartzi and Thaler (1995), and Barberis and Huang (2008). For experimental studies on the preference parameters see Abdellaoui (2000) and Abdellaoui, Vossmann, and Weber (2005). These studies yield similar parameter values.

fore the cost of effort, is held constant. Recall from our discussion in the Introduction that the last assumption does not imply that CEOs are not powerful or that they cannot extract rents. Rather, we take the value of rents to the CEO as given and assume that externally imposed restrictions on pay do not change the balance of power between the CEO and shareholders. Then, whatever level of rents the CEO obtains under the old contract will carry over to the new contract after restrictions are imposed.

The shareholders' problem is therefore to minimize expected costs of contracting $E[\tilde{w}]$ subject to the two constraints (2.4) and (2.5). In addition, we require that fixed salary ϕ, and stock holdings n_S, and total wage $\tilde{w}$ are non-negative. Intuitively, we are looking for a contract that minimizes compensation costs to shareholders, is acceptable to the CEO, and implements a level of effort not below the one induced by the observed contract. DMS show that with mild assumptions the contract that solves this optimization problem is unique, so the agent indeed chooses the same level of effort under the new contract.[14] For brevity, we shall refer to the optimal contract (ϕ^*, n_S^*, n_O^*) that is predicted by the model as the model contract.

The strength of the modeling approach developed in this section is that we do not need any information about the functional form of the production function $P(e)$ or the cost function $C(e)$, because the constraints (2.4) and (2.5) can both be evaluated independently of these functions, which we therefore do not need to parameterize. However, this modeling approach comes with a cost, because it cannot address the expected value of compensation and does not allow firms to adjust the level of effort if pay restrictions make the old effort level too costly to achieve. The second model, which we analyze in Section 2.7 below, can address the level of compensation.

2.4 Data and calibration of the model

2.4.1 Data set

We base our analysis on ExecuComp, which contains the details of the compensation contracts of the 1,500 largest listed U.S. firms. We select all executives who are CEO for the whole year 2006, who work for the same firm in years 2005 and 2006, and who are not listed as executives of another firm in 2005 or in 2006.[15] This leaves us with 1,407 CEOs. We construct the approximate option portfolio at the end of the 2005 fiscal year using

[14] The main condition is that the cost function $C(e)$ of the CEO is sufficiently convex so that the overall objective $U(\tilde{w}) - C(e)$ is globally concave.

[15] We do not perform our analysis for a more recent year for two reasons. First, we cannot construct our sample consistently for 2007, because there was a significant change in the reporting standard in 2006; some firms reported according to the new standard while other firms still used the old standard. Second, we did not choose 2008 and 2009 to avoid using data from the financial crisis.

the algorithm proposed by Core and Guay (2002) and aggregate this option portfolio into a representative option as described in Dittmann and Maug (2007). Effectively, we set the strike price and the maturity of the representative option such that the representative option has the same value and the same Black-Scholes delta as the observed portfolio of options. This aggregation of the option portfolio is necessary, because this portfolio typically contains options with different maturities that cannot be described in a one-period model. In this way, we obtain the number of options, n_O, the option strike price K, and the option maturity T. Likewise, we take the number of shares held by the CEO, n_S, from the end of 2005. Both variables, n_S and n_O, are expressed as the proportion of total shares outstanding.

We define fixed salary ϕ as the sum of salary, bonus, and "all other compensation" (e.g. perquisites or insurance premia) from 2006. We include bonus payments, because prior literature has shown that these payments are only weakly related to stock returns (see Hall and Liebman, 1998). ExecuComp also provides us with the firm's market capitalization P_0 at the end of 2005 and the dividend rate d during 2005. For the risk-free rate r_f, we use the yield of the 5-year U.S. government bond in January 2006. Next, we use CRSP data to calculate the firm's stock return volatility σ from daily stock returns from fiscal year 2006. We lose 26 observations because of insufficient data for the volatility calculation, and another 54 observations, because our algorithm failed to find a representative option.

Our calibration method is based on the assumption that observed contracts are efficient in the sense that risk-sharing and incentives are optimal. We cannot measure the efficiency of contracting directly and therefore use the independence of the compensation committee as a proxy for efficient contracting. We follow Bebchuk, Grinstein, and Peyer (2009) and require that all members of the compensation committee are independent. We match our data with RiskMetrics and delete the 134 CEOs from those firms where at least one member of the compensation committee was not independent in 2005. In this step, we also lose 349 CEOs because of missing data in RiskMetrics. Table 2.1 shows descriptive statistics for the remaining sample of 844 CEOs in Panel A. Since we lose many observations through matching with RiskMetrics we also report the same statistics before matching in Panel B.

The table shows that the median CEO owns 0.24% of her firm's stock and has options on another 0.79% of the firm's equity. Median fixed salary is \$1.03m. Options are considerably in the money with median moneyness 73.3%, and their median maturity is 4.8 years. Our sample contains large firms with a median (average) market capitalization of \$2.636bn (\$9.707bn) and a median annualized stock return volatility of 27.4%. The

Table 2.1: Description of the data set

This table displays the mean, standard deviation, and 10%, 50%, and 90% quantiles of the variables in our data set. Panel A shows these statistics of our sample of 844 CEOs from 2006 who worked in a firm where all members of the compensation committee were independent directors. *Value of contract* is the market value of the compensation package $\pi = \phi + n_S P_0 + n_O BS$, where BS is the Black-Scholes option value. All dollar amounts are in millions. Stock and options are expressed as a percentage of all outstanding shares. Panel B displays statistics for the full sample of 1,327 CEOs ExecuComp CEOs before matching them with RiskMetrics.

Panel A: Sample of 844 CEOs from 2006 (after matching with Risk-metrics)

Variable		Mean	Std. dev.	10% Quantile	Median	90% Quantile
Stock	n_S	1.88%	5.79%	0.03%	0.24%	3.60%
Options	n_O	1.25%	1.63%	0.10%	0.79%	2.87%
Fixed salary	ϕ	1.58	4.17	0.50	1.03	2.32
Value of contract	π	95.6	439.5	4.5	23.6	156.6
Firm value	P_0	9,707	27,934	559	2,636	17,930
Strike price	K	7,383	23,967	353	1,680	12,904
Moneyness	K/P_0	71.7%	22.0%	43.3%	73.3%	100.0%
Maturity	T	5.3	2.3	3.4	4.8	7.0
Stock volatility	σ	28.9%	10.5%	16.5%	27.4%	44.1%
Dividend rate	d	1.29%	2.09%	0.00%	0.72%	3.45%

Panel B: All 1,327 ExecuComp CEOs in 2006 (before matching with Risk-metrics)

Variable		Mean	Std. dev.	10% Quantile	Median	90% Quantile
Stock	n_S	1.95%	5.74%	0.03%	0.29%	4.45%
Options	n_O	1.28%	1.58%	0.10%	0.82%	2.93%
Fixed salary	ϕ	1.54	3.62	0.49	1.00	2.41
Value of contract	π	129.8	1,304.5	3.5	21.4	154.8
Firm value	P_0	8,567	24,835	365	1,999	17,311
Strike price	K	6,521	21,272	234	1,330	12,306
Moneyness	K/P_0	72.8%	26.0%	41.5%	74.0%	100.0%
Maturity	T	5.3	2.2	3.4	4.8	7.0
Stock volatility	σ	31.0%	13.5%	16.9%	29.1%	46.8%
Dividend rate	d	1.28%	3.27%	0.00%	0.51%	3.40%

table also describes the value of the contract $\pi = \phi + n_S P_0 + n_O BS$, where BS is the Black-Scholes value of the representative option. The median (average) value of the contract is \$23.6m (\$95.6m). Comparison of Panels A and B shows that matching with RiskMetrics selects in favor of larger, less volatile firms with higher median contract values. The lower average contract value for the smaller sample can be attributed to the elimination of some outliers through matching. The structure of compensation contracts is remarkably similar for the samples before and after matching.

We repeat the entire analysis of the chapter for the year 1999, the first year for which membership of the compensation committee is available from RiskMetrics. The year 1999 is significantly different from 2006, with more volatile firms, more valuable compensation contracts, and a compensation structure that leans more towards stock rather than options. Still, we find that all our conclusions hold for 1999 as well (results not tabulated).

2.4.2 Calibration of the model

Our strategy is to introduce restrictions on compensation contracts into our model and to numerically calculate the optimal contract (the "model contract") under these restrictions. In the next step, we compare the model contract with the observed contract in order to describe how contracts would change if the considered restriction could be implemented. This approach is meaningful only if our model predicts the observed contract for the case without restrictions on pay. We therefore calibrate the CEO's reference wage w^R such that the observed contract coincides with the model contract in the absence of any restrictions on CEO pay. This subsection explains in detail how we perform this step.

Neither prospect theory nor the experimental literature provides us with much guidance regarding the reference wage of the CEO. The main idea is therefore to determine the reference wage such that the observed contract coincides with the model contract. For this step we restrict the reference wage to lie within a reasonable range. We proceed in three steps: First, we solve the model by minimizing expected compensation $E[\tilde{w}]$ subject to the incentive compatibility constraint (2.4) and the participation constraint (2.5) for a given reference wage w^R. Then we calculate the distance $\left|n_S^* - n_S^d\right|$ between this model contract (ϕ^*, n_S^*, n_O^*) and the observed contract (ϕ^d, n_S^d, n_O^d). Note that accurate approximation for one parameter implies accurate approximation for all parameters, because the model has two constraints and optimizes over three parameters. Finally, we search for the reference wage w^R that minimizes the distance $\left|n_S^* - n_S^d\right|$ and require that this distance does not exceed 10^{-6}. In this way, we identify the reference wage for which the model contract is identical to the observed contract. We shall refer to this value for w^R that rationalizes the observed contract as the *implied reference wage*.

Table 2.2: Implied reference wage

This table describes the reference wage w^R for which our model exactly predicts the observed contract. The reference wage is parameterised by the discount δ as $w^R(\delta) = \phi + (1-\delta)MV(n_S^d, n_O^d)$, where MV represents the market value of the CEO's stock and options. The table displays the mean, standard deviation, and 10%, 50%, and 90% quantiles of the discount δ for our sample of 844 U.S. CEOs.

	Two solutions		**One solution**	**No solution**
	Higher discount	**Lower discount**		
Observations	717	717	79	48
Mean	0.90	0.66	0.72	N/A
Std. dev.	0.08	0.20	0.20	N/A
10% Quantile	0.80	0.37	0.44	N/A
Median	0.93	0.69	0.78	N/A
90% Quantile	0.98	0.90	0.91	N/A

To better compare these implied reference wages across CEOs, we follow DMS and represent the reference wage as the sum of fixed salary and a proportion $1-\delta$ of the market value of stock and options:

$$w^R(\delta) = \phi + (1-\delta) \cdot MV(n_S^d, n_O^d).$$

Here MV represents the market value of the CEO's stock and options and δ can be interpreted as the discount the CEO applies to her deferred compensation. If $\delta = 0$, then there is no discount and the reference wage equals the market value of the CEO's compensation in the previous period. If $\delta = 1$, then the discount is 100% and stock and options do not enter the formation of the reference wage at all so that the reference wage then equals fixed compensation. We restrict δ to lie within the unit interval, which implies that the reference wage lies between last year's fixed compensation and the market value of all compensation. Table 2.2 shows descriptive statistics for the implied reference wages parameterized by the discount δ.

The table shows that for 85.0% (or 717) of the CEOs in our data set, we obtain two solutions for the reference wage.[16] The solution with the higher discount δ has an average discount of 90%, whereas the discount for the second solution averages 66%. For 79 CEOs (9.4%), we find exactly one solution with an average discount δ of 72%. For the

[16]To allow for multiple solutions, we first perform a grid search with 100 grid points for δ between 0 and 1. Then we identify the intervals in which $n_S^* - n_S^d$ changes signs, and finally perform a numerical minimization within these intervals.

remaining 48 CEOs (5.7%), there does not exist any reference wage for which the model can replicate the observed contract. A close inspection of these 48 CEOs shows that they manage smaller and more volatile firms, and get almost no stock (results not tabulated).[17]

In the remaining part of the chapter we therefore work with the subsample of 796 CEOs for which a solution for the implied reference wage exists. If we obtain two solutions, we use the solution with the lower value for the discount δ, which seems more plausible and is also closer to the values we obtain if there is only one solution. In unreported results, we repeat our main analysis for the higher value of the discount δ and find very similar results.

2.5 Restricting total realized compensation

We now ask how the optimal contracts would be different if we imposed restrictions on compensation contracts. The first restriction we look at is an *ex post* restriction, such that realized compensation cannot exceed a certain threshold. This restriction would apply to a CEO who leaves her firm and immediately cashes in all her options and shares. The resulting high realized payouts might trigger public criticism or outrage, and the laws in some countries (e.g., Canada, Germany, The Netherlands) have put compensation committees on notice that they should stress-test their compensation contracts and avoid excessive payouts.

Legal standards on this question are vague and lack the precision we require for our modeling purposes. In particular, we need to relate the realized payouts that qualify as excessive to some measure of average or typical compensation. We use the expected payout under the observed contract of the CEO, $E\left[\tilde{w}^d\right]$, as a benchmark, because this amount can be regarded as typical and therefore not objectionable for a particular company. Our model above takes the firm's choice of CEO and her effort as given and therefore cannot say anything about the determinants and the acceptability of average or expected pay itself. We address such questions in Section 2.7.

We define pay as excessive if it exceeds expected pay $E\left[\tilde{w}^d\right]$ by more than a prespecified multiple M. More formally, we require that the wage function for the capped contract, which we denote by $\tilde{w}_{Cap}$, satisfies $\tilde{w}_{Cap} \leq M \cdot E\left[\tilde{w}^d\right]$. Note that $E\left[\tilde{w}^d\right]$ is the market value of the entire observed compensation contract that also includes options and stock granted in previous years or held voluntarily by the CEO. So, if $M = 5$ and the market value of the CEO's contract is \$20 million, then we only consider wage functions

[17] For one of these 48 CEOs, we find a solution with $\delta < 0$. For another CEO, the model contract has a corner solution at $n_S = 0$ for all $\delta \in [0,1]$, so that we cannot identify an implied δ. For the remaining 46 CEOs, we find no solution. In these cases, $\left|n_S^* - n_S^d\right|$ achieves a minimum for some $\delta \in [0,1]$, but this minimum exceeds 10^{-6}.

that never pay out more than \$100 million for any realization of the stock price. The shape of the contract therefore becomes:

$$\begin{aligned}\tilde{w}_{Cap} &= min\left\{M \cdot E[\tilde{w}^d], \phi e^{r_f T} + n_S P_T + n_O \max(P_T - K, 0)\right\} \\ &= \phi e^{r_f T} + n_S P_T + n_O \max(P_T - K, 0) \\ &\quad -(n_S + n_O) max\left(P_T - K - \frac{M \cdot E\left[\tilde{w}^d\right] - \phi e^{r_f T} - n_S K}{n_S + n_O}, 0\right).\end{aligned} \tag{2.6}$$

The wage function in (2.6) imposes a ban on all payouts in excess of $M \cdot E\left[\tilde{w}^d\right]$.[18] The capped contract has therefore the shape of a bull spread, which is long in a call option with strike price K, and short in a call with strike price $K + \frac{M \cdot E\left[\tilde{w}^d\right] - \phi e^{r_f T} - n_S K}{n_S + n_O}$ that exactly counterbalances the impact of shares and options so that pay cannot increase above the cap. This structure cannot be implemented with plain vanilla stock options, but could be implemented with stock appreciation rights and is similar to many bonus schemes, which also cap maximum payouts (see Healy, 1985, and Murphy, 1999).

It may not be possible to find an optimal contract $\tilde{w}_{Cap}$ that satisfies the two constraints (2.4) and (2.5) and the additional constraint $\tilde{w}_{Cap} \leq M \cdot E\left[\tilde{w}^d\right]$ if M is too small. The reason is that M restricts the incentives the contract can provide, so that the incentive compatibility constraint (2.4) might not be satisfied. We calculate the minimum M for which the model contract can still be found for each CEO. We find that the average minimum M is 2.1 and that the minimum M is smaller than three for 753 CEOs in our sample (results not tabulated). For these 753 CEOs, we calculate the model contracts for $M = 5$ and $M = 3$ and tabulate the results in Panels A and B in Table 2.3. Each panel shows descriptive statistics of the three parameters (fixed salary ϕ, the number of shares n_S, and the number of options n_O) of the model contract with the respective cap. The table also describes the distribution across CEOs of the change in expected costs, the change in the CEO's pay when the stock price at the end of the contracting period equals the stock price at the beginning of the period, and the probability that the CEO's pay increases. Finally, the table displays the proportion of CEOs whose certainty equivalent CE is higher under the model contract than under the observed contract and, for the subsample of CEOs where this is the case, the average and median increase in the CEO's certainty equivalent.

To provide a graphical representation of our results, Figure 1 displays the observed contract and three model contracts ($M = 5$, $M = 3$, and for the minimum M) for a repre-

[18] We assume that the options are in the money when the cap is reached and that the strike price for the second option in (2.6) is higher than K, or, more formally: $\phi e^{r_f T} + n_S K < M \cdot E[\tilde{w}^d]$. For our sample $\phi e^{r_f T} + n_S K$ exceeds $E[\tilde{w}^d]$ for only four CEOs, and then only slightly.

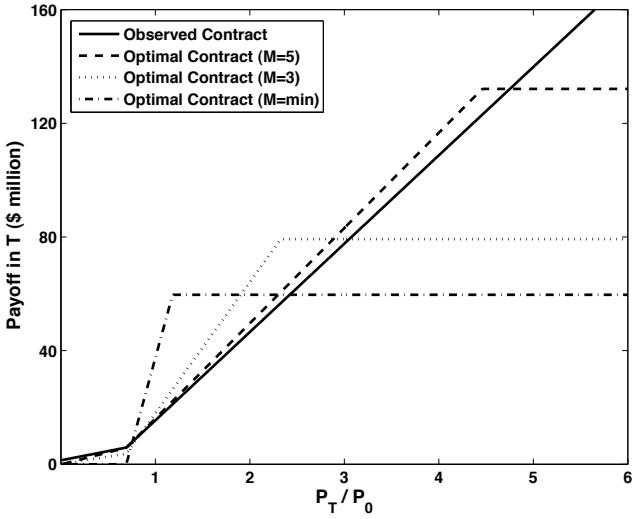

Figure 2.1: Cap on realized compensation

The figure displays the total payouts of four different contracts for a representative CEO. The solid line shows the payout of the observed contract while the broken lines show the payouts of three different model contracts where compensation payouts cannot exceed an upper threshold that is defined as a multiple M of expected pay. $M = min$ is the contract with the smallest multiple M for which we can find a contract that provides the agent with the same utility and the same pay-for-performance sensitivity as the observed contract. This minimum M is 2.3 for this CEO. The parameters are $\phi = \$1.1$ million, $n_S = 0.27\%$, and $n_O = 1.02\%$ for the observed contract. P_0 is \$2.42 billion, K/P_0 is 68%, $T = 5.8$ years, $\sigma = 31.2\%$, $r_f = 4.4\%$, and $d = 0$. The implied reference wage is \$5.3 million.

sentative CEO.[19] The figure displays total payouts in million dollars as a function of the stock price expressed as P_T/P_0. The slope to the left of the lower kink point, which corresponds to K, represents stock holdings, the slope to the right of this kink point represents the combined stock and option holdings, and the intercept is the fixed salary. The higher kink point corresponds to the strike price of the second call option, in which the CEO has a short position, so that the slope above this point is zero from the cap. The figure shows that optimal contracts with restrictions resemble a bull spread, which approaches a step function as M becomes small. For more severe restrictions (lower M) option holdings increase, stock holdings decrease, and fixed salaries decline. For the representative CEO,

[19] We choose the CEO whose parameter values are closest to the median values in our sample for the following parameters: salary ϕ^d, stock holdings n_S^d, option holdings n_O^d, firm size P_0, stock return volatility σ, time to maturity T, and moneyness K/P_0. We define "closest" as having the smallest maximum percentage deviation.

M cannot be lower than 2.3, that is, for values of M below 2.3 the optimization problem has no solution, because the incentive compatibility constraint can no longer be satisfied.

Mediocre performance is rewarded more

One striking feature that is apparent from Figure 1 as well as from Table 2.3 is that a restriction on extreme payouts implies that intermediate payouts are now higher than in the observed contract: Mediocre performance is rewarded more if large payouts are prohibited. For $M = 3$, the model contract pays out more than the observed contract with 55% probability on average (see $Prob(\Delta payout > 0)$ in Table 2.3, Panel B), and the payout for an intermediate stock price $P_T = P_0$ increases on average by 14.9% (median: 4.6%, see $\Delta Payout$ at $P_T = P_0$). A cap reduces incentives from high payouts, so firms must resort to contracts that are more high-powered for intermediate payouts in order to provide the same effort incentives as in the observed contract. The lower the cap, the steeper the wage function has to be for intermediate stock prices. Hence, one - probably unintended - implication of caps on extreme payouts is that pay for more typical scenarios is higher.

Contracting costs increase

Restricting realized payouts *ex post* increases the costs of compensation *ex ante*. The reason is that contracting becomes less efficient if the contract has to satisfy an additional constraint. Incentives that were previously provided through payoffs above the cap must be replaced by less efficient incentives with payoffs below the cap. We find that the impact of restrictions on costs is small if $M = 5$, where costs increase by \$50,000 or 0.2% of total compensation costs for the typical CEO (see ΔExpected costs in Table 2.3, Panel A). However, for tighter restrictions, costs become more significant. The distribution of these costs is also skewed so that, for $M = 3$, average costs increase by \$2.25 million, but only by \$290,000 for the typical CEO. Note that our analysis provides an upper bound for the costs from adjusting contracts because our model does not allow for an adjustment of the optimal effort level. Providing firms with additional degrees of freedom, which they could use to adjust to restrictions on compensation contracts might reduce the costs from such restrictions.

Some CEOs are better off

In a few cases we find that capped contracts are not only more expensive for the firm but also more valuable to the CEOs. To provide the same incentives as the observed contract, the capped contract is much steeper below the cap. This steepness is achieved by replacing fixed salary and stock with options. Once fixed salary and the number of shares have been reduced to zero, the CEO earns a rent if steepness must be increased further

Table 2.3: Contracts with a cap on realized compensation

This table describes optimal contracts that are capped at M times the expected value of the observed contract, for two values of M (M = 3 in Panel A, and M = 5 in Panel B). The table shows the results for the subsample of 753 executives where the contracting problem can be solved for M = 3. *ΔExpected cost* is the difference in the expected costs between model contract and observed contract, once expressed in million dollars and once expressed as a percentage of total pay π. *ΔPayout at* $P_t = P_0$ is the difference in the payout for the stock price $P_t = P_0$ between model contract and observed contract, once expressed in million dollars and once expressed as a percentage. Prob(*Δpayout* > 0) is the probability that the model contract pays out more than the observed contract. *CE_higher* is a dummy variable that indicates whether the certainty equivalent from the model contract is higher than that from the observed contract. *ΔCE* (%) | *CE_higher*=1 is the difference in certainty equivalents between model contract and observed contract given that this difference is positive. Panel C shows the risk-taking hurdle (*RTH* from equation (2.7)) for the observed contract and the model contracts, and the changes in *RTH* for the model contracts relative to the observed contract. *RTH* is a measure of the CEO's inclination to avoid taking on additional risk.

Panel A: Model contract with a cap = w_{obs} (M = 5)

Variable	Mean	St.Dev	10% Quantile	Median	90% Quantile
Salary ($m)	0.40	1.35	0.00	0.00	1.09
Stock (%)	2.0%	5.4%	0.1%	0.4%	3.8%
Option (%)	1.4%	2.0%	0.1%	0.8%	3.1%
ΔExpected costs ($m)	0.41	3.00	0.00	0.05	0.56
ΔExpected costs (%)	0.5%	0.7%	0.0%	0.2%	1.6%
ΔPayout at Pt=P0 ($m)	0.13	15.89	0.01	0.29	1.59
ΔPayout at Pt=P0 (%)	3.9%	7.5%	0.0%	1.3%	11.0%
Prob(Δpayout>0)	55%	33%	9%	59%	99%
CE_higher	0.0%	0.0%	0.0%	0.0%	0.0%
ΔCE (%) | CE_higher=1	N/A	N/A	N/A	N/A	N/A

Panel B: Model contract with a cap = w_{obs} (M = 3)

Variable	Mean	St.Dev	10% Quantile	Median	90% Quantile
Salary ($m)	0.10	0.69	0.00	0.00	0.00
Stock (%)	1.8%	5.1%	0.0%	0.3%	3.5%
Option (%)	3.5%	12.1%	0.1%	1.1%	6.1%
ΔExpected costs ($m)	2.25	12.70	0.01	0.29	4.02
ΔExpected costs (%)	3.1%	5.2%	0.1%	1.3%	7.4%
ΔPayout at Pt=P0 ($m)	2.89	53.75	0.03	0.76	9.92
ΔPayout at Pt=P0 (%)	14.9%	39.2%	0.1%	4.6%	38.7%
Prob(Δpayout>0)	55%	22%	20%	58%	84%
CE_higher	8.5%	27.9%	0.0%	0.0%	0.0%
ΔCE (%) | CE_higher=1	13.2%	9.6%	2.4%	11.1%	25.2%

Panel C: Risk-taking hurdle (*RTH*)

Variable	Mean	St.Dev	10% Quantile	Median	90% Quantile	Prop.>0
Observed contract	0.20	0.36	-0.30	0.22	0.61	72%
Model contract (M=5)	0.47	0.46	-0.07	0.44	1.03	87%
Model contract (M=3)	0.90	0.62	0.22	0.80	1.70	97%
Model – observed (M=5)	0.27	0.32	0.01	0.16	0.67	99%
Model – observed (M=3)	0.70	0.56	0.11	0.59	1.45	100%

to maintain incentives. For $M = 3$, this happens for 8.5% of the CEOs (see CE_higher in Panel B of Table 3) who then receive pay that increases their certainty equivalents on average by 13.2% (see ΔCE|CE_higher=1). Also, the representative CEO (see Figure 1) earns a rent of 11% if the multiple M is set to its lowest feasible value ($M = min = 2.3$). Note that our assumption that the lower bound on realized payouts is zero is rather extreme. For higher bounds the rents of CEOs and the number of CEOs who obtain rents would be higher. Hence, another - and almost surely unintended - consequence of caps on extreme payouts is that some CEOs are on average better off.

Risk-taking incentives decline

Restrictions on extreme payouts eliminate the convexity of observed contracts for high stock prices and, in this sense, make the model contract more concave. As a consequence, CEOs have a stronger inclination to avoid taking entrepreneurial risks. As a measure of risk avoidance, we use the Risk-Taking Hurdle (RTH) from Dittmann and Yu (2010):

$$RTH \equiv \left.\frac{dP_0/P_0}{d\sigma}\right|_{E[U(\tilde{w})|P_0]=const.} = -\frac{\frac{d}{d\sigma}E\left[U\left(\tilde{w}\right)|P_0\right]}{\frac{d}{dP_0}E\left[U\left(\tilde{w}\right)\right]}\frac{1}{P_0}. \tag{2.7}$$

RTH combines the CEO's risk aversion and the convexity of her contract. It measures how the CEO trades off an increase in firm risk against an increase in firm value. It is defined implicitly from holding the expected value $E\left[U\left(\tilde{w}\right)|P_0\right]$ of the CEO's utility constant. An increase in risk by one percentage point increases the CEO's utility if and only if firm value increases by at least RTH percent.[20] We scale this ratio by P_0 in order to express the change in firm value as a percentage rather than as an absolute dollar amount.

RTH should be thought of as a hurdle rate. If a project increases firm risk by $\Delta\sigma$, then the CEO accepts this project if the relative increase in firm value from this project, $\frac{\Delta P_0}{P_0}$, is at least $RTH \times \Delta\sigma$. If RTH is positive, the CEO rejects some positive-NPV projects because they increase risk too much, and if RTH is negative the CEO accepts some negative-NPV projects that increase firm risk. Consider a project that results in a one percentage point increase in firm risk, for example, from 30% to 31%, and assume that $RTH = 0.5$. Then the CEO will not take the project unless it increases firm value at least by 0.5%, so she passes up some value-increasing projects. Similarly, if $RTH = -0.5$, the CEO will take the project as long as it does not destroy more than 0.5% of firm value, so she accepts some value-reducing projects. If $RTH = 0$, the CEO is indifferent between

[20] Our measure of risk-taking incentives is effectively the utility-adjusted vega of the compensation contract, $\frac{d}{d\sigma}E\left[U\left(\tilde{w}\right)|P_0\right]$, scaled by the utility-adjusted delta, $\frac{d}{dP_0}E\left[U\left(\tilde{w}\right)\right]$, where the latter is the pay-for-performance sensitivity we introduced in (2.4) above. We hold the CEO's expected payoff constant and, using these utility-adjusted definitions, require $delta \times dP_0 + vega \times d\sigma = 0$ from the implicit function theorem. Then (2.7) follows.

risk-increasing projects and risk-decreasing projects and always makes value-maximizing choices.

Table 2.3, Panel C displays descriptive statistics for RTH, both for the observed contract and for the model contract with $M = 3$ and $M = 5$. In the observed contract, RTH is positive for 544 CEOs (72% of the subsample considered in the table), which means that most CEOs are averse to increasing their firms' risk and reject projects that increase risk without a sufficiently strong increase in firm value so that $\Delta P_0/P_0 < \Delta\sigma \times RTH$. The average (median) RTH is 0.20 (0.22), which means that the CEO will adopt a project that increases volatility by one percentage point only if it increases firm-value by at least 0.2%. For the median firm in our sample with market capitalization of \$2,636 million, this corresponds to a value of \$5.3 million. When we introduce a cap in the model contracts, RTH increases for all CEOs in our sample. RTH is positive for 653 CEOs or 87% of our sample for $M = 5$, and for 97% of all CEOs in our sample if $M = 3$. The average RTH increases substantially from 0.20 in the observed contract to 0.90 in the restricted contract with $M = 3$. Hence, if the firm switches from the observed contract to the model contract, the CEO will also pass up all projects that generate between 0.2% and 0.9% (or, for the median firm, between \$5.3m and \$23.7m) additional firm value for each percentage point of additional volatility. These projects would be accepted under the original contract. If the firm has many such marginal projects, the firm's market value can decline considerably. It is unclear whether this consequence is intended or not. It probably is intended for CEOs in the financial industry, which has been criticized for excessive risk-taking during the financial crisis. It is less clear that a reduction of risk-taking incentives is also warranted for CEOs of companies in other sectors. For these CEOs an unintended consequence of restricting pay may be that restrictions blunt entrepreneurial incentives to accept risky projects that promise unlikely but large payoffs.

Taxes on realized compensation

So far we considered a ban on total realized pay in this section. An alternative for policy makers is to make undesirable compensation contracts more costly by introducing special taxes. We therefore also analyze (in unreported results) a tax on realized payouts that exceed a threshold $M \cdot E\left[\tilde{w}^d\right]$, and allow for standard contracts $\tilde{w}$ from (2.1) that consist of fixed salary, stock, and options. For this case, we obtain qualitatively similar results to those reported in Table 2.3, although the quantitative effect is less stark because a tax is a less stringent restriction than a cap. If we hold the threshold M constant and increase the tax rate, the firm replaces option pay and fixed salary by more stock pay, and option holdings become eventually negative to approximate the flat region of the payout in the case with a cap (see Figure 1). However, this result only obtains for sufficiently

high thresholds M, because the incentive compatibility constraint forces firms to provide sufficient incentives. For a lower threshold M, firms might have to use options and pay taxes even it the tax rate is very high, simply because they otherwise cannot provide the necessary incentives. The case of a cap above ignores this confounding effect, because firms that cannot provide sufficient incentives with a given cap simply drop out of the analysis.

2.6 Restricting components of pay

While the previous section analyzes bans and taxes on payouts above a certain limit, we turn to taxes on components of pay in this section. We continue to use the stylized representation of CEO contracts in (2.1) and analyze taxes on fixed pay (salary plus bonus), taxes on option pay, and taxes on all deferred compensation (options plus stock).

Taxes on salary and bonus

For the analysis of a tax on cash payouts, we consider a 50% tax on fixed compensation that exceeds a certain threshold. A tax of 50% on compensation corresponds to a loss of tax deductability of 33%, which is close to the U.S. federal tax rate of 35% on company profits. Note that, in the US, fixed pay above $1 million is taxed, but effectively this tax is evaded by declaring fixed salary as a bonus. We therefore ignore the existing $1 million rule and analyze a stricter rule which taxes all fixed payouts, including bonus payments.

Table 2.4 shows the results for four different levels of the threshold above which fixed pay incurs this additional penalty tax. We report the three components of the model contract, the tax that is incurred on the model contract, and the tax that would be incurred on the observed contract if companies would not adapt their compensation structure. By adjusting the compensation structure, firms save the difference between these two tax figures, but they incur an efficiency loss, which is the additional contracting cost of the model contract compared to the observed contract when taxes are ignored. The table also shows this efficiency loss.

We find that companies respond to a tax on fixed pay by simply shifting compensation away from fixed pay towards more stock and fewer options. For a $1 million threshold, median stock compensation increases from 0.28% to 0.32% of the outstanding shares, median option compensation declines from 0.77% to 0.74%, and the median fixed salary declines from $1.03 million to $0.98 million. The logic of these adjustments is that a share of common stock is approximately equivalent to a certain number of options plus a fixed payoff. Hence, companies can replace fixed pay by a combination of additional shares and fewer options, where the exchange ratio between the additional shares and the

Table 2.4: Taxation of fixed pay

This table shows the results for a 50% tax on fixed compensation for four different levels of the threshold above which fixed pay incurs this penalty tax. The table shows the mean and median of the three contract parameters, the taxes incurred on the observed and the model contract, and the efficiency loss, which is the difference in contracting costs between model contract and observed contract in the absence of taxes. *RTH*, the risk-taking hurdle from equation (2.7), is a measure of the CEO's inclination to avoid taking on additional risk. This table shows the results for the 796 CEOs for whom we can find an implied reference wage (see Table 2.2). We drop one additional CEO due to numerical problems.

Threshold ($m)	**Fixed salary ($m)**		**Stock (%)**		**Option (%)**		**Efficiency loss ($'000)**		**RTH**		**Taxes ($'000)**			
											Obs. contract		**Model contract**	
	Mean	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**
5.0	1.26	1.03	2.00%	0.29%	1.23%	0.77%	0.7	0.0	0.20	0.22	92.3	0.0	0.0	0.0
2.5	1.14	1.02	2.01%	0.29%	1.22%	0.76%	1.3	0.0	0.20	0.22	151.4	0.0	0.0	0.0
1.0	0.81	0.98	2.04%	0.32%	1.18%	0.74%	3.0	0.0	0.24	0.25	311.4	17.2	0.0	0.0
0.5	0.46	0.50	2.10%	0.37%	1.10%	0.67%	5.1	0.4	0.29	0.28	495.2	267.2	0.0	0.0
Observed	1.48	1.03	1.99%	0.28%	1.25%	0.77%	N/A	N/A	0.20	0.22	N/A	N/A	N/A	N/A

reduction of options follows from the incentive compatibility constraint (2.4). The number of options to be replaced then depends on the desired reduction in fixed compensation.

The model contract does not incur any taxes. Hence, the optimal compensation contract can maintain incentives as well as the CEO's expected payoff and avoid taxes entirely for all firms. The resulting contract is more costly and therefore less efficient from shareholders' point of view, but the efficiency loss is very small and amounts to about $3,000 for the average CEO and is zero for the median CEO for a $1 million threshold. The adjustment of the contract leads to slightly higher risk avoidance, RTH, since options are replaced with stock, and stock makes CEOs more averse to an increase in firm risk than options.

Taxes on option pay

We model a tax on option pay by assuming that the tax would be imposed on the Black-Scholes value of all option pay. Table 2.5 shows the results for five different tax rates between 10% and 100%. For a 50% tax rate, median stock compensation increases from 0.28% to 0.45% and median option compensation declines from 0.77% to 0.54%. As options become a more expensive form of compensation, shareholders maintain incentives with stock rather than with options. Because stock generates higher payoffs for the CEO, the participation constraint then requires that fixed salaries decline. Table 2.5 shows that the median fixed salary drops to zero for all tax rates considered in the table. For more than 50% of the CEOs in our sample we therefore have a boundary solution, where the restriction that fixed salaries have to be positive becomes binding. At this point replacing even more options with stock becomes too expensive because fixed salaries cannot be lowered any further.

Unlike in the previous case with a tax on fixed pay, companies avoid the tax on options only partially. The reason is that the substitution of options and salaries for stock stops at the point where fixed salaries become zero and the non-negativity constraint becomes binding. For a 50% tax, companies avoid on average $1.9 (= $11.1 - $9.2) million of taxes, but incur an average efficiency loss of $0.5m, so total contracting costs are reduced by only $1.4m relative to the observed contract. For most CEOs the efficiency loss is virtually zero. The average efficiency loss increases with the tax rate as the minority of firms that faces high efficiency costs when replacing options by stock are nevertheless willing to do so if the tax rate becomes high.

Finally, the hurdle rate RTH for accepting risky projects increases for the model contracts for any tax rate compared to the observed contract. Median RTH increases from 0.22 to 0.32.

Table 2.5: Taxation of option pay

This table shows the results for a tax penalty on option pay (the Black-Scholes value of all option) for five different tax rates. The table shows the mean and median of the three contract parameters, the taxes incurred on the observed and the model contract, and the efficiency loss, which is the difference in contracting costs between model contract and observed contract in the absence of taxes. *RTH*, the risk-taking hurdle from equation (2.7), is a measure of the CEO's inclination to avoid taking on additional risk. This table shows the results for the 796 CEOs for whom we can find an implied reference wage (see Table 2.2).

Tax rate	Fixed salary ($m)		Stock (%)		Option (%)		Efficiency loss ($m)		RTH		Taxes ($m)			
											Obs. contract		Model contract	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
10%	0.12	0.00	2.15%	0.45%	1.02%	0.57%	0.007	0.002	0.32	0.32	1.8	0.7	1.6	0.6
25%	0.12	0.00	2.16%	0.45%	1.02%	0.57%	0.009	0.002	0.32	0.32	5.6	2.2	5.0	1.7
50%	0.12	0.00	2.22%	0.45%	0.96%	0.54%	0.459	0.002	0.32	0.32	11.1	4.4	9.2	3.1
75%	0.12	0.00	2.28%	0.47%	0.89%	0.47%	1.117	0.003	0.33	0.32	16.7	6.6	12.7	3.9
100%	0.12	0.00	2.43%	0.48%	0.73%	0.46%	3.710	0.003	0.37	0.32	22.2	8.8	16.7	5.0
Observed	1.48	1.03	1.99%	0.28%	1.24%	0.77%	N/A	N/A	0.20	0.22	N/A	N/A	N/A	N/A

Table 2.6: Taxation of all deferred compensation

This table shows the results for a tax penalty on total deferred compensation (the market value of stock and option pay) for five different tax rates. The table shows the mean and median of the three contract parameters, the taxes incurred on the observed and the model contract, and the efficiency loss, which is the difference in contracting costs between model contract and observed contract in the absence of taxes. *RTH*, the risk-taking hurdle from equation (2.7), is a measure of the CEO's inclination to avoid taking on additional risk. This table shows the results for the 796 CEOs for whom we can find an implied reference wage (see Table 2.2).

Tax rate	Fixed salary ($m)		Stock (%)		Option (%)		Efficiency loss ($m)		RTH		Taxes ($m)			
											Obs. contract		Model contract	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
10%	32.16	4.66	0.45%	0.00%	3.38%	1.44%	0.184	0.023	-0.12	-0.07	7.5	1.9	5.2	1.5
25%	35.36	5.02	0.17%	0.00%	3.93%	1.48%	0.891	0.034	-0.18	-0.13	24.7	6.1	16.4	4.6
50%	36.71	5.03	0.03%	0.00%	4.15%	1.48%	1.170	0.039	-0.20	-0.16	49.3	12.1	32.3	9.2
75%	36.74	5.03	0.02%	0.00%	4.17%	1.48%	1.178	0.039	-0.20	-0.16	74.0	18.2	48.5	13.9
100%	36.74	5.03	0.01%	0.00%	4.17%	1.48%	1.181	0.039	-0.20	-0.16	98.7	24.2	64.6	18.5
Observed	1.48	1.03	1.99%	0.28%	1.24%	0.77%	N/A	N/A	0.20	0.22	N/A	N/A	N/A	N/A

Taxes on all deferred compensation

The third case is similar to the previous case, only that now the tax is levied on stock and options and not just on options. We again consider five tax rates between 10% and 100% in Table 2.6. The adaptations of contracts are the opposite to those in the previous two cases, but they are more dramatic. For example, if the tax rate is set to 50%, median option holdings increase from 0.77% to 1.48%, stock holdings decline to zero, and fixed salaries quintuple from $1.0 million to $5.0 million.

As both forms of incentive pay, stock as well as options, are taxed at the same rate, taxes cannot be avoided as easily by substituting one form of deferred pay for another. However, the dollar value of options required to provide one unit of incentives (in our case, the pay-for-performance sensitivity from (2.4)) is less than the dollar value of stock required to provide one unit of incentives. The tax rate per dollar is the same for stock and for options, so the additional tax burden per unit of incentives is higher for stock than for options. Intuitively, stock is equivalent to options plus fixed pay, so options plus fixed pay have one component that is not taxed under this scenario. Therefore, firms replace stock by options and fixed salary up to the point where the non-negativity constraint on stock holdings becomes binding. In this way, firms can reduce their tax burden significantly. For example, if the tax rate is 50%, net benefits are on average $15.8 million, which consists of tax savings of $17.0 million (= $49.3m - $32.3m) net of an efficiency loss of $1.2 million.

As options replace stock, risk avoidance decreases and becomes negative for most companies for all tax rates considered. Therefore, under this tax regime, most CEOs have an incentive to accept negative NPV projects that increase firm risk. For a 50% tax rate, median RTH is -0.16, so the median CEO would be willing to see the firm value drop by 0.16% in order to increase firm risk by one percentage point.

Modeling a more realistic tax system: a robustness check

This section so far analyzes penalties on components of compensation that work like taxes, even though we have not explicitly considered taxes so far. This omission may potentially bias our results, because the tax system may have built-in biases that favor some compensation instruments over others. The penalty taxes we consider may even be efficiency enhancing if they neutralize the biases of the tax system.

We therefore repeat the analysis in Tables 2.4 to 2.6 for a stylized representation of the U.S. tax system.[21] We assume that CEOs pay income tax at a constant rate of 41% (state and federal taxes combined) and that companies can deduct compensation expenses from

[21] The modeling of the tax system follows Dittmann and Maug (2007), who provide a more detailed discussion (see their section VI.A).

corporate taxes, which they pay at a rate of 35%. Our definition of base salary includes all bonus payments. We assume that all these payments accrue to the CEO at $t = 0$ and we abstract from the one-million-dollar rule that can be circumvented when fixed salary is declared as a bonus. Stock options are granted at $t = 0$ and exercised at $t = T$. The CEO pays personal taxes and the company receives a tax credit at the exercise date of the options on the difference between the stock price and the strike price, $P_T - K$. We distinguish between restricted stock and unrestricted stock. Restricted stock is taxed at the personal level at the vesting date T and firms receive a tax credit at that time.[22] The CEO also pays personal taxes on dividend income. We do not consider capital gains taxes that may never be paid when the shares are never sold.

Table 2.7 repeats the analysis in Tables 2.4 to 2.6 and reports the key results. For clarity we shall refer to the additional taxes on particular compensation items as penalty taxes in order to distinguish them from standard income taxes. For this analysis we do not recalculate the reference wage for each CEO and use the reference wage for the case without taxes instead. As a consequence, the model contract for the baseline case does not correspond to the observed contract as before and we cannot report efficiency losses or gains relative to the observed contract.

The results for the case in which fixed compensation is subject to penalty taxes (Panel A of Table 2.7, corresponds to Table 2.4) are virtually unchanged relative to the case without income taxes. Base salaries and option holdings are slightly lower, which means that the substitution of base salaries and options for stock takes places even more strongly. Similar comments apply to the cases in which only options are subject to penalty taxes (Panel B of Table 2.7, corresponds to Table 2.5) and to the case in which all deferred compensation is subjected to penalty taxes (Panel C of Table 2.7, corresponds to Table 2.6).

2.7 Restricting the total value of compensation

In this section, we address a conceptually different question: we investigate the implications of *ex ante* restrictions on compensation. This is in line with proposals that limit the total value of compensation, for example as a multiple of the pay of workers in the same company. The conceptual framework of Sections 2.5 and 2.6 is not suitable to

[22] We maintain this assumption in Panels A and B of Table 2.7. In Panel C, we do not distinguish between restricted and unrestricted stock, so that all shares are taxed at time T. The reason is that (in contrast to Panels A and B) shareholdings decrease in Panel C and restricted stock would otherwise become negative.

Table 2.7: Robustness check with taxes

This table shows robustness checks of Tables 2.4 to 2.6 when we introduce realistic taxes both at the company level and at the personal level. We use the implied reference wage from the non-tax world (higher discount from Table 2.2) and calculate the optimal contract with realistic taxes. The resulting contract is shown in the first line of each table. Panel A shows optimal contracts for 709 CEOs when - in addition to the baseline taxes - fixed salary is not any longer tax deductible above the threshold displayed in the first column. Panel B shows optimal contracts for 699 CEOs when - in addition to the baseline taxes - option pay is taxed with the tax rate displayed in the first column. Finally, Panel C shows optimal contracts for 748 CEOs when - in addition to the baseline taxes - option and stock pay is taxed with the tax rate displayed in the first column. For the baseline tax case in Panels A and B, we assume that unrestricted stock is not an expense to the firm and, accordingly, not tax deductible. For consistency reasons (see Footnote 22), we assume in Panel C that all equity pay is tax deductible.

Panel A: Taxation of fixed pay

Threshold ($m)	Fixed salary ($m)		Stock (%)		Option (%)		RTH	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Infinity	2.05	0.57	2.00%	0.32%	1.21%	0.81%	0.36	0.39
5.0	1.23	0.57	2.01%	0.33%	1.19%	0.75%	0.38	0.40
2.5	0.89	0.55	2.02%	0.35%	1.17%	0.74%	0.39	0.41
1.0	0.52	0.50	2.04%	0.38%	1.14%	0.72%	0.42	0.42
0.5	0.30	0.45	2.07%	0.40%	1.11%	0.68%	0.44	0.43

Panel B: Taxation of option pay

Tax rate	Fixed salary ($m)		Stock (%)		Option (%)		RTH	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
None	4.16	0.68	1.81%	0.31%	1.28%	0.80%	0.34	0.37
10%	0.59	0.00	1.93%	0.40%	1.09%	0.64%	0.40	0.42
25%	0.08	0.00	1.99%	0.41%	1.01%	0.59%	0.43	0.43
50%	0.08	0.00	2.06%	0.44%	0.95%	0.52%	0.43	0.43
75%	0.08	0.00	2.19%	0.51%	0.83%	0.37%	0.44	0.43
100%	0.08	0.00	2.37%	0.57%	0.67%	0.24%	0.44	0.42

Panel C: Taxation of all deferred compensation

Tax rate	Fixed salary ($m)		Stock (%)		Option (%)		RTH	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
None	21.45	0.09	1.38%	0.07%	2.20%	0.97%	0.27	0.32
10%	31.75	4.52	0.39%	0.00%	3.55%	1.39%	0.08	0.12
25%	35.51	4.93	0.07%	0.00%	4.01%	1.47%	0.02	0.05
50%	35.57	4.93	0.04%	0.00%	4.05%	1.47%	0.01	0.05
75%	35.67	4.93	0.00%	0.00%	4.10%	1.47%	0.01	0.05
100%	35.67	4.93	0.00%	0.00%	4.10%	1.47%	0.01	0.05

address this question, because it is based on the idea that shareholders have already minimized the total value of compensation. Hence, a further reduction of total compensation is possible only if the incentive compatibility constraint or the participation constraint can be violated.

We formulate a new model where firms choose the level of incentive pay and thereby of effort. Here, a new trade-off arises, because companies now have to decide whether they want to award a higher level of variable compensation and reduce fixed compensation. Such a change provides more incentives and elicits a higher effort level, but leads to a higher risk premium and therefore a lower subjective value of the contract for the CEO. Contracts with a high level of variable compensation are therefore less attractive to CEOs, so that firms will have to compromise on the talent of the CEOs they can attract. Our model below incorporates this trade-off between incentive provision and CEO talent.

2.7.1 A model of effort and talent

We start with a simple Cobb-Douglas production function and assume that firm value is influenced by the level of effort e and the CEO's talent t:

$$V_0 = \kappa e^{\beta} t^{\gamma}, \tag{2.8}$$

where κ summarizes all other factors that influence firm value, and β and γ are elasticities.[23] Shareholders have to compensate the CEO for the costs of effort (denoted by $C(e)$) and for the costs of bearing idiosyncratic risk (denoted by RP for "risk premium"). Together, these two components make up the costs of incentive provision, which we express by IC (i.e., $IC = C(e) + RP$). For tractability, we assume an isoelastic supply function that relates incentive costs to the level of effort

$$IC(e) = e^{\eta}. \tag{2.9}$$

The firm faces a supply of talent, and we represent the costs of providing talent of quality t by the isoelastic function[24]

$$TC(t) = t^{\delta}. \tag{2.10}$$

[23] Baker and Hall (2004), Murphy and Zabojnik (2004), and Gabaix and Landier (2008) propose production functions where talent or effort affect the output linearly.

[24] Existing models assume that talent in inelastic. In Murphy and Zabojnik (2004) and Sung and Swan (2009), firms can choose between two managers only. Gabaix and Landier (2008) focus on the distribution of talent among the most talented managers. We allow for elastic talent supply, because arguably talent can be developed and retirement or leisure can be deferred. For simplicity, we treat talent as a homogeneous good and abstract from the problem that a particular level of talent might not be available because there are no or too few managers with this particular level of talent.

Since we cannot observe effort e or talent t, the parameters β, γ, η, and δ are not identified. In our setup, we cannot distinguish between supply and demand factors. We therefore substitute (2.9) and (2.10) into (2.8) and rewrite:

$$V_0 = \kappa IC^{\beta/\eta} TC^{\gamma/\delta} = \kappa IC^{a_1} TC^{a_2}, \tag{2.11}$$

where $a_1 = \beta/\eta$ and $a_2 = \gamma/\delta$ are identifiable if we can estimate incentive costs IC and talent costs TC. Total pay equals $\pi = IC + TC$ and this amount needs to be paid to the CEO every year. If the firm expects to stick to its choice of talent and incentives in all future years, the expected cost of all future compensation is given by the perpetuity $\frac{\pi}{r}$, where r is the appropriate discount factor. If the current CEO leaves the firm, another CEO with similar talent will be employed at a similar cost. In the absence of a cap on pay, the firm therefore maximizes $V_0 - \frac{\pi}{r}$ with respect to IC and TC. The first-order conditions then imply:

$$IC = a_1 r V_0,\ TC = a_2 r V_0. \tag{2.12}$$

Next, we investigate the impact of a cap on CEO pay on the value of the firm. A cap on CEO pay is simply a restriction so that total expected pay π cannot exceed some upper limit $\overline{\pi}$. Hence, we require $\pi \leq \overline{\pi}$. In the appendix, we prove the following claim:

Proposition 1. Value impact of a cap on pay: *Let π^* be the level of expected CEO compensation in the model without a cap on pay and assume that a binding cap on pay $\overline{\pi} \leq \pi^*$ is imposed. Then the log change in value of the firm with a cap on compensation, $ln(V_0(\overline{\pi})/V_0(\pi^*))$, can be written as:*

$$\ln\left(\frac{V_0(\overline{\pi})}{V_0(\pi^*)}\right) = (a_1 + a_2) ln\left(\frac{\overline{\pi}}{\pi^*}\right). \tag{2.13}$$

If we assume that the observed level of CEO compensation is the unrestricted optimum π^* and the observed firm value is $V_0(\pi^*)$, we can use (2.13) in order to estimate the impact of a cap on CEO pay once we obtain estimates for the sum of the elasticities a_1 and a_2.

Proposition 1 depends on the arguably strong assumption that a cap on pay induces firms to readjust the selection of their CEOs and their compensation practice by moving along the supply curves for talent and effort. It is conceivable that a cap on pay would also result in a shift in the supply curve. In particular, if a cap on compensation would

be imposed on an economy-wide basis, such a legislation would also reduce the outside options of CEOs if they consist in employments as top executives of other firms.[25] We ignore this aspect here because we have no credible way of calibrating such a shift in supply functions. Our model therefore portrays a cap that is imposed on an individual firm, for example, as a policy of external investors or as a condition for state subsidies that are available only to a small number of firms. However, even an economy-wide ban would probably result in some movement along the supply curve. For example, if a cap on compensation would affect only publicly listed companies, then talented CEOs might move to jobs in privately held companies. Alternatively, CEOs might go abroad or start their own business. It is unlikely that legislative intervention can foreclose all possible alternatives, so that the decline in value (even if it is somewhat lower than described by Proposition 1 and by (2.13)) would persist.

2.7.2 Calibration and empirical results

In this subsection, we calibrate the model individually for each firm in our sample and calculate the reduction in firm value caused by a cap on ex-ante pay from equation (2.13). We then estimate the elasticities a_1 and a_2 for, respectively, incentive costs and talent costs in the firm's production function (2.11) and validate these estimates by relating them to firm characteristics.

Our empirical results are to a large extent determined by our model assumptions, as is reflected in the fact that we can calibrate the model and generate predictions for an individual firm. An alternative approach that works with weaker assumptions and estimates the model across a number of firm (e.g., from the same industry) fails, however. The reason is that by assumption, firms have optimized CEO compensation, so that any cross-sectional variation in the relation between firm value and CEO compensation can only come from firm heterogeneity (see, e.g., Himmelberg, Hubbard, and Palia, 1999). Hence, any approach that gives more power to the data fails because we do not observe out-of-equilibrium outcomes.

To estimate the reduction in firm value from (2.13) we need an estimate of $a_1 + a_2$. As $\pi = IC + TC$, the first-order conditions (2.12) imply that $a_1 + a_2 = \frac{\pi}{rV_0}$. For the costs of the contract π, we use total compensation (TDC1 from ExecuComp) from 2006.[26] As V_0

[25] See Acharya and Volpin (2010) for an analysis of such general equilibrium effects.

[26] We do not use the expected value of the observed contract $E\left(\widetilde{w}^d\right)$ from (2.1) because the observed contract $\widetilde{w}^d$ might contain large unrestricted stock holdings that the CEO cannot reasonably expect to receive during each contracting period of length T. Many CEOs own a considerable amount of shares in their own firm,

denotes the gross firm value before the deduction of wage payments to the CEO, we set V_0 equal to the sum of the firm's market capitalization at the end of 2005, the firm's total debt at the end of 2005, and the present value of all future CEO compensation which we estimate by total compensation in 2006 divided by the risk-free rate $r = 4.35\%$. We delete 74 CEOs from our sample who hold more than 5% of the shares of their firms, because these CEOs are likely to be owner-managers rather than salaried agents. We lose another 33 CEOs because we do not have enough data to construct the firm value V_0.

Table 2.8, Panel A displays the results of our calibration for the full sample and separately for each of the 12 Fama-French industries. The last two columns show the loss in firm value when CEO pay is reduced by 20%. The first of these two columns displays the gross change in firm value from (2.13), while the second column shows the change in firm value net of CEO pay. For the purpose of this calculation, we define firm value as net firm value, which equals $V_0(\pi) - \pi/r$ and report the decline in value as a percentage change, not as a logarithmic change as in (2.13). The average loss across all firms in our sample is 0.64% in gross terms and 0.07% net of CEO pay. Hence, approximately $(0.64\% - 0.07\%)V_0$ comes from the 20% reduction in CEO pay. The average gross firm value therefore declines by $\frac{0.64\%V_0}{(0.64\%-0.07\%)V_0} = \$1.12$ for each dollar cut in compensation, which results in a net loss of \$0.12.

For the separate estimation of a_1 and a_2 we need estimates of incentive costs IC and talent costs TC. Incentive costs are the sum of the costs of effort and the risk premium ($IC = C(e) + RP$). We obtain the risk premium over the whole contracting period, $RP \cdot T$, from the model in Section 2.5 as the difference between the market value of the contract and the certainty equivalent of the contract for the CEO. We divide this risk premium $RP \cdot T$ by the length of the contracting period, T, over which the risk premium is measured in order to arrive at an annual value, RP. As the costs of effort are unobservable, we assume that these costs are proportional to the risk premium, so that $C(e) = \xi RP$ and consequently $IC = (1+\xi)RP$. We repeat our analysis for different values of ξ to demonstrate that our results are robust. The talent costs are then given by $TC = \pi - IC$.

Panel A of Table 2.8 also shows the average estimates of the elasticities a_1 and a_2, where we assume $\xi = 0.5$, i.e. costs of effort are 50% of the risk premium. The choice of ξ affects our results in two respects. First, the relative importance of incentives and talent depends on ξ. For $\xi = 0.5$, incentives appear less important for value creation than talent, because the average a_1 is considerably smaller than the average a_2. As ξ

either because they were founders of the firm or because they are required to do so by shareholders. These stock holdings are not a compensation cost to the firm as they were given to the CEO or acquired by the CEO in the past. Nevertheless, these stock holdings enter the risk premium RP. The firm need not pay for these shareholdings, but it must compensate the CEO for the disutility of holding on to them.

Table 2.8: The effect of talent and effort on firm value

Panel A shows average estimates of the coefficients a_1 and a_2 of the production function (2.11) for the complete sample of 689 CEOs and separately for the twelve Fama-French industries in our sample. We lose 107 observations, because of data requirements and because we drop those CEOs who are owner-managers, i.e., their shareholdings n_S exceed 5%. The rightmost two columns in Panel A show the average estimated change in firm value ΔV when total CEO pay is reduced by 20%. The second-to-last column shows the gross change in firm value from Proposition 1. The last column shows the change in firm value net of CEO pay, where firm value equals $V_0(\pi) - \pi / r$ and the decline in value is reported as a percentage change rather than a logarithmic change as in Proposition 1. The estimates for a_1 and a_2 – but not those for ΔV – depend on the assumption that $\xi = 0.5$. Panel B shows the average of six firm characteristics for subsamples formed according to the size of our estimates for a_1 and, respectively, a_2. Here, the subgroup 'High' ('Low') refers to the firms with above median (below median) value for the considered coefficient. We exclude financial firms from our analysis in Panel B. The table also shows the p-value of the two-sample t-test. *Tangibility* refers to tangible assets and is expressed as a percentage of total assets, just like *R&D expense* and *Advertising expense*. *PPS $-$* is the pay-for-performance sensitivity that measures by how many dollars CEO wealth increases if firm value increases by $1. *PPS $-%* measures by how many dollars CEO wealth increases if firm increases by 1%. Excess pay is the residual from a regression of total CEO pay on previous year's sales, investment opportunities, ROA, stock return, and the volatilities of ROA and stock returns over the past five years (see Core et al.,1999).

Panel A: Estimation of the importance of effort, talent, and size for firm value

Industry	Obs.	a_1	a_2	ΔV	
				gross	net
Full sample	689	0.007	0.022	-0.64%	-0.07%
Consumer NonDurables	37	0.008	0.025	-0.75%	-0.08%
Consumer Durables	17	0.013	0.031	-0.98%	-0.10%
Manufacturing	100	0.006	0.025	-0.69%	-0.07%
Oil, Gas, and Coal Extraction and Products	37	0.007	0.021	-0.62%	-0.06%
Chemicals and Allied Products	26	0.004	0.030	-0.75%	-0.08%
Business Equipment	115	0.011	0.022	-0.73%	-0.08%
Telephone and Television Transmission	6	0.005	0.001	-0.15%	-0.02%
Utilities	52	0.001	0.012	-0.28%	-0.03%
Wholesale, Retail, and Some Services	77	0.008	0.023	-0.71%	-0.07%
Healthcare, Medical Equipment, and Drugs	61	0.010	0.022	-0.71%	-0.07%
Finance	83	0.005	0.012	-0.37%	-0.04%
Others	78	0.006	0.029	-0.78%	-0.08%

Panel B: Do our estimates reflect firm characteristics?

	Groups formed according to a_1				Groups formed according to a_2			
	Subgroup mean		Diff.	p-value	Subgroup mean		Diff.	p-value
	High	Low			High	Low		
Tangibility	78.5%	80.9%	-2.3%	0.14	0.79	0.80	-0.02	0.34
R&D Expense	3.6%	2.3%	1.2%	0.00	2.8%	3.0%	-0.2%	0.63
Advertising Expense	1.2%	0.8%	0.4%	0.11	1.1%	0.9%	0.2%	0.40
PPS $-$	0.011	0.002	0.009	0.00	0.007	0.006	0.001	0.31
PPS $-%	0.32	0.48	-0.16	0.63	0.11	0.68	-0.57	0.09
Excess pay	-0.65	0.28	-0.93	0.07	0.21	-0.58	0.79	0.13
Observations	303	303			303	303		

increases, however, the difference between a_2 and a_1 shrinks and eventually changes sign. The second effect of ξ is that talent costs become negative for some CEOs, because total pay π is smaller than $(1+\xi)$ times the risk premium *RP*. For $\xi = 0.5$ this happens for 41 firms. We keep these firms in Table 2.8, because we do not want to introduce a bias in our cross-sectional results. If we assume that ξ is of similar size across industries, the differences in our estimates across industries are independent of the actual size of ξ. Table 2.8, Panel A then shows that effort is most important for consumer durables and business equipment and least important for utilities, and chemicals. On the other hand, talent is most important for consumer durables and chemicals, while it is least important for telephone/television, utilities, and finance.

We expect that incentive pay is more important (i.e., the elasticity a_1 is higher) in firms where the CEO has more discretion and agency problems are stronger. In Table 2.8, Panel B, we therefore split our sample into two groups according to the median of a_1. Here, we exclude the financial industry since their balance sheets are difficult to compare to those of industrial firms. For both groups, the group with above median values of a_1 and the group with below median values of a_1, we report the means of several firm characteristics and test whether these differences are significant. We consider tangibility, R&D expenses, and advertising expenses, all scaled by total assets. We also include the mean pay-for-performance sensitivity in each industry, once in dollar-dollar terms and once in dollar-% terms. The latter variable measures the dollar increase in CEO wealth for a percentage increase in firm value. Moreover, we estimate excess pay following the approach of Core, Holthausen, and Larcker (1999): we regress total compensation (ExecuComp item TDC1) on sales, a five-year average of the market-to-book ratio, return on assets, the standard deviation of the return on assets, the stock market return, and the standard deviation of the stock market return. Standard deviations are also calculated over five years. Excess pay is then the residual from this regression.

Table 2.8, Panel B shows that asset tangibility is lower by 2.3%, R&D expenditures are higher by 1.2%, and advertising expenses are higher by 0.4% for the firms where our estimate of the effort elasticity a_1 is above the median. These differences are statistically significant only for the R&D expenditures. These findings are consistent with our hypothesis that incentives play a larger role in industries where managers have more discretion and where agency problems are larger. We also find that the pay-for-performance sensitivity (if expressed in \$-\$ terms) is significantly higher for firms with high a_1 estimate. This finding is not surprising, because a_1 is by construction high when the risk-premium is high.

The right part of Table 2.8, Panel B displays a similar sample split with respect to the

coefficient a_2 on talent. It shows that this parameter cannot be related to any of the firm characteristics shown in the table. Interestingly, our estimate for the importance of talent is also not significantly associated with excess pay. There is a debate in the literature whether excess pay is a measure of rent extraction (e.g., Core, Holthausen, and Larcker, 1999) or of managerial talent (e.g., Falato, 2007). If excess pay is a measure of talent, firms where talent is important should employ more talented CEOs and give them more excess pay, i.e., a_2 should be positively related to excess pay. We do find a positive sign, but the difference is insignificant. Altogether, our results for the coefficients a_1 and a_2 suggest that the model captures the relationship between compensation and firm value in a sensible way.

2.8 Discussion and conclusion

In this chapter we discuss restrictions on executive pay and analyze three types of restrictions that have been advocated recently: restrictions on ex post realized pay in order to avoid large payouts to executives across a range of possible scenarios, restrictions on components of pay, and, finally, restrictions on the ex ante value of pay.

The impact of restrictions on realized pay is mostly small, but these restrictions have some unintended consequences: CEOs earn on average more, they are rewarded more for mediocre performance, and they become generally more averse to accepting additional risks. Restrictions on individual components of pay have almost no impact at all because companies can contract around these restrictions at no or little cost. In both cases, the impact on firm value is small because firms can still hire the same CEO and implement the same level of incentives as before, unless restrictions on realized pay become too stringent.

Regulating the ex ante value of pay in order to limit compensation when it is deemed to be excessively high is potentially more costly. In this case firms cannot simultaneously provide the same level of incentives and attract executives of the same quality as before. We therefore develop a simple model that features compensation to provide incentives as well as compensation for talent. Consistent with our intuition we find that effort provision has a bigger impact on firm value when agency problems are likely, i.e., in industries with more intangible assets and more R&D. However, the model implies only an average 0.07% loss in firm value if firms are forced to reduce total CEO pay by 20%. The reason is that the model does not incorporate frictions in the market for managerial labor and assumes a significant degree of substitution between talent and effort, which provides firms with a lot of leeway to evade restrictions. Our model has this feature in common with other models of the executive labor market (e.g., Gabaix and Landier, 2008; Edmans

and Gabaix, 2010) and we conjecture that models that would include more frictions would give rise to higher estimates of the costs of restricting compensation.

Throughout the chapter we maintain the working hypothesis that observed compensation practice is Pareto efficient and we therefore work with a sample of firms where all directors on the compensation committee are independent. A stronger indication of efficient contracting is that one of the directors on the compensation committee holds an equity stake of at least 1% and is not an employee of the firm. There are 59 firms in our sample that qualify as "good corporate governance" according to this indicator. In unreported work, we repeat our analysis from Sections 2.5 and 2.6 separately for this subsample, but none of our results changes much.

Our analysis does not cover the potential efficiency gains from pay restrictions, mainly because they seem to be impossible to quantify. Theoretical research on governance externalities, turnover costs, or hidden compensation is in its infancy and existing models do not lend themselves to calibration and the quantification of effects (see our discussion in the Introduction). We can only speculate that these defects of the managerial labor market would be better addressed through improvements of the pay-setting process and the managerial labor market such as better disclosure rules and improved governance, rather than through pay restrictions. More theoretical work is needed here.

We restrict our analysis to a discussion of firm value. Restrictions on compensation may have other consequences. For example, capping CEO pay may increase the utility of voters who are inequality averse and reduced risk-taking incentives may also benefit workers. While these issues may be important for the political process and for the motivations of capping CEO pay, they are beyond the scope of this chapter.

Appendix 2.A: Proof of Proposition 1

In the presence of a cap, the firm maximizes $V_0 - \frac{\pi}{r} = \kappa IC^{a_1} TC^{a_2} - \frac{IC+TC}{r}$ subject to the constraint $\pi \leq \overline{\pi}$. We assume that the restriction is binding, that is, that $\overline{\pi} < \pi^*$. The first-order conditions then are:

$$\begin{aligned} \frac{a_1}{IC} V_0 - \frac{1}{r} + \lambda &= 0 \Rightarrow IC = \frac{a_1 V_0}{\frac{1}{r} - \lambda}, \\ \frac{a_2}{TC} V_0 - \frac{1}{r} + \lambda &= 0 \Rightarrow TC = \frac{a_2 V_0}{\frac{1}{r} - \lambda}, \end{aligned}$$

where λ is the Lagrange multiplier associated with the constraint $\pi \leq \bar{\pi}$. Together with $\pi = IC + TC$, we obtain

$$\begin{aligned} \pi &= (a_1 + a_2) \frac{V_0}{\frac{1}{r} - \lambda} \\ \Rightarrow IC &= \frac{a_1}{a_1 + a_2} \pi, \; TC = \frac{a_2}{a_1 + a_2} \pi. \end{aligned}$$

Under a binding cap, we therefore have $IC(\bar{\pi}) = \frac{a_1}{a_1+a_2}\bar{\pi}$, and $TC(\bar{\pi}) = \frac{a_2}{a_1+a_2}\bar{\pi}$. In the case without a cap, we obtain similar expressions (this is the case where the restriction is not binding, so that $\lambda = 0$.): $IC(\pi^*) = \frac{a_1}{a_1+a_2}\pi^*$, and $TC(\pi^*) = \frac{a_2}{a_1+a_2}\pi^*$. We therefore obtain:

$$\begin{aligned} \ln\left(\frac{V_0(\bar{\pi})}{V_0(\pi^*)}\right) &= \ln(V_0(\bar{\pi})) - \ln(V_0(\pi^*)) \\ &= \ln\kappa + a_1 \ln IC(\bar{\pi}) + a_2 \ln TC(\bar{\pi}) \\ &\quad - (\ln\kappa + a_1 \ln IC(\pi^*) + a_2 \ln TC(\pi^*)) \\ &= a_1 \ln\left(\frac{a_1}{(a_1+a_2)}\bar{\pi}\right) + a_2 \ln\left(\frac{a_2}{(a_1+a_2)}\bar{\pi}\right) \\ &\quad - a_1 \ln\left(\frac{a_1}{(a_1+a_2)}\pi^*\right) - a_2 \ln\left(\frac{a_2}{(a_1+a_2)}\pi^*\right) \\ &= a_1 \ln(\bar{\pi}) + a_2 \ln(\bar{\pi}) - a_1 \ln(\pi^*) - a_2 \ln(\pi^*) \\ &= (a_1 + a_2) \ln\left(\frac{\bar{\pi}}{\pi^*}\right). \end{aligned}$$

The last line shows (2.13).

Chapter 3

Executive Dividend Protection and Payout Policy

3.1 Introduction

This chapter provides empirical evidence of a strong relation between executive compensation and an important managerial decision, namely dividend payout policies. The primary characteristics of compensation discussed in this chapter is the dividend protection on CEO restricted stock and option holdings. This chapter contributes to the literature in four aspects. First, I compile explicit dividend protections in executive restricted stock grants, as well as executive stock options, for S&P 500 firms between 2000 and 2009. Second, I introduce an intuitive measure of dividend protections, which can be easily constructed for each individual executive based on publicly available information. Third, I show that there is a strong relation between executive dividend protections and corporate dividend payouts. In particular, I find that a high dividend protection on executive compensation is associated with higher dividend payouts and lower repurchases. Fourth, I use an external shock from the 2003 tax reform and analyze the impact of changes in executive dividend protections on changes in dividend policy. I find evidence for a causal relation from executive dividend protections to dividend policy, but not the other way round.

Due to agency problems and managerial over-confidence, investors demand large, profitable and mature firms to make substantial ongoing distributions because large-scale internal cash accumulation gives managers the opportunity to waste corporate resources

(Roze (1982), Easterbrook (1984)). Dividends may also force managers to commit future cash flows to maintain a certain level of dividend payments, given the fact that investors penalize dividend reductions or omissions (Jensen (1986), Healy and Palepu (1988), Kallapur (1994)). Thus, the payment of dividends provides an implicit mechanism for monitoring the manager's actions. However, managerial incentives from their compensation contracts are not always fully aligned with shareholders' interests in dividend payouts. Specifically, restricted stock and option grants might deter executives from paying out dividends, because dividend payments reduce the stock price and thus the value of equity incentive grants which are not dividend protected[1].

This study is the first to explore explicit dividend provisions found in executives' unvested restricted stock[2]. In particular, I argue that the dividend protection of unvested restricted stock helps to reduce the conflict between managers and shareholders over the dividend policy. Such dividend protections are particularly important given the fact that the use of restricted stock grants has grown rapidly in recent years[3]. To examine the role of executive dividend protections in influencing dividend policy, I use a unique data set manually collected from annual proxy statements of S&P 500 firms over the period of 2000-2009. In particular, for each restricted stock or stock option grant awarded to a CEO, I collect its value, amount, vesting period, and whether (and if so, how) it is dividend protected. I then construct a measure of dividend protection that captures to what degree CEO restricted stock and option holdings are dividend-protected. To examine the effect of dividend protections on corporate payouts, I use industry fixed-effects panel data estimators, which reduces the likelihood that an omitted effect drives the result.

I have two important findings. First, higher dividend protection is associated with

[1] In addition to the direct effect of dividend payment on stock price, the payment of dividends might also have a signaling effect on stock price, because there is a tendency for stock prices to increase when managers raise dividends, and to decline when they reduce them. However, as suggested by Lambert et al.(1989), the cumulative reduction in share price caused by payment of dividends dominates any signaling effects on share price. Section 3.4.7 examines the market reaction to dividend changes and provides evidence supporting Lambert et al. (1989).

[2] Prior literature has mostly focused on option grants. Lambert et al. (1989) suggest stock option plans provide incentives for executives to reduce dividends, because most executive stock options are not dividend protected (Murphy (1999)). Bartov et al. (1998), Jolls (1998), Weisbenner (2000), Fenn and Liang (2001), and Cuny et al. (2009) show that executives holding options have incentives to avoid dividends and to favor share repurchases. Chetty and Saez (2005) and Brown et al. (2007) provide further evidence on the negative association between executive option holdings and the likelihood of a dividend increase following the dividend tax cut. Aboody and Kasznik (2008) look at both stock options and restricted stock. They find that stock options deter executives from using dividends while restricted stock induces the use of dividends. They speculate that it is because restricted stock grants are dividend-protected while option grants are not. However, they do not provide data or direct analysis on dividend protection.

[3] Blouin and Carter (2010) find that the granting of restricted stock has grown from 20% to 67% of ExecuComp (S&P 1500) firms from 1992 to 2008. Aboody and Kasznik (2008) suggest an increase use of restricted stock following the 2003 dividend tax rate reduction. Table 1 (Panel A) also shows an increasing trend in restricted stock grants for S&P 500 firms during 2000-2009.

higher dividend payouts. A one-standard-deviation increase in dividend protection is associated with a 29-basis-point increase in dividend yield, which translates into about a 31% increase in annual dividend yield for a median S&P 500 firm. Second, I show that the dividend protection is associated with lower repurchases, but has no effect on total payouts. This result suggests that there is a substitution between dividends and repurchases. These findings are robust to different subsamples based on whether dividend protections are provided, whether firms pay dividends in the past ten years, whether their CEOs have restricted stock holdings and/or option holdings, and whether there is a CEO turnover. They are also robust using alternative measures of dividend-paying incentives, including the dividend protection dummy and dividend-paying disincentive. The dividend-paying disincentive measures the dollar change in CEO's non-dividend-protected compensation if the estimated future dividend yield increases by one percentage point.

Such a positive association between dividend protections on executive compensation and firm dividend payouts is consistent with two alternative explanations. First, dividend protections may influence the dividend policy of firms. Alternatively, dividend protections may be designed based on a firm's dividend policy. To distinguish between these two hypotheses, I perform several tests. First, I use the 2003 dividend tax cut as an exogenous variation and compare the dividend increase and the dividend initiation before and after the tax cut. I find that CEOs with higher dividend protections in the year before the dividend tax cut are more likely to increase dividend payments after the tax cut, supporting the first hypothesis that dividend protections influence the dividend policy. I also examine the relation between the changes in dividend protection and the changes in dividend yield for a one-year lag and a two-year lag, respectively. I find that one-year lagged changes in dividend protection increase with changes in the firm dividend payouts of this year, but neither the one-year nor the two-year lagged changes have any effects on changes in dividend protection. Overall, the results suggest that causality runs in one direction: the dividend protections on executive compensation appear to influence the corporate dividend payouts.

The remainder of this chapter is organized as follows. Section 3.2 reviews prior research on managerial dividend-paying incentives and corporate payout policies. Section 3.3 presents the sample and the data. Section 3.4 provides main results and Section 3.5 concludes.

3.2 Compensation and the payout decision

Beginning with Lambert et al. (1989), a large literature examines executive stock option plans and corporate payout policies. Lambert et al. (1989) find that the initial

adoption of executive stock option plans provides an incentive for the managers to reduce corporate dividends. The finding follows from the observation that executive stock options are generally not dividend protected. When options are not dividend protected, dividend payouts will reduce the value of options due to their effects on the stock price. Since the exercise price is fixed when options are granted and is not adjusted over time, the use of options without dividend protection creates a disincentive for executives to pay dividends. Lambert et al. (1989) interpret these results as evidence that the personal incentives of executives can affect certain aspects of the observed corporate dividend policy.

Bartov et al. (1998) study the choice between increasing dividends and initiating open-market repurchases. Their findings suggest that managers who own more stock options or stock appreciation rights are more likely to distribute cash to stock holders through open-market repurchase rather than an increase in cash dividends. Weisbenner (2000) also finds that executive stock option grants induce more earnings retention and lower cash distributions, but finds no evidence that such option-induced dividend reductions have led to increased share repurchases. Jolls (1998) and Fenn and Liang (2001) find a strong negative relationship between dividends and management stock options and a positive relationship between repurchases and management stock options. They argue that their findings help to explain the rise in repurchases at the expense of dividends. Cuny et al. (2009) confirm the negative association between the executive stock options and the dividend payouts. They further show that firms increase payouts through repurchases in order to offset earnings per share dilution resulting from the usage of executive and non-executive stock options. In addition, they find that incentives from not having dividend protection for option dominate those from antidilution, resulting in lower total payout for firms with higher options usage. Kahle (2002) find that executive stock options increase the likelihood that a firm will repurchase, since repurchases do not affect the value of managerial options but dividends do. However, once the decision to repurchase has been made, the number of shares actually repurchased depends only on total options exercisable by all employees but independent of managerial options.

Chatty and Suez (2005) analyze firms response to the large tax cut on individual dividend income enacted in 2003. They show that firms whose top executives held more shares and fewer unexercised stock options were much more likely to initiate dividend payments in the year after the reform. Brown et al. (2007) also use the 2003 dividend tax cut to identify an exogenous change in the after-tax value of dividends. They find that executives with higher ownership were more likely to increase dividends after the tax cut in 2003, where as no relation is found in period when the dividend tax rate was higher. They argue that executives who have undiversified wealth with large company stock own-

ership may place additional value on dividends for liquidity reasons. In contrast, they find a negative relation between executive stock option holdings and dividend increase, both before and after the dividend tax cut. The reason is that executives compensated with options have a personal financial incentive to limit dividends both before and after the tax cut.

Although restricted stock has become one of the largest components of executive compensation, few studies examine the direct link between restricted stock and dividend payout policies. Jolls (1998) finds no relationship between repurchases and restricted stock. Aboody and Kasznik (2008) suggest that the increase in dividends following the 2003 dividend tax cut is induced primarily by increased grants of restricted stock and, to a lesser extent, by a decrease in stock option grants. They argue that this shift in equity-based executive compensation helps to align managers' payout choices with shareholders' tax-related payout preferences, with the assumption that restricted stock grants are dividend-protected while option grants are not.

3.3 Sample and data description

3.3.1 Sample selection

To construct my sample, I begin with a panel of S&P 500 firms for the period of 2000-2009. I start with the year 2000 because the use of restricted stock was not popular before. More than half of my sample has never granted any restricted stock to their CEOs before 2000[4]. Frydman and Jenter (2010) show that restricted stock grants account for an average of 5% of total CEO compensation in the early 1990s and increased to 7% in 2000. However, after the stock market decline of 2000-2001, some firms started to replace option grants with restricted stock grants. In 2004, FASB adopted an accounting change by requiring a charge against earnings for stock option grants. Therefore, the previous accounting advantage for stock options has been eliminated. Since the new rule, firms have tended to cut back the number of stock options granted and have replaced them with restricted stock. According to Frydman and Jenter (2010), restricted stock has become the most popular form of equity-based compensation by 2006.

After merging the data from Compustat and Execucomp, I obtain a sample of 4,258 observations for 482 firms. Following the prior literature, I further exclude financial firms (SIC 6000-6999), utilities (SIC 4900-4999), and regulated phone companies (SIC code

[4]This is consistent with Murphy (1999) who documents that only 28% of S&P 500 firms granted restricted stock to their CEO in 1996 and those grants account for an average of 6.1% of total compensation. Blouin and Cater (2010) also show that 20% of ExecuComp firms grant restricted stock in 1992 and the value of these restricted stock grants accounts for 3% of the total compensation.

4813), because their payout policies may be significantly affected by their regulated status (Smith and Watts, 1992; Fenn and Liang, 2001). My final sample contains 3,527 observations for 372 firms across 10 years.

3.3.2 Measuring dividend protection

Data collection from proxy statements

I use SEC's EDGAR system and manually collect dividend provisions on restricted stock and option grants from companies' annual proxy statement[5]. Such information can usually be found in the following places of proxy statement: a) compensation philosophy and elements of compensation for executive officers in the Compensation Discussion and Analysis section; b) the footnote of the Summary Compensation Table; 3) the footnote of the Outstanding Equity Awards at the Fiscal Year-End (only for proxy statement filed after 2006); d) the company's Long-Term Incentive Plan in the appendix[6]. Specifically, I collect the following information for each individual grant held by CEOs during 2000-2009.

1. Does the firm offer incentive compensation, such as restricted stock, option, and long-term incentive equity plans, to the CEO?

2. Does the firm provide dividends on stock or options during the vesting period?

3. If so, are dividends paid at the same time as to other shareholders or accumulated and paid out only upon vesting? Are they paid in cash or in an equivalent amount of additional restricted stock?

4. Does the firm grant voting rights on executives' unvested incentive grants?

5. Is the incentive award contingent on any criteria, such as performance and time?

Table 1 provides an overview of the information collected from proxy statements following the above procedure. I focus specifically on restricted stock and option grants but not other compensation components that are not sensitive to changes in dividend distribution. For example, executives who hold unrestricted stock are entitled to all shareholder

[5]Proxy statements are not available or information on executive compensation is missing in less than 5% of the time. In most of these cases, I found the relevant information in the company's annual report.

[6]The full text of the Long-Term Incentive Plan is not available every year, but whenever the old Plan is amended/restated or when a new plan is made the full text will be included in the appendix. For my sample, on average firms amend their Long-Term Incentive Plan more than twice for a ten-year period.

rights, including the right to receive dividends, and thus do not suffer from paying out dividends[7].

As shown in the second column of Panel A, the disclosure of dividend arrangements on restricted stock and option grants is very good, with at most 4 firms in a year that lack information in their proxy statements. Consistent with Frydman and Jenter (2010) and Blouin and Carter (2010), I find an upward trend for restricted stock grants compared to a downward trend for option grants. The percentage of firms that grant restricted stock to CEOs increases sharply from 22% in 2000 to 68% in 2009. However, the percentage of firms that use executive option grants decreases slightly from 83% to 73%. Before 2005, majority of restricted stock grants offer dividend rights that entitle the CEOs to be paid at the same rate and at the same time as cash dividends are paid to common stockholders (denoted as "*immed*" for immediate payment). After 2005, more and more firms offer dividend rights that accumulate the dividend payments either as cash in a special account or as additional restricted stock that is subjected to the same restriction as the restricted stock grant (denoted as "*accum*" for accumulation). In addition to dividend rights, some firms also provide voting rights on unvested restricted grants. While a large majority of firms offer dividend protections on restricted stock grants, less than 1% of firms provide dividend protections on option grants. In fact, I find in total 4 firms for the period of 2000-2009 that have provided dividend rights on options[8].

Panel B provides an overview of dividend rights on restricted stock grants across industries, classified based on the Fama-French 12 industry definitions[9]. On average, 45% of firms-year observations grant restricted stock to CEOs, ranging from 34% in business equipment to 61% in energy sector. For firms that use restricted stock grants, about 79% on average provide dividend protections, with the highest in durables and the lowest in health sector. I divide the sample into two subsamples based on whether the firm has paid out any dividend during the past 10 years. On average, 49% of dividend paying firms grant restricted stock to CEOs which is much higher than that of 28% in non-dividend firms. Among those firms that use restricted stock grants, on average 82% (41% out of 49%) of dividend paying firms provide dividend protections compared to 59% (17% out of 28%) of non-dividend firms.

[7]Another explanation might be "mental accounting". When stock grants are earned, they are treated as wealth while unearned restricted stock is treated as income.

[8]This number is consistent with prior research. Murphy (1999) finds 7 out of 618 firms in year 1992 provided dividend protection on their executive stock options while Weisbenner (2000) finds 2 out of 799 firms in 1994. Cuny et al. (2009) report only one firm that explicitly mentions the use of a dividend-protected option plan after searching all 10-K statements over the period 1992–2005 for the term "dividend protected" and variations thereof.

[9]Due to rare incidence, dividend rights on option grants are not shown here. For those 4 firms that provide dividend protection on option grants, we have one from manufacture, one from energy, and two from others.

Table 3.1: Dividend protections of CEO restricted stock and option grants

Panel A provides summary statistics of dividend protections of CEO restricted stock and option grants for S&P 500 firms in the period of 2000-2009. Financial firms, utilities, and regulated phone companies are excluded. *No info.* is the number of cases where no dividend information on incentive grants can be found. Dividend (voting) rights refer to the rights that entitle the grantee to receive dividends (to vote) during the vesting period. *immed* means the dividend on restricted stock or options is paid to the CEO at the same time as paid to the common stock shareholders. *accum* means the dividend equivalent is accumulated and paid upon vesting. Panel B provides an overview of dividend protections (*DP*) on restricted stock grants (*RSG*) across industries classified based on the Fama-French 12 industry definitions. If firms paid out cash dividends at least once in the past ten years, they are defined as dividend-paying firms; otherwise, as none dividend-paying firms.

Panel A: Dividend protections over the period of 2000 - 2009

		Restricted Stock Grants				**Option Grants**		
			Dividend rights		Voting		Dividend rights	
Year	No info.	Total	*immed*	*accum*	rights	Total	*immed*	*accum*
2000	2	22%	15%	5%	7%	83%	0.3%	0.3%
2001	2	24%	16%	5%	8%	86%	0.3%	0.3%
2002	1	26%	17%	5%	8%	82%	0.3%	0.3%
2003	1	34%	24%	8%	10%	82%	0.3%	0.0%
2004	3	44%	27%	12%	12%	80%	0.7%	0.3%
2005	3	48%	29%	14%	14%	76%	0.4%	0.4%
2006	2	59%	22%	20%	12%	71%	0.4%	0.0%
2007	2	65%	22%	23%	10%	69%	0.4%	0.0%
2008	2	69%	23%	25%	10%	69%	0.5%	0.0%
2009	4	68%	20%	26%	9%	73%	0.4%	0.0%

Panel B: Dividend protections across industries

	Full sample			**Dividend Paying Firms**			**Non-Dividend Firms**		
	N	*RSG*>0	*DP*>0	N	*RSG*>0	*DP*>0	N	*RSG*>0	*DP*>0
All	3,527	45%	35%	2,725	49%	41%	802	28%	17%
NonDurables	334	53%	47%	321	53%	46%	13	54%	54%
Durables	105	42%	37%	95	45%	40%	10	10%	10%
Manufacture	514	50%	43%	465	51%	45%	49	37%	24%
Energy	187	61%	50%	171	65%	53%	16	19%	19%
Chemicals	158	47%	40%	158	47%	40%	0	0%	0%
B. Equipment	826	34%	23%	419	38%	27%	407	29%	19%
Telecom	150	47%	39%	127	53%	44%	23	13%	13%
Shops	494	43%	31%	385	51%	37%	109	16%	11%
Health	375	44%	30%	238	52%	43%	137	31%	7%
Others	384	48%	40%	346	48%	41%	38	47%	26%

The dividend protection variable

I construct the variable, dividend protection (*DP*), as the value of CEO restricted stock and option holdings that are dividend-protected divided by the total value of restricted stock and option holdings. This variable measures to what extent the CEO's restricted stock and option holdings are protected against the potential loss from paying dividends. $DP = 1$ means that the CEO is fully protected and thus neutral on paying dividends. $DP = 0$ means that the CEO is not entitled to the dividends on any of her restricted stock or option holdings and has a personal disincentive to pay dividends. I consider holdings rather than new grants awarded in a specific year, because executives often held more than one grants from previous years which are still under restrictions. Counting only new grants will underestimate executives' potential losses in their equity compensation from paying dividend[10]. I take values rather than the number of holdings, because per unit value of restricted stock is different from that of stock options. Specifically, the value of restricted stock holdings is the sum of values of all restricted stock grants, calculated as the number of restricted stock holding multiplied by the stock price at the fiscal year end. The value of option holdings is the sum of the Black-Scholes values of all option grants held by the CEO. When a CEO holds no restricted stock or options, which is less than 2% of the sample, her compensation is not subject to the potential loss from paying dividends. In such a case, I set *DP* equal to one. In section 3.4.2, the results are replicated for CEOs that have positive restricted stock or option holdings. This does not qualitatively change my conclusion. In section 3.4.3, some alternative measures for dividend protection will also be considered for robustness checks.

Table 3.2 presents the summary statistics for 3,527 firm-year observations. The mean dividend protection (*DP*) is 17% and the median is zero. The number for *DP* may seem small. However, these are the mean and median for the full sample, including firms which do not grant restricted stock or options. If we only look at firms that do provide managerial dividend-incentives, which is 49.8% of the case (1,702 firm-year observations), on average 41% of CEO restricted stock and option holdings are protected against the potential loss from paying dividends[11]. In addition, an alternative measure, dividend-paying disincentives, is shown in Table 3.2. Dividend-paying disincentives are the absolute dollar change in CEO's equity incentive compensation for a 1% increase in the estimated future dividend yield. The details about this measure are discussed in section 3.4.3.

[10]For my sample, on average a CEO holds $27 million of restricted stock and options, of which $8.6 million are for new grants. It's plausible to assume that CEOs care about all grants they currently hold rather than just new grants awarded in current year.

[11]The mean (median) estimated payment on dividend protection is $171,086 ($52,648) per year.

Table 3.2: Summary statistics

DP is the value of CEO restricted stock and option holdings that are dividend-protected divided by the total value of restricted stock and option holdings. Dividend-paying disincentive is the absolute dollar change in CEO's compensation for a 1% increase in the estimated dividend yield. CEO stock ownership is the number of stock held by the CEO divided by the number of common shares outstanding. CEO cash compensation is the sum of salary and bonus. Dividend yield is regular cash dividends divided by the market value of equity. Repurchases are defined as total expenditure on the purchase of common and preferred stocks minus any reduction in the value of the net number of preferred stocks outstanding. Total payouts are the sum of dividends and repurchases divided by the market value of equity. Free cash flow is operating income before depreciation minus capital expenditures. Market-to-book ratio is the book value of assets plus the market value of equity minus the book value of equity, divided by the book value of assets. Leverage is total long-term debt scaled by total assets. Volatility of earnings is based on the standard deviation of the past 5-year earnings before interest, taxes and depreciation less capital expenditures, scaled by total assets. Sales growth is the percentage change in sales. Entrenchment index is a measure of corporate governance, following Bebchuk et al. (2009)'s definition. Firm age is the number of years since its IPO.

	Mean	**Std. Dev.**	**10th Pctl**	**Median**	**90th Pctl**	**N**
Dividend protections on stock and options						
Dividend protection (*DP*)	17%	27%	0%	0%	61%	3,527
Dividend-paying disincentives ($000)	3,011	5,252	88	1,559	6,657	3,527
CEO compensation						
# Restricted stock holdings ('000)	137	303	0	21	375	3,527
Value of restricted stock ($000)	4,572	12,551	0	707	11,498	3,501
# Option holdings ('000)	2,792	4,988	333	1,549	5,593	3,527
Value of option holdings ($000)	27,596	73,228	0	8,219	63,977	3,523
CEO stock ownership	0.8%	2.8%	0.0%	0.1%	1.3%	3,509
CEO cash compensation ($000)	2,078	2,267	750	1,493	3,868	3,470
Payout policy						
Dividend yield	1.3%	1.6%	0%	0.9%	3.2%	3,500
Repurchase/MV	2.7%	3.9%	0%	1.1%	7.8%	3,497
Total payouts	4.0%	4.2%	0%	2.9%	9.2%	3,497
Dividend/total payouts	46.6%	38.7%	0%	37.3%	100.0%	2,988
Firm characteristics						
Free cash flow/assets	0.11	0.09	0.02	0.10	0.20	3,499
Market-to-book ratio	2.27	1.63	1.11	1.77	3.86	3,497
Firm size (log. assets)	9.01	1.20	7.57	8.95	10.50	3,527
Leverage	0.20	0.16	0.00	0.19	0.40	3,511
Earnings per share, t-3:t-1	1.60	2.49	-0.09	1.48	3.80	3,510
Volatility of earnings	0.04	0.03	0.01	0.02	0.07	3,435
Past 60-month stock volatility	0.39	0.18	0.22	0.35	0.64	3,311
Return on assets, t-1	5.47	13.96	-0.87	6.29	14.07	3,471
Sales growth	8%	23%	-12%	7%	28%	3,524
Entrenchment Index	1.9	1.3	0	2	3	3,285
Firm age	35.4	23.4	9.0	32.0	77.0	3,519

3.3.3 Measuring payout policy

Following the earlier literature, I use the dividend yield to study dividend policy. For the main results reported in this chapter, dividend yield is defined as total dollar amount of dividends declared on the common stock of a firm during the year divided by the market value of the common stock at year-end. I further check all annual dividend payments that exceed 5% of the market value to ensure they reflect normal payouts and not events such as leveraged recapitalizations or liquidations. I find 5 such special dividends out of 3,527 observations. This small number is consistent with Fenn and Liang (2001) who find 4 out of 4,663 observations during the period 1993-1997.

Following Grullon and Michaely (2002), repurchases are defined as total expenditure on the purchase of common and preferred stocks minus any reduction in the value of the net number of preferred stocks outstanding[12]. Similar to the dividend yield, the repurchase yield is repurchases divided by the market value at year-end. The total payout is defined as dividends plus repurchases, normalized by the market value of equity. The dividend payout ratio is defined as dividends divided by the sum of dividends and repurchases.

To deal with potential outliers in dividend yield and repurchase yield due to very low stock prices, the measures are further winsorized at 99% levels. For robustness checks, I follow Grinstein and Michaely (2005) and normalize dividends and repurchases by book assets instead of market value of equity to ensure that my results are not driven by price variation. Doing so yields similar results. Summary statistics for the dividend payout policy variables are provided in Table 3.2.

Prior to investigating the relation between dividend protections and payout policy in a regression frame work, it is useful to look for a relation in the raw data. Figure 1 depicts such an effort. First, I compare firms that provide dividend protections to their CEOs with those that do not. In plot (a), firms are partitioned into two groups within a year depending on whether *DP* is larger than zero in the previous year. Then firms in each group are aggregated across years. For my sample, 49.8% of firms provide dividend protection while 50.2% of firms do not. The average *DP* is presented in the text box below each group. The dividend-protected group ($DP > 0$) has on average 41% of their CEO restricted stock and option holdings protected against the potential loss from paying dividends. For the other group, by construction, *DP* is zero. On average, the annually dividend yield is 1.76% for the dividend-protected group and 1.03% for non-dividend-protected group.

[12] According to Grullon and Michaely (2002), this measure is very similar to the measure of repurchase activity reported by SDC, with the correlation coefficient of 0.97.

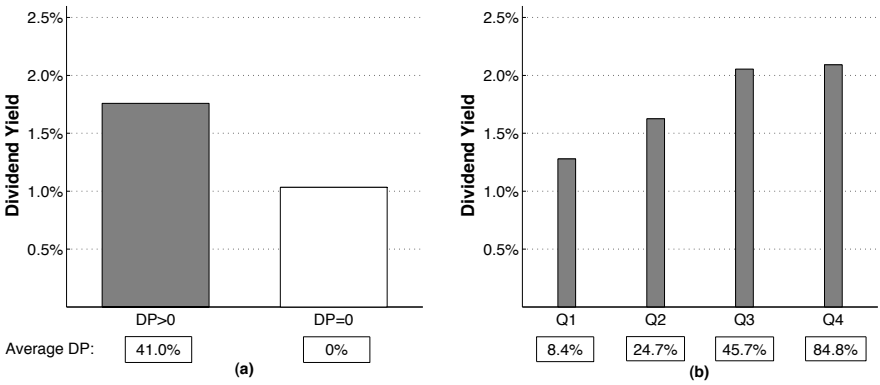

Figure 3.1: Dividend yield and the dividend protection (*DP*)

DP is the value of CEO restricted stock and option holdings that are dividend-protected divided by the total value of restricted stock and option holdings. Plot (a) compares the dividend yield for firms that provide dividend protections to their CEOs ($DP > 0$) with those that do not ($DP = 0$). Plot (b) focuses on dividend-protected firms and sorts them into four quartiles according to *DP*. The bars present the average dividend yield for each group. The average *DP* is presented in the text box below each group. The quartiles are sorted within a year and then aggregated across years. The sample consists of S&P500 firms for the period 2000-2009, excluding financial firms, utilities, and regulated phone companies.

Second, for the dividend-protected group, I further sort firms into four quartiles according to the proportion of CEO restricted stock and option holdings that are dividend protected. Again, the quartiles are sorted within a year and then aggregated across years within each quartile. The mean dividend yield is calculated for each quartile and shown in the text box below each quartile numbers. By construction, there are an equal number of firms in each quartile. Plot (b) presents the mean dividend yield against the quartile's average level of *DP*. The plot shows a positive relation between the proportions of CEO restricted stock and option holdings that are dividend protected in a firm and the dividend yields of the firm in the raw data. The highest proportion of dividend protection corresponds to an average dividend yield of 2.09%, the lowest corresponds to an average dividend yield of 1.28%

3.3.4 Other explanatory variables

To control for the CEO equity-based incentive, I include the number of restricted stock holdings, the number of option holdings, and CEO stock ownership (stock held by the CEO as a percentage of total shares outstanding), using Execucomp database. Prior research shows that the number of restricted stock holdings is positively related

with dividend payouts while option holdings have a negative effect. The findings on the relation of CEO stock ownership and dividends are mixed. Fenn and Liang (2001) find no effect of share ownership on payouts. Brown et al. (2007) find that executives with higher ownership were more likely to increase dividends after the tax cut in 2003, but no relation is found in period when the dividend tax rate was higher. Cuny et al. (2009) find a negative relation between executive stock ownership and total payout.

Prior literature suggests that firms are likely to have higher payouts if they are large, mature, profitable firms, and with a lot of cash flows. Following Fenn and Liang (2001), Brown et al. (2007), and Cuny et al. (2009), free cash flow ratio is calculated as operating income before depreciation minus capital expenditure divided by total assets. The market-to-book ratio, a proxy for investment opportunities, is calculated as total assets minus book value of equity plus market value of equity divided by total assets. To control for external financing costs, I use firm size, measured as the log of total assets. I also control for leverage, measure by total debt divided by total assets, and volatility of earnings, measured as the standard deviation of net operating cash flow scaled by assets. To count for past performance and growth, I construct the past three-year average of earnings per share, the lagged return on assets, and the growth in sales. Table 3.2 provides summary statistics for the variables described above. All numbers are similar to values reported in related studies, such as Fenn and Liang (2001), Brown et al. (2007), Aboody and Kaznik (2008), and Cuny et al. (2009).

3.3.5 Which firms provide dividend protections?

To determined whether the measure of the dividend protection is correlated with other CEO or firm characteristics, I focus on the dividend-paying firms and divided them into two groups, namely *DP* firms that provide dividend protection on CEO incentive pays and non-*DP* firms that do not provide such a protection. Table 3.3 compares the mean and median of the variables for the two groups using t-test and Wilcoxon rank sum test.

In addition to the payout policy measures discussed in the sub-section 3.3.3, I construct two other variables to measure the dividend smoothing, which is one of the most well-documented phenomena in payout policy (see for example, Lintner (1956), Fama and Babiak (1968), and Brav et al. (2005)). I follow Leary and Michaely (2011)'s two-step procedure to measure the dividend smoothing[13]. First, the target payout ratio (TPR) is calculated as the firm median payout ratio over a ten-year period, where the payout ratio is defined as common dividends divided by net income. Second, I estimate

[13]Leary and Michaely (2011) extend the model of Fama and Babiak (1968) and Brav et al. (2005). They use a simulation exercise to show that their methods overcome the small-sample bias and improve the precision of the estimates for the speed of adjustment and target payout ratio.

the speed of adjustment $\hat{\beta_{i,t}}$ from the regression $\Delta D_{i,t-9:t} = \alpha + \beta_{i,t} dev_{i,t-9:t} + u_{it}$, where $dev_{i,t,} = TPR_i * E_{i,t} - D_{i,t-1}$, D is the dividend per share and E is the earnings per share. A lower speed of adjustment suggests a smooth dividend policy

As shown in the table, CEOs in *DP* firms hold more restricted stock, fewer options, and have larger stock ownership. However, there is no significant difference in CEO cash compensation. In terms of payout policy, *DP* firms have higher dividend yield and higher proportion of dividend relative to total payouts. In addition, *DP* firms exhibit a lower level of dividend-smoothing. This is intuitive because if the actual dividend paid is close to the expected dividend leve then the change in the value of option is limited. Thus firms should not worry less about the loss of CEO compensation when paying dividends. Furthermore, the table shows that*DP* firms are larger, more mature, with higher earnings and lower volatilities. There is no difference in corporate governance measured by entrenchment index.

Next, I run a probit model to see which firms provide dividend protection to their CEOs. As shown in column (1) of Table 3.4 the speed of adjustment is significant at 5% level, suggesting dividend smoothing firms (lower speed of adjustment) are less likely to provide dividend protections. However, when CEO compensation variables are added to the model, as shown in column (2), the significance of the dividend smoothing measure is gone. At the same time, the CEO restricted stock holdings and option holdings are highly significant. In column (3), I replace CEO compensation variables with firm characteristics. Larger firms and more mature firms are more likely to use dividend protections. However, when CEO compensation variables are added, as shown in column (4), only CEO restricted stock holdings and option holdings are highly significant: the higher the restricted stock holding and the lower the option holdings, the more likely that firms provide dividend protections on CEO compensation.

3.4 Empirical results

3.4.1 Dividend protections and corporate payouts

In this section, I examine the relation between the dividend protection on CEO compensation (*DP*) and corporate payout policies. I expect that a higher *DP* will be associated with higher dividend payouts. I estimate four separate Tobit regression models censored at zero and one for dividend yields, repurchases, total payouts, and dividends relative to total payouts. All specifications control for the number of restricted stock holdings, the

Table 3.3: Comparisons of sub-samples

This table compares the means and medians of payout policies, CEO characteristics, and firm characteristics for two sub-samples based on whether firms provide dividend protections to their CEOs. The sample consists of only dividend-paying firms. *DP* firms provide dividend protections on CEO restricted stock and/or option holdings while non-*DP* firms do not. The target payout ratio is estimated as the firm median payout ratio over the sample period, where the payout ratio is defined as common dividends divided by net income. The speed of adjustment is estimated from the regression $\Delta D_{i,t-9:t} = \alpha + \beta_{i,t} dev_{i,t-9:t} + u_{it}$ where $dev_{i,t} = TPR_i * E_{i,t} - D_{i,t-1}$, D is the dividend per share and E is the earnings per share. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively, for t-test (rank sum test) that the means (medians) are equal across the two sub-samples.

	DP Firms (1)		**Non-DP Firms (2)**		**Difference (1) - (2)**	
	Mean	**Median**	**Mean**	**Median**	**Mean**	**Median**
CEO compensation						
Restricted stock holdings ('000)	233	119	33	0	200 ***	119 ***
Option holdings ('000)	2,122	1,384	2,778	1,528	-656 ***	-144 ***
CEO stock ownership	0.6%	0.1%	0.9%	0.1%	-0.3% ***	0.0%
CEO cash compensation ($000)	2,350	1,738	2,351	1,693	-1	45
Payout policy						
Dividend yield	2.0%	1.7%	1.7%	1.4%	0.3% ***	0.3% ***
Repurchase/MV	2.9%	1.6%	3.1%	1.7%	-0.3%	-0.1%
Total payouts	4.9%	3.9%	4.8%	3.6%	0.1%	0.3% *
Dividend/total payouts	57.2%	52.6%	51.4%	43.0%	5.8% ***	9.6% ***
Speed of adjustment	0.17	0.17	0.15	0.15	0.02 ***	0.02 ***
Target payout ratio	42.7%	36.0%	38.7%	29.6%	4.0% **	6.4% **
Firm characteristics						
Free cash flow/assets	0.11	0.11	0.12	0.12	-0.01	-0.01
Market-to-book ratio	2.07	1.72	2.24	1.87	-0.17 ***	-0.16 ***
Firm size (log. assets)	9.38	9.36	9.02	8.93	0.36 ***	0.43 ***
Leverage	0.21	0.20	0.20	0.19	0.01	0.01
Earnings per share, t-3:t-1	2.32	2.01	2.04	1.75	0.27 ***	0.27 ***
Volatility of earnings	0.04	0.03	0.04	0.03	0.00 *	0.00
Past 60-month stock volatility	0.32	0.31	0.34	0.32	-0.02 **	-0.01
Return on assets, t-1	6.98	6.85	7.26	7.22	-0.28	-0.37
Sales growth	6.9%	6.5%	8%	7%	-1.4% *	-0.5%
Entrenchment Index	1.9	2.0	1.9	2.0	0.0	0.0
Firm age	45.3	41.0	37.8	35.0	7.5 ***	6.0 ***

Table 3.4: Which firms are more likely to provide dividend protections?

This table shows probit regressions on which firms are more likely to provide dividend protections. The sample consists of only dividend-paying firms. The dependent variable is *DP* dummy which equals one if the firm provides dividend protections on CEO restricted stock and/or option holdings and zero otherwise.The marginal effect and *t*-statistics (in parentheses) are reported. Standard errors are clustered at the firm level. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively.

	Dependent variable: DP dummy			
	(1)	(2)	(3)	(4)
Restricted stock holdings		1.32 ***		1.29 ***
		(4.66)		(4.52)
Option holdings		-0.03 ***		-0.03 ***
		(-3.65)		(-3.82)
CEO stock ownership		0.00		0.00
		(-0.43)		(-0.39)
CEO cash compensation		0.00		0.00
		(-0.13)		(-0.43)
DPS t-1	0.03	0.04	-0.03	0.00
	(0.81)	(1.08)	(-0.60)	(0.09)
Speed of adjustment	0.09 **	0.05	0.04	0.03
	(1.99)	(1.33)	(0.96)	(0.73)
Free cash flow/assets			0.15	-0.08
			(0.59)	(-0.34)
Market-to-Book			-0.01	0.01
			(-0.41)	(0.54)
Firm size			0.05 **	0.03
			(2.35)	(1.43)
Debt/assets			0.04	-0.05
			(0.26)	(-0.35)
Volatility of earnings			-0.10	-0.02
			(-0.21)	(-0.03)
Past 3-year EPS			(-0.01)	(0.00)
			(-0.63)	(0.26)
ROA			(0.15)	(0.12)
			(0.66)	(0.58)
Firm age			0.002 **	0.001
			(2.00)	(1.19)
Year, industry fixed effects	Yes	Yes	Yes	Yes
Number of observations	2,212	2,185	2,169	2,153
Pseudo R-squared	0.039	0.198	0.051	0.202

number of option holdings, CEO stock ownership, CEO cash compensation, the lagged payout policies, and several firm characteristics, such as free cash flow, market-to-book ratio, firm size, leverage, volatility of earnings, the past three-year earnings per share, and the lagged ROA. All explanatory variables are measured at the end of the previous fiscal year. To address the possibility that there are other omitted variables, I include year and industry fixed effects. Standard errors are clustered at the firm level to account for the possibility of correlations across observations of the same firm in different years. Results are reported in Table 3.5.

The first principal finding is that *DP*, the fraction of CEO restricted stock and option holdings that is dividend protected, is an important determinant of dividend policy. As shown in column (1), the marginal effect on *DP* is positive and highly significant; the marginal effect of 1.05 indicates that a one-standard-deviation increase in *DP* is associated with an increase in dividend yield of 29 base-point (1.05*27%), which translates into about a 31% increase in dividend yield for a median firm in my sample (median dividend yield is 0.9%). Consistent with the literature, the number of CEO option holdings is strongly and negatively related to dividend yield. Interestingly, the number of restricted stock holdings is also negative at 1% significance level. This is in different from the finding of Aboody and Kasznik (2008) of a positive relation between restricted stock grants and dividend yield. This result suggests that the finding in prior research on the positive relation between the restricted stock and dividends is due to the dividend protection, but not the granting of restricted stock itself.

In addition, I test if *DP* has any effect on repurchases, total payouts, and dividends as a share of total payouts. I repeat the same analysis as in the specification (1) by replacing the dependent variable, dividend yield, with repurchase, total payouts, and dividend as a share of total payouts. The result shown in column (2) suggests that *DP* has a negative effect on CEO's decision on repurchase. A one-standard-deviation increase in *DP* is associated with a 27% increase in repurchases for a median firm in the sample. Column (3) shows that *DP* has a positive but insignificant effect on the total payouts. Combined with column (2), these results suggest that there is a substitution effect between dividend and repurchases. As shown in column (4), *DP* induces CEO to pay out more dividends relative to total payouts.

Most of the control variables in the model specifications have expected signs. Dividend yield is highly related to the lagged dividend yield. So do the share repurchases, total payouts, and dividend as a share of total payouts. The coefficient on the market-to-book ratio is negative and significant at 1% level, suggesting that firms with greater investment opportunities have lower dividend yields. The coefficients on proxies cash flow, firm size

Table 3.5: Dividend protections and corporate payouts

The table provides Tobit estimates of corporate payout policies on dividend protection (*DP*). The dependent variables are dividend yield, repurchase divided by market value of equity, payout (the sum of dividends and repurchases divided by the market value of equity), and dividend divided by payout. *DP* is the value of CEO restricted stock and option holdings that are dividend-protected divided by the total value of restricted stock and option holdings. The marginal effect and *t*-statistics (in parentheses) are reported. Standard errors are clustered at the firm level. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively.

	Div. Yield	**Rep./MV**	**Payout/MV**	**Div/Payout**
	(1)	(2)	(3)	(4)
Dividend protection (*DP*)	1.05 ***	-1.11 ***	0.03	0.18 ***
	(4.49)	(-2.58)	(0.08)	(2.97)
Restricted stock holdings	-0.44 ***	0.02	-0.51	-0.07
	(-2.59)	(0.05)	(-1.28)	(-1.53)
Option holdings	-0.07 ***	0.04	0.01	-0.02 ***
	(-3.30)	(1.17)	(0.27)	(-3.53)
CEO stock ownership	-0.03	-0.05	-0.05	0.00
	(-0.90)	(-0.92)	(-1.06)	(0.26)
CEO cash compensation	0.02	0.09	0.06	0.00
	(1.13)	(1.32)	(1.32)	(0.03)
Free cash flow/assets	5.15 ***	17.63 ***	16.21 ***	-0.90 ***
	(5.85)	(7.78)	(9.92)	(-2.62)
Market-to-Book	-0.28 ***	-0.40 ***	-0.55 ***	-0.03
	(-4.75)	(-3.97)	(-6.34)	(-1.54)
Firm size	0.47 ***	-0.11	0.26 **	0.09 ***
	(6.99)	(-0.86)	(2.34)	(4.60)
Debt/assets	0.81	-4.62 ***	-2.46 ***	0.54 ***
	(1.42)	(-4.50)	(-2.69)	(3.61)
Volatility of earnings	-3.41 **	-5.86 **	-5.69 ***	-0.73
	(-1.99)	(-2.05)	(-3.02)	(-1.43)
Past 3-year EPS	0.05	0.17 **	0.17 ***	-0.01
	(1.47)	(2.48)	(2.87)	(-0.75)
ROA	3.08 ***	2.90 **	4.57 ***	0.66 **
	(4.38)	(1.98)	(3.51)	(2.43)
Year, industry fixed effects	Yes	Yes	Yes	Yes
Number of observations	3,232	3,215	3,215	2,792
Pseudo R-squared	0.155	0.066	0.063	0.204

(log. assets), and past performance (ROA_{t-1}) are positive and significant at 1%, indicating that larger and more profitable firms and firms with higher free cash flows pay out more.

3.4.2 The effect of *DP* for different sub-samples

As shown in Figure 1(a) and Table 3.3, *DP* firms have higher dividend yield than non-*DP* firms. The findings on the positive relation between *DP* and payout policies might just pick up the difference between *DP* firms and non-*DP* firms, which are not captured by the control variables, rather than the effect of managerial dividend-paying incentives. To address this concern, I repeat the above analysis for *DP* firms only, which are about 49% of the sample. Each coefficient reported in Table 3.6 represents the marginal effect of *DP* on payout policy variables from a separate Tobit model. In each regression, I include all of the same control variables from Table 3.5, including the year and industry effects, but do not report the individual coefficients on those controls in the interest of brevity. The first row of Table 3.6 shows the marginal effects of *DP* from the Tobit model similar to Table 3.5 for a subsample of firms that provide dividend protections on CEO compensation. The coefficient of 1.07 on the dividend yield suggests that *DP* is positive and highly significant for *DP* firms. The second column show the result for repurchases. The coefficient of -1.49 indicates that a higher dividend protection is associated with a lower repurchase. The effect of *DP* on total payouts is insignificant as found previously. Column 4 shows that *DP* is significant at the 1% level on the dividend payments as a portion of total payouts.

Similarly, to show that *DP* captures the cross-sectional variation in CEO dividend-paying incentives, rather than other factors such as the different payout policies and compensation structure across firms, I repeat Table 3.5 for several sub-samples based on whether firms pay dividends in the past ten years and whether their CEOs have restricted stock holdings and/or option holdings. First, I create a sub-sample of dividend payers by excluding all firms that have not paid out dividend in the past ten years. Second, I look at only those firms whose CEOs have positive restricted stock holdings, which are about 60% of the sample. Then I focus on firms whose CEOs have positive option holdings, which are more than 90% of the sample. Further, I show the combination of dividend payers, restricted stock grants users, and option grant users. The second row of Table 3.6 shows that the signs and magnitudes of coefficients for dividend yield, repurchase, and dividend payout ratio are similar to those in Table 3.5. In rows 3 to 4, I look at subsamples of firms whose CEOs have positive restricted stock holdings and positive option holdings, respectively. In the fifth row, I apply the same approach to the subsample of firms that have paid dividends at least once in the past ten years and whose CEOs have both re-

Table 3.6: Dividend protections and corporate payouts (subsamples)

The table summarizes the Tobit regression results following specifications in Table 3.5, but carried out for various subsamples. Non-CEO-turnover refers to firms that have no CEO turnover in a particular year. Div. payers refer to firms that paid out a cash dividend at least once in the past five years. RS stands for restricted stock. The dependent variables are dividend yield, repurchase divided by market value of equity, payout (the sum of dividends and repurchases divided by the market value of equity), and dividend divided by payout. Only the marginal effect of *DP* and *t*-statistics (in parentheses) are reported. All other variables shown in Table 3.5 are included in the regression, but not reported. Standard errors are clustered at the firm level. ***, and ** denote significance at 1% and 5% levels, respectively.

	N	**DivYield**	**Rep/MV**	**Payout/MV**	**Div/Payout**
		(1)	(2)	(3)	(4)
DP>0 subsample	1,581	1.07 ***	-1.49 ***	-0.33	0.14 **
		(4.01)	(-2.76)	(-0.68)	(1.99)
Dividend payers subsample	2,527	0.75 ***	-1.11 ***	-0.27	0.10 *
		(3.50)	(-2.64)	(-0.69)	(1.79)
RS holdings>0 subsample	1,782	1.29 ***	-1.14 **	0.12	0.24 ***
		(4.40)	(-2.06)	(0.24)	(3.20)
Option holdings>0 subsample	3,142	1.19 ***	-1.31 ***	0.03	0.26 ***
		(5.53)	(-2.59)	(0.08)	(3.99)
Div. payers, RS>0, option>0	1,471	0.89 ***	-1.28 **	-0.27	0.16 **
		(3.69)	(-2.05)	(-0.52)	(2.41)
Non-CEO-turnover subsample	2,811	0.99 ***	-1.18 **	-0.07	0.18 ***
		(4.07)	(-2.52)	(-0.16)	(2.89)

stricted stock and option holdings. All these results suggest that *DP* is positively related to the dividend yield and dividend payout ratio, and negatively related to repurchases.

Finally, since *DP* is constructed at the end of the previous fiscal year (with one-year lag relative to dividend yield), there is a concern that *DP* does not accurately capture the managerial dividend-paying incentives when there is a CEO turnover. To address this concern, I repeat the above analysis for a sub-sample of firm-year observations with no CEO turnovers. Again, the results show that both the sign and the magnitude of marginal effects on *DP* are similar to the previous findings. *DP* is positive and highly significant for both dividend yield and dividend as a share of total payouts. Similar to the previous results, I find a negative effect of DP on firms' repurchase decision but not on total payouts. Therefore, the main findings still hold.

3.4.3 Alternative measures of dividend protections

In previous tests, I use *DP* as the measure of managerial dividend-paying incentives. One alternative measure is simply the dummy variable which equals one if there is a dividend protection on CEO equity incentive holdings and zero otherwise. The underlying argument for the dividend protection dummy variable is that as long as there is a dividend protection, no matter how large the proportion of compensation is protected, CEOs are less reluctant to pay out dividends.

Inspired by the pay-for-performance literature, I also construct an alternative variable which measures the dollar change in CEO's non-dividend-protected compensation if the estimated future dividend yield is increased by one percentage point. This measure is denoted as dividend-paying disincentives (*DPD*), because it captures the potential loss associated with dividend payment when CEO's equity holdings are not dividend protected. Specifically, *DPD* is the sum of dividend-paying disincentives on restricted stock holdings (denoted as DPD^R) and dividend-paying disincentives on option holdings (denoted as DPD^O). Other compensation components arguably are not exposed to any potential loss from dividends distribution and thus the corresponding dividend-paying incentives are set to zero[14]. The calculation of DPD^R is straightforward. It is the sum of the loss in all unvested restricted stock grants when estimated future dividend yield is increased by 1%. To estimate DPD^O, I take a similar approach as in Core and Gay (2002)[15], except that I calculate the partial derivative of the Black-Scholes value with respect to dividend

[14]CEOs who hold unrestricted stock are entitled to all shareholder rights, including the right to receive dividends, and thus do not suffer from paying out dividends. In addition, I control for the CEO stock ownership and cash compensation in all regressions.

[15]Core and Gay (2002) are known for their method of estimating option portfolio value as well as the sensitivities of option portfolio value to stock price and stock return volatility. However, in their Footnote 7, they mention that their method can be used to estimate the sensitivity of option portfolio value to dividend yield.

yield instead of stock price or volatility. Specifically, DPD^O is calculated as the sum of the difference between the value of options with 1% increase in the estimated future dividend yield and the value without any change in the estimated future dividend yield for all option grants. For each year, I construct *DPD* for each individual CEO based on restricted stock and option holdings at the end of the fiscal year. The formula is given below.

$$DPD_{j,t} = DPD^R_{j,t} + DPD^O_{j,t} \tag{3.1}$$

where

$DPD^R_{j,t} = -\frac{\partial(restricted\ stock\ value)}{\partial(dividend\ yield)} = -\sum_i N^R_{i,j,t} P_{i,j,t} \cdot 1\%$

$DPD^O_{j,t} = -\frac{\partial(option\ value)}{\partial(dividend\ yield)} = -\sum_i N^O_{i,j,t} \left[BS\left(X_{i,j,t}, d_{j,t} + 1\%\right) - BS\left(X_{i,j,t}, d_{j,t}\right)\right].$

Superscripts R and O refer to restricted stock grants and option grants, and subscripts are labeled for the grant i of the firm j at year t. N^R and N^O are the number of restricted stock and options, respectively. P is the share price at the fiscal year end. d is the estimated future dividend yield, which is measured as the average over the past three years. $BS(X,d)$ is the modified Black-Scholes option valuation methodology. X are the following inputs: exercise price of the option grant; the time to maturity, which was reduced to an amount of 70% of the actual term because executives rarely wait until the expiration date to exercises their options; the estimated future stock price volatility, which is measured as the volatility over the past 60 months; the risk-free rate, approximated by the interest rate of the 7-year U.S. treasury bond.

I use one-year approximation method developed by Core and Gay (2002) to estimate option portfolio value[16]. Specifically, I distinguish between newly granted and previously granted options. For new grants, all inputs described above can be easily obtained. For previously granted options, I estimate the average exercise price by subtracting the average profits per option (the value of options at the fiscal year end divided by the number of options) from the firm's stock price. I generate estimates for unexercisable and exercisable options separately. I assume out-of-money options have exercise prices equal to the stock price, since Core and Guay (2002) argue that when the portfolio contains out-of-money options the average exercise prices will be underestimated. The time-to-maturity of previously granted unexercisable (exercisable) options is set to equal to the time-to-maturity of the recent option grant minus one (four) year.

[16] Since firms are not required to disclose complete data on outstanding option holdings until 2006, the details of each grant requires extensive data collection. Besides, researchers must carefully determine which of the previously granted options have been exercised and which remain in the portfolio. Core and Gay (2002) show that the one-year approximation proxies exhibit little bias and are highly correlated with the measures one would obtain with full information about the option portfolios.

Table 3.7: Alternative measures of dividend protections

The table provides Tobit estimates of corporate payout policies on two alternative measures of dividend protections. The dependent variables are dividend yield, repurchase, total payouts (the sum of dividends and repurchases divided by market value of equity), and dividend share (dividend/total payout). The dividend protection (dummy) equals one if some part of CEO restricted stock or option holdings are dividend protected; and zero otherwise. Dividend-paying disincentive is the absolute dollar change in CEO's compensation for a 1% increase in dividend yield. The construction of this variable is described in 3.4.3; see formula 3.1. Only the marginal effect of dividend protection measures and t-statistics (in parentheses) are reported. All other variables shown in Table 3.5 are included in the regression including industry and year dummies, but not reported. Standard errors are clustered at the firm level. ** denotes significance at 5% level.

	DivYield	**Rep/MV**	**Payout/MV**	**Div/Payout**
	(1)	(2)	(3)	(4)
Dividend protection (dummy)	0.40 ***	-0.14	0.22	0.10 ***
	(3.62)	(-0.52)	(1.02)	(2.76)
Dividend-paying disincentives	-0.03 *	0.07 **	0.00	-0.01
	(-1.67)	(2.18)	(0.06)	(-1.56)

The summary statistics of *DPD* is shown in Table 3.2. If the dividend yield is increased by one percentage point, the value of a CEO's restricted stock and option holdings is reduced on average by about $3 million. The median loss is $1.5 million. In addition to the one-percentage-point increase (for example, from 1% to 2%), I also calculate the change in the value of CEO's restricted stock and option holdings with respect to a 1% increase in dividend yield (for example, from 1% to 1.1%). The average (median) loss for a CEO is $25,700 ($6,600)[17].

Table 3.7 repeats specifications in Table 3.5, and replace *DP* with the dividend protection dummy and dividend-paying disincentives. Results indicate that the dividend protection dummy is positively related to dividend yield and the dividend payout ration, both being significant at 1% level. However, the effect of dividend protection dummy on repurchases is still negative but not significant any more. Dividend-paying disincentive is negatively related to dividend yield with a 10% significance. It is positively associated with repurchase at 5% level. These results suggest that the firm pays higher dividends when there is a dividend protection on CEO equity compensation. A higher dividend-paying disincentive means a larger part of CEO equity compensation is not dividend protected and is associated with to a lower dividend yield and higher repurchases. Overall, tests

[17]The change in the value of CEO's restricted stock and option holdings respect to a 1% increase in dividend yield is not reported in the table and is not used for the main analysis. There are two reasons to use the sensitivity with respect to a one-percentage-point increase rather than a 1% increase in dividend yield. First, for firms that do not pay dividend, a 1% increase in dividend yield is meaningless. Second, if I use *DPD* based on a 1% increase in dividend yield in regressions with respect to dividend yield, the variable itself has already contained the (past) dividend yield and thus has high correlation with the dependent variable by construction.

with alternative measures for managerial dividend-paying incentives tell a similar story as our previous findings.

3.4.4 Dividend increase around the 2003 dividend tax cut

So far, I show that there is a positive association between managerial dividend-paying incentives and dividend payout policies. This evidence does not, however, provide a precise answer as to whether the dividend protection (*DP*) of CEO restricted stock and option grants is designed based on payout policy or whether *DP* is influencing payout policy. To further identify the effect of *DP* on dividend policy, I compare the dividend initiation and increase before and after the 2003 dividend tax cut. The Jobs and Growth Tax Relief Reconciliation Act of May 2003 (JGTRRA) reduced the dividend tax rate for individual investors from 38.6% to 15%. Following the dividend tax cut, the number of dividend initiations and total value of dividend payments increased sharply (e.g. Chetty and Saez (2005), Brown et al. (2007), Blouin et al. (2011)). However, the survey by Brav et al. (2008) suggests that the tax cut only lead some firms which were "on the fence" about paying a dividend to initiate dividends, but overall the tax effect was second order. Nevertheless, since the tax change was completely unanticipated prior to 2003[18], it is very unlikely that firms did adjust their compensation structure prior to 2003 in anticipation of a future dividend tax cut. Thus, the measure of dividend protection (*DP*) can be treated as predetermined. Therefore, the 2003 dividend tax cut offers a exogenous variation to identify the causal effect of dividend protection of CEO compensation and changes in dividend policy.

Why might dividend protection of CEO compensation influence a firm's reaction to the dividend tax cut? Firms whose CEOs are compensated primarily in the form of non-dividend-protected restricted stock and options have a personal financial incentive to keep dividend payments low, because they face a 100% implicit "tax" rate on dividends (e.g. Brown et al. (2007)), both before and after the dividend tax cut. However, firms whose CEOs held dividend-protected restricted stock and options would be relatively neutral to the increase in dividends. Therefore, when the dividend tax cut changed some firms dividend policy, firms whose CEOs have dividend protected compensation would be more likely to increase dividend payments.

Table 3.8 presents Probit regressions of whether a firm increases dividends in 2003.

[18]The reform was first proposed by the Bush administration on January 7, 2003. It was passed by the United States Congress on May 23, 2003 and signed into law by President George W. Bush on May 28, 2003. Auerbach and Hassett (2005), Chetty and Saez (2005), and Brown et al. (2007) discuss the timing of the tax reform legislative process in detail. They suggest that May 2003 legislation was completely unanticipated until the very end of 2002 or early January 2003. From January to May 2003, the possibility of a dividend tax cut was in the new regular, but it was not a "sure thing" until the ultimate passage of the tax bill.

Table 3.8: Dividend increases around the 2003 Dividend Tax Cut

The table provides Probit regressions of whether a firm increases dividends in 2003. A dividend increase is defined as a rise in ordinary dividends per share based on dividend announcement in CRSP. The analysis is conducted separately for all firms (row 1), for firms that paid dividends in prior year (row 2-3), and for firms that did not pay dividends in prior year (row 4). The table presents regressions of whether a firm increases dividends after the tax cut was signed on May 23, 2003 (postreform), the period before tax cut (prereform), and the difference between the coefficients over the two time periods (post- relative to pre-). Specifically, one regression is estimated for postreform sample (first column). The other regression is estimated across the pooled sample for 2003, with an indicator variable for postreform interacted with all the explanatory variables (interaction terms shown in far right column) to test whether the effect of a variable on the likelihood of a dividend increase is different postreform relative to prereform period. Only the coefficients on the dividend protection (dummy) and *t*-statistics (in parentheses) are reported. All other variables shown in Table 3.5 are included in the regression, but not reported. Standard errors are clustered at the firm level. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively.

		2003 pooled sample	
	Postreform	Prereform	Post- relative to pre-
Probability increase dividends	0.24 **	0.01	0.23 *
	(2.45)	(0.08)	(1.81)
Probability increase dividends given already pay dividends	0.22 *	-0.09	0.31 *
	(1.65)	(-0.77)	(1.78)
Probability increase dividends by at least 20% given already pay dividends	0.13	-0.03	0.16
	(1.37)	(-0.37)	(1.46)
Probability initiate dividends	0.03	0.20	-0.17
	(0.25)	(1.62)	(-1.01)

First, the regression is done for the full sample. Then, I follow Brown et al. (2007) to focus on the year 2003 and split it into two shorter time periods, the portion of 2003 through May 23 when the tax cut was formally passed by Congress and the portion of 2003 after May 23. I use the announcement date from CRSP to divide dividend increases into these subperiods. I further distinguish between dividend increases and dividend initiation by checking if the firm paid dividends during the last ten years. Among firms that increase dividends rather than initiate dividends, I also check if firms increase dividends by large amount, namely 20%. Chetty and Saez (2005) suggest that a 20% change in dividends is both relatively frequent and sufficiently large that is likely to signal a substantial shift in a firm's dividend policy. The coefficient of *DP* is reported in Table 3.8. In each regression, I include all the same control variables from Table 3.5, including industry effects, but do not report the individual coefficients on those controls.

The table presents regressions of whether a firm increases dividends after the tax cut was signed on May 23, 2003 (postreform), the period before tax cut (prereform), and the difference between the coefficients over the two time periods (postreform relative to prereform). Specifically, a regression is estimated across the pooled sample for 2003, with an indicator variable for postreform interacted with all the explanatory variables to test whether the effect of a variable on the likelihood of a dividend increase is different postreform relative to prereform period. The first row corresponds to the regression model, where the dependent variable is dividend increase including dividend initiation. The second to third rows focus on firms that already paid dividend in prior years. The fourth row shows the regression results for the subset of firms that did not pay dividends in the past 10 years. The results show that the probability of increasing dividends in the postreform period is positively associated with the dividend protection, but not for the period before the tax cut. The effect of the dividend protection is positive and significant when firms increase dividends by a small amount, but not significant for a large increase and dividend initiations. Overall, these results indicate that the predetermined dividend protection is associated with a larger likelihood of dividend increase after the tax cut.

3.4.5 The timing of dividend protection

To further investigate the causality, I focus on firms that initiated dividends and examine when those firms provided CEOs dividend protection for the first time. In total, there are 49 firms in my sample that initiated dividend during the period of 2000-2009, among which 24 have not provided any dividend protection on their CEO restricted stock and option grants. For the other 25 firms that did provide dividend protections during the period 2000-2009, 11 firms have already provided *DP* to CEOs three years before the

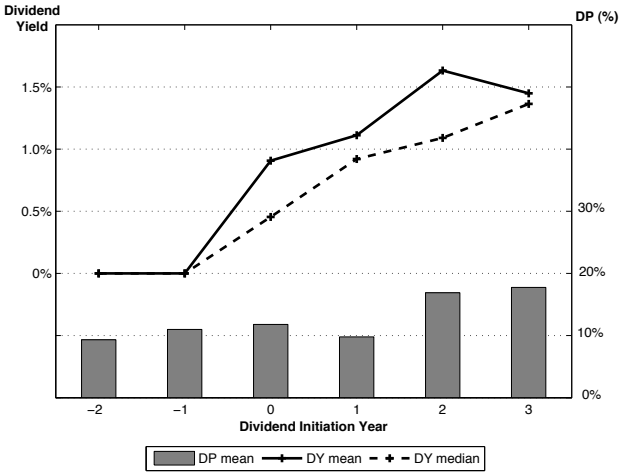

Figure 3.2: Dividend protection (*DP*) around the year of dividend initiation

DP is the value of CEO restricted stock and option holdings that are dividend-protected divided by the total value of restricted stock and option holdings. The solid (dashed) line shows the mean (median) dividend yield. The bars present the average *DP* for each group.

dividend initiation. Three firms provided *DP* two years prior to the year when dividend is initiated while two did so one year before. One firms granted *DP* in the same year of dividend initiation while no firm did the year after. Four firms provided *DP* to CEOs two years after dividend initiation and other four took more than two years. Figure 2 plots the dividend yield and *DP* around the year of dividend initiation. On average, the portion of dividend protected CEO restricted stock and option holdings increases after the dividend initiation from about 9% at the year $T-2$ to 18% at the year $T+3$.

Overall, these results suggest that there is a large dispersion on when firms provide dividend protection to CEOs. It seems that about 2/3 of firms (16 out 25) that did provide *DP* to their CEOs have already done so before initiating dividends. However, the results should be interpreted with cautions for two reasons. First, the sample of dividend initiation firms is quite small, with 49 firms in total. Only about half of these firms provided *DP* during my sample period. For the other half, if they provide *DP* after 2009, they will be counted as providing *DP* after $T+2$ years. Second, even if we find most of firms already provide *DP* before initiating dividends, we can not determine causality because one can argue that firms have already taken into account the possibility of dividend initiation

Table 3.9: Changes in dividend protection and changes in dividend policy

The table provides OLS estimates for relations between changes in dividend policies and changes in dividend protection. The dependent variable in column (1) and (2) is $\Delta Dividend\ yield,t$, which is the dividend yield at year t minus the dividend yield at year $t-1$. The dependent variable in column (3) and (4) is $\Delta DP,t$, which is the difference between DP_t and DP_{t-1}, where DP is the value of CEO restricted stock and option holdings that are dividend-protected divided by the total value of restricted stock and option holdings. All regressions also control for all other CEO and firm characteristics shown in Table 3.5, including the year and industry fixed effects, but coefficients are not reported. The standard errors (in parentheses) are clustered at the firm level. *** and ** denote significance at 1% and 5% levels, respectively.

	ΔDividend yield *t*		**ΔDP *t***	
	(1)	(2)	(3)	(4)
ΔDP *t*-1	0.25 **			
	(2.07)			
ΔDP *t*-2		0.03		
		(0.25)		
ΔDividend yield *t*-1			-0.01	
			(-1.27)	
ΔDividend yield *t*-2				0.64
				(0.85)
Other controls	Yes	Yes	Yes	Yes
Year, industry fixed effects	Yes	Yes	Yes	Yes
Number of observations	2,752	2,446	2,501	2,501
R-squared	0.25	0.27	0.13	0.13

when they designed CEO compensation.

3.4.6 Do dividend changes drive changes in dividend protection?

Previous results provide overwhelming evidence that dividend protection (*DP*) is influencing dividend payout policy. However, do dividend changes drive changes in dividend protection? To examine whether dividend payout policy determines *DP*, another set of tests is provided for the hypothesis that predetermined changes in firm payout policy lead to changes in *DP*, and that predetermined changes in *DP* lead to changes in firms' payout policies.

The test is first run on the hypothesis that predetermined changes in *DP* lead to changes in dividend yield. The predetermined changes in *DP* are measured, and then an empirical analysis is conducted to determine whether these changes affect the changes in dividend yield in this period and the subsequent period. To make sure the analysis is picking up the causality in the right direction (changes in *DP* causing changes in the dividend yield), the change in dividend yield during this year (measured as $\Delta Dividend\ yield_t =$

Dividend yield$_t$ − *Dividend yield*$_{t-1}$) is regressed on both the change in *DP* during the previous year (measured as $\Delta DP_{t-1} = DP_{t-1} - DP_{t-2}$) and the change in *DP* two years ago (measured as $\Delta DP_{t-2} = DP_{t-2} - DP_{t-3}$). Results are reported in the first two columns of Table 3.9. A positive and significant coefficient on ΔDP_{t-1} and an insignificant coefficient on ΔDP_{t-2} suggest that, controlling for everything else, if CEOs' dividend-paying incentives increased last year, firms increase their dividend yields this year but not for the next year.

The test is then run on the hypothesis that predetermined changes in firms' dividend policy lead to changes in managerial dividend-paying incentives. Similar, the changes in DP_t is regressed on both the change in dividend yield of previous year and the change two years ago. As shown in the last two columns of Table 3.9, neither of coefficients is significant: an increase in *DP* this year do not respond to changes in dividend yield of either the previous year or two years ago.

3.4.7 Ex-dividend drop-offs and dividend announcement effects

Prior literature argues that firms may use dividends to provide a signal to the market regarding future prospects (e.g. Asquith and Mullins (1983) and Richardson et al. (1986)). However, some recently research struggles to find evidence that dividend increases are reliable signals of future earnings increases (DeAngelo et al. (1996), Benartzi et al. (1997), Nissim and Ziv (2001), Grullon et al. (2005)). Nevertheless, if the dividend increase announcement increases the stock price, CEOs might benefit from paying dividend rather than suffering from a loss. Follow the literature, I construct the drop-off on ex-dividend date as the stock price change measured from the closing price of the preceding day to the opening price on the ex-dividend day, adjusted for the change on S&P 500 index. To check the effect of dividend announcement on the stock price, the mean cumulative abnormal returns (CAR), using the market-adjusted model, are calculated for the 3-day window around the announcement of the dividend decrease, dividend increase, dividend initiation, and special dividends announcement. Dividend increase is further split into increase by less than 10%, increase by 10% to 20%, and increase by more than 20%.

Table 3.10 summarizes the results. Consistent with the literature, the ex-dividend date drop-off is significantly negative. The average drop-off of -0.39% dominants the dividend announcement effect of 0.12% increase in excess returns. Dividend increase on average generates -0.43% drop-off and 0.41% gain on excess return. One might argue that these two effects cancel out when increasing dividend; hence CEOs do not have to worry about potential loss from increasing dividend. However, given that only 16% (1,419 out of

Table 3.10: Ex-dividend date drop-off and dividend announcement effects

The table provides average ex-dividend date drop-off and cumulative abnormal returns for dividend announcement. The ex-dividend date drop-off is calculated as the stock price change measured from the closing price of the preceding day to the opening price on the ex-dividend day, adjusted for the change on market index. CAR is calculated for the three-day event period from one day before to one day after the announcement day. A dividend increase is defined as a rise in ordinary dividends per share based on dividend announcement in CRSP. A dividend initiation is a dividend increase when no dividend was paid in the past ten years. *** and ** denote significance at 1% and 5% levels, respectively.

	Ex-dividend date drop-off	**CAR (-1,+1)**	**N**
All dividend announcement	-0.39% ***	0.12% ***	9,100
Increase dividend	-0.43% ***	0.41% ***	1,419
Increase dividend by less than 10%	-0.49% ***	0.36% ***	552
Increase dividend by 10% ~ 20%	-0.51% ***	0.41% ***	421
Increase dividend by more than 20%	-0.28% ***	0.50% ***	446
Initiate dividend	-0.70% *	1.93% **	53

9,100) of chance that firms increase dividend, CEOs might still care about majority of times when firms pay same dividends as previous period. It also seems that CEOs might benefit from dividend initiation since the CAR is much larger that the drop-off. However, this is only a one time gain. After the dividend initiation, CEOs will suffer from paying dividend when they are not dividend protected and when dividend increase is not large.

3.4.8 Voting rights and methods of payment

As shown in Panel A of Table 1, I also collected the information on 1) if grantees are entitled to vote during vesting period and 2) if the dividend is paid to executives at the same time as shareholders of common stock or if it is accumulated until specified restrictions lapse. In this subsection, I discuss the effects of these arrangements on CEO's dividend decisions.

With restricted stock awards, firms can choose whether to provide voting rights prior to vesting. I construct a variable, *Voting rights*, as the value of restricted stock holdings that are entitled to voting rights divided by the total value of restricted stock and option holdings. For dividend protections on restricted stock and option grants, there are different kinds of arrangement on how the dividend is actually paid to CEOs. I categorize them into two types, immediate payment and accumulation. Immediate payment means that when firms pay dividends to shareholders of common stock, executives also get paid in cash at the same rate and at the same time. Accumulation can be in two forms. Some firms

provide additional restricted stock, the value of which is equal to the dividend entitled. Such additional restricted stock should be subject to the same restrictions as the original grant. Another form of accumulation is to put the cash amount of dividend into a special account, which distributes cash to executives only when restrictions lapse. Therefore, no matter which form of accumulation a firm adopted, executives will not get dividend payment if restricting conditions are not met. Thus, I expect CEOs with the immediate payment of dividend protections to have higher incentives to increase corporate dividend payouts. I construct *Accumulation* as the proportion of restricted stock and option holdings that are entitled to dividend equivalents which will be accumulated and paid upon vesting. I expect *Accumulation* to have a negative effect on dividend yield.

To examine the effect of voting rights and dividend payment methods, I add *Voting rights* and *Accumulation* separately to specifications in Table 3.5 for *DP* firms. I focus on this sub-sample, because both *Voting rights* and *Accumulation* apply for *DP* firms only[19]. The marginal effects of *Voting rights* and *Accumulation* are shown in 3.11 Panel A and Panel B, respectively. The results suggest voting rights contribute negatively to the dividend yield, but the effect is not statistically significant. The effect of *Accumulation* is also insignificant. However, we notice that the dividend protection (*DP*) is still positive and highly significant for dividend yield and dividend payout ratio. Overall, I find that the voting rights and the methods of dividend payment do not matter on the dividend payout policies.

3.5 Conclusions

This chapter investigates how corporate payout policy is related to managerial dividend-paying incentives. I find evidence of a strong relation between managerial dividend-paying incentives and the CEO's decision on payout policies. I construct a measure of dividend protection (*DP*) which captures to what degree the CEO's restricted stock and option holdings are protected from the loss when paying out dividends. The results suggest that a one-standard-deviation increase in *DP* is associated with a 29-bases-point increase in dividend yield, which is a 31% increase in annual dividend payout for the median S&P 500 firm. In addition, I provide some evidence that the causality runs in one direction but not the other way around: managerial dividend-paying incentives influence corporate dividend payouts.

Recent studies suggest that stock option plans provide executives incentives to to avoid dividends and to favor share repurchases (Bartov et al. (1998), Jolls (1998), Weisbenner (2000), Fenn and Liang (2001), Cuny et al. (2009), Chetty and Saez (2005) and Brown

[19]No firm in my sample provides the CEO restricted stock with voting rights but not dividend rights.

Table 3.11: Voting rights and methods of payment

The table summarizes the Tobit regression results following specifications in Table 3.5 and add Accumulation and Voting rights, respectively. The dependent variables are dividend yield, repurchase divided by market value of equity, total payout divdend by market value of equity, and dividend divided by total payouts. *DP* is the value of CEO restricted stock and option holdings that are dividend-protected divided by the total value of restricted stock and option holdings. Accumulation is the proportion of restricted stock and option holdings that are entitled to dividend equivalent which will be accumulated and paid upon vesting. Voting rights is the proportion of restricted stock and option holdings that are entitled to voting rights. Only the marginal effects of *DP*, Voting rights, Accumulation, and *t*-statistics (in parentheses) are reported. All other variables shown in Table 3.5 are included in the regression, but not reported. Standard errors are clustered at the firm level. ***, and ** denote significance at 1% and 5% levels, respectively.

Panel A: Accumulation of dividends on restricted stock and option holdings

	DivYield	**Rep/MV**	**Payout/MV**	**Div/Payout**
	(1)	(2)	(3)	(4)
Dividend protection (*DP*)	1.11 ***	-1.45 **	0.83 *	0.14 **
	(4.17)	(-2.36)	(1.91)	(2.08)
Accumulation	0.05	-0.67	0.58	0.05
	(0.17)	(-1.08)	(-1.50)	(0.61)
Other controls	Yes	Yes	Yes	Yes
Year, industry fixed effects	Yes	Yes	Yes	Yes
Number of observations	1,512	1,505	1,370	1,370
R-squared	0.15	0.07	0.25	0.27

Panel B: Voting rights on restricted stock and option holdings

	DivYield	**Rep/MV**	**Payout/MV**	**Div/Payout**
	(1)	(2)	(3)	(4)
Dividend protection (*DP*)	1.18 ***	-1.66 ***	0.70	0.18 ***
	(5.03)	(-2.90)	(1.53)	(2.71)
Voting rights	-1.71	0.05	-0.04	0.13
	(-0.52)	(0.08)	(-0.10)	(0.88)
Other controls	Yes	Yes	Yes	Yes
Year, industry fixed effects	Yes	Yes	Yes	Yes
Number of observations	1,512	1,505	1,370	1,512
R-squared	0.15	0.07	0.25	0.26

et al. (2007)). Aboody and Kasznik (2008) also show that the increase in restricted stock grants and the decrease in option grants induce managers to use dividends as a form of payout.

These results, in combination with mine, offer the following picture of managerial dividend-paying incentives and corporate payout policy: First, managerial incentives determine corporate payout policy, above and beyond traditional firm characteristics such as earnings and free cash flow. Second, previous findings on the positive association between the restricted stock grant and dividend payouts and the opposite relation for option grants are indeed a reflection on the fact that the majority of restricted stock grants is dividend protected while very few option grants are. Therefore, my investigation on the managerial dividend-paying incentives provides an important contribution to the field of corporate payout policies and the design of executive compensation.

Chapter 4

One-Dollar CEOs

> Gray: "Why are you cutting your salary to $1?"
>
> Mackey: "...I have enough money, and the deeper motivations are for me to do service and try to do good in the world...."
>
> Gray: "How much of your salary cut decision has something to do with decelerating same-store sales growth?"
>
> Mackey: "None. Zero."
>
> – From the interview of Mr. John Mackey, CEO of Whole Foods (Wall Street Journal, Dec. 4, 2006).

4.1 Introduction

Even as U.S. CEOs are being accused of drawing excessive compensation (Frydman and Jenter, 2010, Frydman and Saks, 2008, and Gabaix and Landier, 2008), why have some CEOs settled for a mere dollar-a-year salary? Recently, in the wake of the worst economic downturn in decades, the CEOs of all three major U.S. automakers pledged to work for an annual salary of just $1. This presumably sacrificial step to share the pain with shareholders and employees is not unique to economic crises, however. Scores of CEOs, including those with thriving firms like Apple and Google, have also adopted this compensation arrangement since the early 1990s. In fact, the first striking feature about firms with $1 CEO salaries is their banality: Many of these firms are household names and are drawn from a very wide variety of industries (see Appendix 4.A). In this chapter, we examine the past adoptions of $1 CEO salaries to address a number of unanswered

questions regarding this apparently contrarian behavior.[1]

Specifically, in this chapter we ask the following questions about adoptions of $1 CEO salaries: What are the motivations behind these adoptions? Are these adoptions merely publicity gimmicks to divert attention from other enormous, less visible payoffs in the form of bonus, stocks or options?[2] What is special about these CEOs and their firms that led them to agree to this uncommon salary scheme? Importantly, how do these CEOs and their shareholders fare in the aftermath of these adoptions? Altogether, the answers would address an overarching question about these adoptions: Are they the result of arm's length bargaining between boards and CEOs seeking to minimize managerial agency costs and obtain optimal compensation contracts, or are they driven by the rent-seeking motives of CEOs? These alternatives sum up contrasting views of adoptions of $1 CEO salaries, drawn from the two main approaches to executive compensation.

According to the traditional approach based on the principal-agent framework, 'the optimal contracting approach', the board uses compensation schemes to provide the CEO with efficient incentives to maximize shareholder value (see surveys of extensive work on this by Murphy, 1999, and Core, Guay, and Larcker, 2001). Market forces and effective corporate governance help enforce the optimal contract. In the competing approach, 'the managerial power approach,' executive compensation is not necessarily a part of the solution to the managerial agency problem, but is itself a potential mechanism for rent-seeking in the hands of powerful CEOs (Bebchuk, Fried, and Walker, 2002). What constrains the board from allowing, and the powerful CEO from seeking, greater excessive compensation is the public outrage it might engender. There are serious social and professional costs to board members and CEOs who are highlighted by the media for excessive pay.[3] Negative publicity can damage a firm's reputation, which is a signal of its product quality and affects its financial performance (Milgrom and Roberts, 1982, Michalisin, Kline, and Smith, 2000, and Roberts and Dowling, 2002). To soften this "outrage constraint,"

[1]This Chapter is based on "The Ruse of the One Dollar CEO Salary", co-authored with Loureiro Gilberto and Anil Makhija. We appreciate helpful comments from Ulf Axelson, Uri Ben-Zion, Jennifer Carpenter, Ingolf Dittmann, Kose John, Garen Markarian, Stephen Sapp, Francesca Silvestrini, René Stulz, Moqi Xu, David Yermack, Scott Yonker, Manuel Vasconcelos (discussant at the PFN 2010 meetings), and the seminar participants at Universidade do Minho, Universidade Nova de Lisboa, and Faculdade de Economia do Porto. We thank Rudiger Fahlenbrach for giving us data on founders. Excellent research assistance was provided by Abdulrahman Almalik, Andrew Hom, and Jongha Lim.

[2]In an oft-repeated position in the media, Scott Mayerwotitz (2008) of ABC News notes that some of the $1 salary CEOs "earned millions of dollars through stocks and other forms of compensation." For example, Scott DeCarlo (2007) notes in Forbes that Steve Jobs of Apple was the highest paid boss among the 500 firms they tracked: "He drew a nominal $1 salary but realized $647 million from vested restricted stock last year."

[3]E. g., Johnson, Porter, and Shackell (1997) report that CEOs with adverse media coverage subsequently received smaller pay increases. Similarly, according to Thomas and Martin (1999), CEOs, who were targets of shareholder resolutions criticizing executive pay, saw their annual compensation reduced dramatically in the following two years.

and facilitate rent extraction, the CEO may seek to camouflage excessive compensation.[4] This has also been referred to as the "skimming" view of executive compensation (Yermack, 1997, Bertrand and Mullainathan, 2001, Bebchuk, and Fried, 2004, and Kuhnen and Zweibel, 2006), according to which CEO compensation is fraught with distortions by entrenched managers: "When changing circumstances create an opportunity - either by changing outrage costs and constraints or by giving rise to a new means of camouflage - managers will take full advantage of it..." (Bebchuk, Fried, and Walker, 2002). From the perspective of these two approaches, we examine whether $1 CEO salaries are a move towards optimal contracts, or are they camouflage to avoid outrage about excessive rents.

We formulate and test three hypotheses, highlighting different salient features of adoptions of $1 CEO salaries in light of the above alternative approaches to executive compensation in the literature: First, according to an Alignment Hypothesis based on the 'optimal contracting approach,' a $1 CEO salary may better align CEO-shareholder interests and produce more efficient incentives (Hart and Holmstrom, 1987, Core, et al., 2003). Second, in the spirit of Leland and Pyle (1977) in another application of the 'optimal contracting approach,' according to a Signaling Hypothesis we emphasize the implications of the willingness of some CEOs to suffer certain current loss of salary in exchange for substantial equity-based risky payoffs later. Shareholders are expected to benefit from adoptions of $1 CEO salaries, according to both the Alignment and Signaling Hypotheses. In contrast to the 'optimal contracting approach,' a rent extraction view defines our third hypothesis, the Managerial Power Hypothesis. Now, $1 CEO salaries are not consistent with shareholder value maximization. In this view, the compensation contract is not the result of vigorous arm's length bargaining, but is instead designed to serve the CEO's personal goals. The $1 CEO salary may be a form of camouflage to avoid outrage over excessive total compensation or a diversion of attention from other self-serving activities of the CEO. Instead of seeing it narrowly as a form of subterfuge to garner just excessive compensation, we view the camouflage value of adoptions of $1 CEO salaries to encompass other self-serving behaviors as well. Projected as a sacrificial act, these adoptions can serve as a façade behind which the seemingly selfless CEO can hide, not only large non-salary compensation, but also other personal benefits from the firm as well. We elaborate on these hypotheses further.

We begin with the first explanation, the Alignment Hypothesis. As a compensation decision normatively set to provide the CEO with incentives that minimize managerial

[4]Consistent with Weisbach (2007), Kuhnen and Niessen (2010) document that following negative press of CEO pay, firms have reduced option grants, which have been the focus of adverse public attention recently, and increased the less controversial forms like stock awards.

Table 4.1: Hypotheses and their predictions regarding the $1 CEO salaries

Hypotheses	Nature of $1 CEO Salary Contract	Predictions		
		Motivating Factor Present	Corporate Governance	Value Effect for Shareholders
Alignment	Optimal	Managerial agency problems	Effective	Value-creating
Signaling	Optimal	Business challenge to restore profitability or exploit opportunities	Effective	Value-creating
Managerial Power	Non-optimal	Potential for outrage over private benefits	Ineffective	Value-destroying

agency costs and lead to the maximization of shareholders' wealth, a $1 CEO salary shifts compensation to a largely equity-based form. It consequently better aligns the interests of the CEO with those of shareholders, as well as incent him through grants of options to undertake risky growth opportunities. It has been argued that more options-heavy contracts increase the incentives to exploit risky growth opportunities (Core and Qian, 2001).[5] Thus, from the perspective of optimal contracting theory, we expect that firms in greater need of alignment between shareholders and their CEOs (greater managerial agency problems), and firms in possession of more growth options, are more likely candidates for adopting a dollar-a-year CEO salary. These predictions of the Alignment Hypothesis, along with those of the other hypotheses, are summarized in Table 4.1.

It is, however, unlikely that we are simply looking at ordinary variation in compensation structure, except that the salary component has been dropped to its lowest limit. If a $1 CEO salary is the preferred mechanism to deal with managerial agency problems in such commonplace firms, then this compensation choice should be far more common. Rather adoptions of $1 CEO salaries may be an appropriate contracting response to an urgent business challenge faced by the firm. Arguably, firms adopting $1 CEO salaries face serious concerns about their prospects (either dire or loss of highly valuable opportunities), and these adoptions are a radical signaling response to these situations. Only a capable CEO candidate would step forward to take a $1 salary "bet," agreeing to a certain sizeable drop in current income in exchange for a potential uncertain reward later. In essence, by accepting the bet, the CEO signals ability and wins the opportunity to execute his, possibly controversial, turnaround plan. This Signaling Hypothesis predicts that $1 CEO salaries are adopted by well-governed firms, facing challenging prospects, with able

[5] Though heavily in-the-money options have largely similar incentives as stocks.

CEOs who have "skin in the game."

An alternative hypothesis, the Managerial Power Hypothesis, does not take a favorable view of $1 CEO salaries from the shareholders' perspective. The reason why some firms adopt $1 CEO salaries can be attributed to CEOs who are interested in the compensation and other economic benefits that they can draw because of the camouflage provided by these arrangements. By reducing salary, the most visible form of compensation, the CEO may deflect attention from the other forms of pay, e.g., stocks and options. But, the camouflage value of $1 salaries may go beyond their usefulness in extracting rents through compensation. As a seemingly altruistic action, $1 CEO salaries may also reduce the likelihood of outrage over his other behaviors, providing the CEO with the cover to draw other private benefits and pursue a personal agenda harmful to shareholders. This is a broader view of the camouflage value of $1 CEO adoptions. In fact, relative to the extra dollars of compensation that he may get away with because of the $1 salary, arguably the other personal pursuits of the CEO may well be more expensive for shareholders. These other activities may include personally-preferred investments, heavy perk consumption, nepotistic appointments, favored charities, etc. Moreover, the $1 salary, even if chosen only for its camouflage value for compensation purposes, may also be distortive because it does not provide optimal incentives to the CEO. We do not expect the firm to be well-governed, since the CEO prevails in adopting a value-destroying agenda. The $1 CEO is part of the power dynamics that results from strong CEOs with weak boards. We expect the firm to underperform as a result.

Thus far, we have drawn upon rational economic motives for the Managerial Power Hypotheses. But, given the nature of the problem, it is natural to wonder if behavioral biases also play a complementary role. Consequently, we consider personal traits of the CEO and extend the Managerial Power Hypothesis to include adoptions motivated by behavioral biases. In particular, we examine whether CEOs that want a $1 salary are perhaps overconfident of their abilities (Malmendier, Tate, and Yan, 2010), and thus too willing to accept a bad gamble. Though possibly well-intentioned, their "good faith mismanagement" is nevertheless value-destroying, and can prevail only if the CEO is strong and the board is weak. Similarly, because $1 salaries attract considerable personal publicity and enhance his social status, a CEO may favor these adoptions, even if not in the best interests of shareholders. Since the rich may be more prone to favor such non-monetary consumption over some incremental salary dollars as the interview with Mr. Mackey quoted at the top of this article suggests, we also consider the wealth of the CEO. Of course, we cannot rule out the possibility that the $1 salary was meant to prevent criticism of Mr. Mackey despite the problems faced by Whole Foods. Again, for the CEO to get

away with carrying out plans driven by his personal biases, the cover of a $1 salary can be useful.

We identify 50 genuine cases of firms with $1 CEO salaries over the years, 1992-2005.[6] First of all, these drastic cuts in salary seem to hide other forms of compensation since we find that the resulting total compensation, inclusive of bonus, stock, and options awards, is similar to that at comparable firms. Furthermore, we find that there is greater likelihood of a $1 CEO salary arrangement if the CEO owns a sizeable ownership stake in the firm, and institutional ownership is relatively low. Arguably, this provides the CEO enough power to do as he wishes, with no need to cut or replace his salary with risky income, except to preempt public outrage with a seemingly selfless act. There is also evidence that the camouflage of a $1 CEO salary is valuable for these CEOs since we document that in many cases the $1 CEOs are at risk of being targets of public outrage. This potential for public outrage arises from prior media coverage of large CEO compensation, businesses challenges faced by the firm, even pending disclosures of wealth from divorce proceedings, etc. Importantly, the firm does not fare well in the aftermath of adoptions of $1 CEO salaries. These findings support the Managerial Power Hypothesis. There is also supporting evidence of behavioral biases that seem to motivate these CEOs to adopt $1 salaries. Even against other CEOs who tend to be overconfident, we find that $1 CEOs are significantly more overconfident. Moreover, though CEOs also tend to be rich in general, $1 CEOs are even richer still. One can conjecture that the very rich are more likely to pursue non-monetary personal pursuits, which are not necessarily in the best interests of shareholders.

This study offers to make broader contributions beyond an examination of an unaddressed phenomenon that affects familiar firms. It adds to our understanding of the role and function of executive compensation, and hence to the ongoing debate on the relative importance of the optimal contracting and managerial power approaches. There are other unique advantages as well. Studies of executive compensation routinely assume the traditional compensation format in which salary is the main pillar, with other components of compensation like target bonuses, options grants, defined pension benefits, and even severance arrangements typically expressed as a percentage or a multiple of base salary (Murphy, 1999). In contrast, our study illustrates the unexamined motivations and consequences in a case where the traditional format is abandoned.

There are serious consequences from assuming that the traditional compensation for-

[6] In many cases, ExecuComp, a widely used database in empirical work on executive education, reports no salary in the Annual Compensation table in the proxy statement. But, a closer reading of the footnotes in the proxy statement reveals that the CEO is well-compensated through an affiliated enterprise or was prepaid in a previous year.

mat applies to all firms. In particular, recent studies bring out the importance of ignoring $1 CEO salaries in studies of CEO compensation. For example, Guthrie, Sokolowsky, and Wan (2010) show that the findings of Chhaochharia and Grinstein (2009) are upturned when just two "outliers" – both cases of $1 CEO salaries in our sample, Steve Jobs of Apple and Kosta Kartosis of Fossil – are removed from the analysis. We document many more cases of $1 CEO salaries, which too do not fit the usual mode of CEO compensation.

This study also adds to work that focuses on special subsets of CEOs. In that sense, this chapter follows a similar approach to that taken by Malmendier and Tate (2009), who study "Superstar CEOs". This closer, more detailed approach permits one to take into account the heterogeneity of characteristics among CEOs, which may be useful in understanding the behavior of firms according to a growing literature that links CEO characteristics with the policies and outcomes of firms (Bertrand and Schoar, 2003, Schoar, 2007, Graham, Harvey, and Puri, 2009, and Kaplan, Klebanov, and Sorensen, 2008, Malmendier, Tate, and Yan, 2010, and Cronqvist, Makhija, and Yonker, 2010).

In the next section, Section 4.2, we develop several hypotheses regarding the motivation for adopting a dollar-a-year CEO salary. To test these hypotheses, in Section 4.3 we identify and describe our sample. For factors that motivate the adoptions of $1 CEO salaries, we test the Alignment Hypothesis in Section 4.4, and the Signaling and Managerial Power Hypotheses in Section 4.5. We examine the role of CEO overconfidence in the adoptions of $1 CEO salaries in section 4.6. The value effects of these adoptions are considered in section 4.7. We describe in section 4.8 the reasons why the CEOs with $1 salaries are at risk of public outrage over their private benefits, including compensation. In Section 4.9, we undertake a number of robustness checks and discuss further the implications of our findings. We offer concluding remarks in Section 4.10.

4.2 Hypotheses and their tests

To better understand the context in which firms adopt $1 CEO salaries, we begin by reading proxy statements for the first year of adoption.[7] Appendix 4.A presents related excerpts from proxy statements for some 50 firms that are the basis of our later empirical analysis. Table 4.2 draws upon this information to highlight certain aspects of these adoptions.

Table 4.2: Information in Proxy Statements on $1 CEOs, 1992-2005

"Sample firms" are not repeated. Whenever the CEO of a "sample firm" earns a $1 (or less) salary for more than 1 consecutive year, only the first year is considered. Panel A shows the stated reasons for adopting a $1CEO salary. Panel B shows other forms of compensation earned by the CEOs of sample firms. Panel C shows how many of the sample CEOs are first-time CEOs, that is, cases where the CEO appointment is simultaneous with the $1 salary arrangement.

Panel A: Reason for adoption of $1 salaries (out of 50 sample firms)

Reason	**N**	**%**
No reason cited	19	38%
Reason was cited by the remaining 31 firms (62% of sample), incl. repetitions:		
To align interests of CEO and shareholders	20	40%
To reduce costs/ aid in recovery	12	24%
To convey CEO's confidence in future	3	6%
To fund CEO's preferred charitable cause	2	4%
To attract superior executive (i.e., the CEO)	1	2%
To share at the top in sacrifice towards recovery	1	2%

Panel B: Non-salary form of compensation (out of 50 sample firms)

Non-salary forms of compensation	**N**	**%**
Bonus awards	6	12%
Options	35	70%
Equity-based awards	39	78%
Explicit statement that equity-based compensation are *in lieu* of salary	19	38%
Automatic gain as major stockholder (holdings > 5% of outst. stock)	25	50%

In Panel A of Table 4.2, we note that the two most frequently cited reasons for adopting $1 salaries are to align the interests of CEOs with shareholders, and to aid in the restoration of profitability.

In Panel B, we see that the reduction in salary to $1 is overwhelmingly accompanied by a reduction in bonus as well (88% of the cases), effectively eliminating current cash payoffs. Furthermore, a large proportion of the CEOs in our sample receive some equity-based compensation (78%), and that in many cases the firm actually notes that this compensation has been provided in lieu of lost salary and bonus. The exchange may be implied in other cases. This supports the view that a $1 salary may not necessarily imply a sacrifice, and motivates us to later examine total compensation.

Furthermore, in about half the cases (46%) the appointment of the CEO occurs simultaneously with the adoption of a $1 salary arrangement. This is highly suggestive of a quid pro quo deal, whereby the CEO pays in lost salary and bonus in exchange for the opportunity to lead the firm and get any benefits that may accrue to him in the future from the stocks and options granted to him. Incumbent CEOs that change to a $1 salary arrangement may be accepting similar bargains to hold on to their jobs, and be allowed the opportunity to execute their preferred turnarounds.

4.2.1 Alignment hypothesis

Interestingly, a sizeable number (38% of all cases, Panel A of Table 4.2) of firms offer no explicit reason for the adoption in their proxy statements. However, when they do, the most frequent reason (40% of all 50 cases) is that a $1 salary helps align the interests of the CEO and shareholders by shifting compensation to a more stock- or option-based form.[8] Thus, the $1 CEO salary is frequently accompanied by equity-based compensation, (78%, in Panel B), with options grants in 70% of all cases. The following examples, all from proxy statements (Form DEF 14a) illustrate this:

> Extended Stay America, Inc., George D. Johnson, Jr., 2000. "The Company does not pay Mr. Johnson any cash salary or bonus but rather compensates him exclusively through stock option grants. We believe that tying Mr. Johnson's remuneration to the performance of the Company's Common Stock will motivate Mr. Johnson to

[7] Interestingly, corporate law has historically been largely silent on how much and in what manner executives should be compensated, though the recently passed Dodd-Frank Act of 2010 is about to introduce advisory "say on pay" voting by shareholders. These decisions by default are left to the board. Similarly, exchange listing requirements place only procedural restrictions on pay, such as the NYSE rule that stock option plans be approved by shareholders. Government and other regulations are generally focused on disclosure requirements.

[8] The media has noted this too. Writing in Business Week, Moira Herbst (2007) calls it the ultimate pay-for-performance scheme, where CEOs are "sending the message to investors that they'll make money only if other shareholders do, too."

> maximize stockholder value and is consistent with our policy of compensating the Company's senior executives, like Messrs. Huizenga and Johnson, primarily through annual stock option grants."

In many of these cases, the firm explicitly noted that the equity-based compensation was in lieu of the foregone salary and bonus:

> AES Corp., Dennis W. Bakke, 1999. "The Committee decided that, beginning in 1999, Mr. Bakke would no longer receive cash as part of his overall compensation. Mr. Bakke was compensated solely by the grant of stock options (in lieu of a cash salary and cash bonus). The Committee believes that this method of compensation will align Mr. Bakke's compensation more closely with the financial interests of the Company's other shareholders."

In a few cases, the firm offered the exchange of salary and bonus as an option left to the discretion of the CEO:

> Bombay Co., Inc., James D. Carreker, 2003. "Pursuant to his employment agreement, he was entitled to receive a base salary of $600,000 or, if he elected to receive his base salary in the form of restricted stock vesting in full at the end of three years, he was entitled to a grant of restricted stock valued at 1.25 times base salary. He elected to take stock and was granted 81,256 shares. At January 30, 2004, the shares had a value of $611,858. Similar elections may be made each year on or about the anniversary date of Mr. Carreker's appointment."

And then, there are cases where the salary is dropped because the CEO has a large ownership stake and thus automatically has interests aligned with shareholders:

> Netscape Communications Corp, James L. Barksdale, 1997. "For 1997, Mr. Barksdale elected to receive a salary of $1.00 and to return an option grant of 300,000 shares made in April 1997. Mr. Barksdale believes that his compensation should be linked to the long-term interests of Netscape's stockholders. Accordingly, through his ownership position in Netscape's Common Stock, Mr. Barksdale's pecuniary interests are aligned with those of Netscape's stockholders."

The finance literature recognizes the potential benefits from an improved alignment of interests of the CEO and shareholders. Along with how much the CEO is paid, it is also important how he is paid, so that the structure of compensation matters to CEO behavior (Jensen and Murphy, 1990). According to traditional agency models, a larger equity-based compensation makes the CEO behave more like stockholders, and reduces the agency cost of equity (Jensen and Meckling, 1976). Moreover, since we see more of a shift towards larger options-based compensation rather than stock awards, we also raise the (implied) possibility that the purpose of $1 CEO salary is to incent the CEO to take on greater risks and benefit the firm from its growth opportunities (Smith and Watts, 1992). While alignment of CEO-shareholders interests and exploitation of growth opportunities are in principle desirable objectives across the board, only adopting firms take on extreme measures in formulating their compensation structures. Thus, our agency-based prediction is the following: Alignment Hypothesis: One-dollar CEO salaries are adopted by firms in greater need of alignment of CEO-shareholders interests and/or in possession of more growth options. The adoption reduces managerial agency costs and creates shareholder value.

These predictions are laid out in Table 4.1: According to the Alignment Hypothesis, (a) the motivating factor for the adoptions is the presence of greater managerial agency problems, (b) the corporate governance of the firm is effective, and (c) the adoptions of $1 CEO salaries are value-creating for shareholders.

4.2.2 Signaling hypothesis

Of course, it should not be surprising that in the proxy statements, which are meant to garner their votes, that firms would most emphasize the shareholders' perspective in the adoption of $1 CEO salaries. But, adoptions of $1 CEO salaries also require the risk-averse CEOs to accept riskier compensation packages, exchanging certain current income in exchange for an uncertain future reward. Only those CEO candidates would accept such packages that have the confidence in their ability to deliver. In a handful of cases (6%), the proxy statements literally voice this very confidence, typically in the context of performance problems:

> Lily (Eli) & Co, Sidney Taurel, 2002. "In light of the reduction in the company's Prozac sales, Mr. Taurel voluntarily reduced his base salary to $1.00 for the year 2002. The company did not offset this reduction in salary by any additional compensation but provided a benefits allowance to preserve his employee benefits at their

> normal level. Mr. Taurel requested this reduction to demonstrate his confidence in the company's future results and to set an example for employees."

In many more cases (24%), the CEO gave up his salary to reduce costs and aid in the recovery of the firm, again effectively betting on the future:[9]

> Cisco Systems, Inc., John T. Chambers, 2002. "On April 1, 2001, Mr. Chambers requested that his base salary be lowered to a rate of $1.00 annually (until the recognition of a recovery in Cisco's performance). On May 11, 2001, the Committee agreed to honor this request until such a time as the Committee deems it appropriate to return Mr. Chambers' base salary to a market competitive level. For fiscal year 2002 Mr. Chambers' base salary remained at $1.00."

In other cases, the CEO may bet on adding significantly more value to an already profitable firm, with behaviorally similar implications regarding betting on the future as entailed in restoring profitability. Though this is a plausible situation, as perhaps in the cases of Apple and Google, Panel A of Table 4.2 suggests that restoration of profitability is likely a much more common reason for adoptions of $1 CEO salaries than the upside bet on the exploitation of large growth options.

> We expect that only capable CEO candidates will signal an ability to successfully carry out a turnaround, or else they face an expected loss. Moreover, well-functioning boards will go forward with these arrangements with only deserving candidates, or else they accept a losing proposition for their shareholders. For the signal to be credible, the CEO must have a sufficient stake in the outcome to be handed over the reins of the firm.The Signaling Hypothesis is closely related to the Alignment Hypothesis, and could be seen as a special case of it during a "turnaround" period.

Signaling Hypothesis: One-dollar salaries are adopted by well-governed firms to identify credible CEOs who can successfully address the concerns about the firms' prospects. The adoption signals value creation for shareholders.

[9]For the Signaling Hypothesis and the bet it entails, there is indeed some evidence in the proxy statements and press releases made by the firms (Factiva and Lexis/Nexis) that they are facing some challenges. Some 17 (34%) firms are actively engaged in restructuring in the period surrounding the adoption of a $1 CEO salary. If we increase the window, from (-1, +1) to (-3, +3) years, 23 (46%) of the firms are restructuring. Besides reading the proxy statements and 10Ks, we made searches on restructure (-ing) /reorganize (-ing/-ation) /turnaround/ costcut (-ing) /pay(salary /wage/payroll) cut and lay(laid) off /sack for this purpose.

These predictions are laid out in Table 4.1: According to Signaling Hypothesis, (a) the motivating factor is a business challenge, poor performance or realization of growth opportunities, (b) the corporate governance of the firm is effective, and (c) adoptions of $1 CEO salaries are value-creating for shareholders.

4.2.3 Managerial power hypothesis

The starting point now is that the CEO has considerable influence over the design of his compensation package to adopt schemes that benefit him.[10] Obviously, the proxy statements of firms adopting $1 CEO salaries do not point out that these schemes can be harmful to shareholders. Yet, the adoptions of $1 CEO salaries may be driven by the desire to camouflage personal agendas of the CEOs, and may not maximize shareholders' wealth. With public attention diverted towards the reduction in salary, the CEO may continue to enjoy large compensation through additional stocks and options. He can also protect other benefits from the firm. Indeed, in a couple of cases the proxy statements do mention personal motives, e.g., funding of favored charitable causes, that may have prompted CEOs to seek these salary arrangements. See for example:

> Pepsico, Inc., Roger A. Enrico, 1998. "At Mr. Enrico's request, the Committee approved a reduction in Mr. Enrico's annual salary from $900,000 to $1, and recommended to the Board of Directors that it consider using the savings to support front line employees(scholarship for children of PepsiCo's sales people, truck drivers, manufacturing plant workers and other front line employees). In January 1999/2000, the Board approved annual charitable contributions of approximately $1,000,000 to fund additional scholarships for children of PepsiCo's front line employees."

Besides protecting a general mindset that is not focused on shareholders, adoptions of $1 salaries may be at a cost to firm performance because it may not be the optimal incentive scheme. Yet, it may be personally beneficial to the CEO. As the CEO of Palm Pilot, Carl Yankowski (2006) put it in Marketplace, "No question, the $1 salary is good personal marketing that's worth a fortune in publicity." If motivated by such personal pursuits, approval of the $1 CEO salary and the value destruction that follows presumes a failure of corporate governance. The wealthier individuals are more likely to seek the psychic

[10] Out of the 50 adoptions of $1 CEO salaries in our sample, we are able to discern who seems to have initiated the scheme in 35 cases. We do so by inferring from words like "volunteered," "requested," "elected," etc. We find that 30, 3, and 2 times the initiators are the CEO, compensation committee, and the board, respectively.

pleasure of public service for its own sake, and the social recognition it engenders, instead of being tainted by the monetary gains associated with being a paid CEO.

Managerial Power Hypothesis: One-dollar CEO salaries are adopted by firms with weak governance and wealthier CEOs as camouflage for their personal agendas which are detrimental to shareholders.

These predictions are laid out in Table 4.1: According to the Managerial Power Hypothesis, (a) the motivating factor is the protection of private benefits (at least maintenance of total compensation, and the ability to carry out other personal agenda), (b) the corporate governance of the firm is weak, and (c) the adoptions of $1 CEO salaries are value-destroying for shareholders. As a part of (a), we include examination of the potential reasons why there may be public outrage about the CEO's behavior, be it compensation-related or his other activities.

4.3 Data

In this section, we identify and describe our sample of firms that adopted dollar-a-year salaries, as well as a control group of firms.

4.3.1 Sample and data

Sample identification

We use the entire ExecuComp/Compustat database, as of the end of 2005 to identify all CEOs that at some point in time worked for a $1 salary or less. Spanning the period, 1992 to 2005, there were a total of 100 such "$1" CEOs in the database. We started in 1992 because that is when ExecuComp compensation data starts, and because there were very few cases (e.g., Lee Iacocca at Chrysler in 1978) before that date. We stopped in 2005 so that we could examine the post-adoption performance in the following years (long-term performance). We dropped 24 cases because the CEO served less than a year, frequently serving in a stated or implied interim position. Next, we read the proxy statements for the remaining 76 cases to see if these are truly $1 salary CEOs, and qualify for inclusion in our sample. Startlingly, in very many cases this is not so.

We clean the sample using other information in the proxy statements, eliminating CEOs who got a $0 or $1 salary because they were either prepaid in the previous year or are indirectly compensated by other enterprises under some special agreements. For example, the data from ExecuComp shows that Thomas W. Sturgess, the CEO of United Stationers, Inc., has a zero salary in the fiscal year 1995. However, the footnote with the

compensation table in DEF 14A of United Stationers, Inc., states that, "For calendar year 1995, Mr. Sturgess received compensation from Wingate Partners, but no compensation from the Company". Due to the lack of compensation information from Wingate Partners, we do not consider Mr. Sturgess as a $1 CEO. Similarly, Gabriel Battista from Talk America Holdings also has a zero salary for fiscal years 2000 and 2001. However, the accompanying note in the proxy statement shows that Mr Battista's salaries for the years 2000 and 2001 were prepaid in 1999. This too is not a case of a $1 CEO. To ensure that we do not incorrectly include such cases, we manually check the CEO compensation descriptions in 10-K or DEF 14A filings on EDGAR, paying attention to textual footnotes, for all cases initially found to have very low salaries in ExecuComp. Nearly one-third of the cases (26/76) were excluded in the process, which spells a serious caveat regarding the common over-reliance in studies on executive compensation on figures from the Annual Compensation table reported in ExecuComp. We dropped 21 cases because the CEO received salary from other sources (under special arrangements). Another 4 were dropped because the CEO was paid consulting fees in lieu of salaries. And, in 1 case the salary was prepaid in a previous year. Our final sample consists of 50 cases, which with excerpts from proxy statements, are listed in Appendix 4.A.[11]

To form the control group of comparable firms, we begin with all the firms in the same 4-digit SIC industry as the firm adopting a $1 CEO salary in the year of the adoption. Since we are interested in determining the factors that affect how likely it is for a firm to adopt a $1 CEO salary (through a probit analysis), we prefer wider industry membership instead of one-to-one matches, which would greatly overstate the likelihood of these uncommon $1 CEO salary adoptions. We purposely exclude any sample firms that appear among the matches for a sample firm in a different year. Next, we retain those firms that, like our sample firms, are covered by the same data sources, giving us a total control group of 246 firms. In terms of various size measures, the sample and control are similar, as discussed later. All dollar amounts in the analysis are adjusted to 2005 dollars using the CPI.

Later, as an important robustness check on our year and industry matched control group, we avoid any restrictions in forming the control group and use panel data with all other S&P 1500 firms for the years 1992-2005 as the sample of control firms.

Sources of data

Besides reading proxy statements, we access Compustat for accounting data, CRSP

[11] In order to augment our sample size and yet retain the (psychological) advantage and cover value of a $1 or $0 salary, we searched for cases of salary under $1000. We find no additional cases to add to our sample, which underscores the purported cover value of a $1 or $0 salary.

for stock market data, Thomson 13-F's for institutional ownership, and Riskmetrics (ISS) for governance and board data. We undertake various searches using a number of search engines, including Factiva. Data on founders are partly hand-collected, and the rest are from Compact Disclosure and Anderson and Reeb (2003).[12] Data on the CEO's non-firm wealth are from Dittmann and Maug (2007).[13] We also utilize the Forbes 400 list to identify the richest individuals, Hoover's and Bloomberg for the education and history of individual CEOs, and to identify if a CEO was the founder of a firm. For measuring CEO overconfidence, we read articles on sample and control firms in more than a dozen media outlets, following the media-based methodology suggested by Malmendier and Tate (2005) and Malmendier, Tate, and Yan (2010).

Incidence of $1 CEOs

Table 4.3 Panel A, shows the incidence of $1 CEO salaries. More than two-thirds of the new cases (35) are firms that are listed on NYSE, 14 are listed on NASDAQ and only one firm (Metaldyne) is listed on the OTC market. The number of new cases is on average only about 3.5 per year, with twice that number in 1999, the year with the most $1 CEO salary adoptions. But, 1999 is hardly unique since several other years have just one less adoption. Even so, later we affirm our main findings with year fixed effects. The average number of $1 CEOs out there in any year, new plus continuing, is just under 10. Given the thousands of listed firms, the phenomenon of adopting a $1 CEO salary is rare.

Panel B of Table 4.3 shows that on average a CEO works for a $1 salary for 2.7 consecutive years. The median number of years is 2, and the mode is just 1 year (16 out of 50 cases). In about one-third of the cases, the CEO earns a dollar-a-year salary for just one year. In another one-fourth of the cases, the $1 CEO salary persists for two years. For 78% of our sample, the CEO receives a $1 salary for under 3 years, which implies that the adoption of a $1 CEO salary is frequently a temporary phenomenon.

From Panel C of Table 4.3, we observe that these firms are drawn from a very wide range of 4-digit SIC industries, revealing no notable clustering in a particular industry. Some 92% of the sample firms are solitary representatives of their industry. Only one industry has anything like a cluster, if only of five firms. But, even these firms from the prepackaged software industry did not adopt $1 CEO salaries in the same year: Epicor Software adopted in 1995, Netscape in 1997, Zix in 1999, Oracle in 2000, and Siebel Systems in 2001. (We affirm our findings with year fixed effects and clustering by industry).

In sum, based on the incidence of adoption of $1 CEO salary, we find that it is a rare and temporary occurrence. When it does occur, it is more common among firms listed

[12] These data are available on line at http://astro.temple.edu/~dreeb/Working2.html.
[13] These data are available on line: http://people.few.eur.nl/dittmann/data.htm.

Table 4.3: Incidence of $1 CEOs

Panel A shows the number and percentage of total and new cases per year of CEOs that were paid a $1 (or less) salary. It also shows the distribution of new cases according to the exchange on which they are listed. Panel B shows the frequency and selected descriptive statistics of the number of consecutive years the CEO earns $1. Panel C shows the frequency of cases by industry.

Panel A: Incidence of $1 salary CEOs

Year	**Exchange**			**New cases**		**All cases**	
	NYSE	*Nasdaq*	*OTC*	*N*	*%*	*N*	*%*
1992	1	0	0	1	2	1	0.7
1993	2	0	0	2	4	3	2.2
1994	1	0	0	1	2	3	2.2
1995	0	1	0	1	2	3	2.2
1996	5	0	0	5	10	7	5.1
1997	4	2	0	6	12	11	8.1
1998	4	1	1	6	12	14	10.3
1999	5	2	0	7	14	17	12.5
2000	4	1	0	5	10	13	9.6
2001	1	2	0	3	6	13	9.6
2002	4	2	0	6	12	16	11.8
2003	2	0	0	2	4	14	10.3
2004	2	1	0	3	6	11	8.1
2005	0	2	0	2	4	10	7.4
Total	*35*	*14*	*1*	*50*	*100*	*136*	*100*

Panel B: Number of consecutive years the CEO earns a $1 salary

Mean	**Median**	**Max**	**Min**
2.7	2	8	1

# Consecutive years of $1 salary	Frequency
1	15
2	12
3	10
4	5
5	1
6	1
8	4

Panel C: Incidence by industry (only new cases, no repeated firms)

	#Industry	**Industry Names**
1 firm	46	Various
2 firms	3	Natural gas transmission
		Pharmaceutical preparation
		Television broadcast station
5 firms	1	Prepackaged software

on the NYSE with no discernible pattern of industrial affiliation. These observations are more consistent with the view that these adoptions are precipitated by special business circumstances, or the unique motives of some CEOs, rather than routine issues of compensation structure.

Next, we examine various aspects of the profiles of the $1 CEOs. dollar salary.

4.3.2 CEO profile

Personal characteristics

In Panel A of Table 4.4, we describe their personal characteristics. In terms of age, gender, and education, CEOs of adopting firms are not remarkably different from CEOs at comparable firms. The one notable difference between the two groups is that adopting CEOs are portrayed to be more "confident" by the media, which we infer from the average number of articles on sample and control CEOs in the media with "confident" depictions of CEOs. We later develop a more detailed analysis motivated by this observation, since it suggests more hubristic behavior among CEOs of our sample firms.

Indications of personal wealth

The indicators of the personal wealth of CEOs that accept a dollar-a-year salary are presented in Panel B of Table 4.4. Some 30% of our sample CEOs belong to the Forbes 400 list of the richest Americans, whereas less than 5% of the control group of CEOs belongs to this elite club. There is a clear over-representation of the richest among the CEOs with $1 salaries. In an alternative direct dollar comparison of one important source of their wealth, we rank all CEOs, those in the sample with $1 salaries along with their comparable CEOs in the control group, by the value of their stockholdings in the firms they head up. We then divide the list into terciles based on the highest, middle, and lowest values of stockholdings. Notably, 68% of the sample CEOs belong to the tercile with the highest value of stockholdings in comparison to only 30% of the control group CEOs. These and other comparisons of CEO wealth between the sample and control firms show that they are statistically significantly different at the 1% levels. CEOs, as represented by those in our control sample, are in general a wealthy group. Our sample CEOs are wealthier still.

In order to assess the source of their wealth, we turn to Dittmann and Maug (2007) for estimates of non-firm wealth based on cumulating all historical cash inflows and outflows shown in ExecuComp. It would appear that the wealth of our sample CEOs is based largely on their holdings in their firm rather than non-firm wealth. One can interpret this to imply that CEOs of adopting firms have a serious commitment to the success of the firm. Alternatively, these individuals are so very rich that they are likely to seek non-

Table 4.4: CEO profile

"Sample firms" are not repeated. Whenever the CEO of a "sample firm" earns a $1 (or less) salary for more than 1 consecutive year, only the first year is considered. Control firms are from the CRSP universe, matched with sample firms by 4-digit SIC codes and year. The table summarizes the results for 50 sample firms and 246 control firms. The variables in this table characterize the CEO profile. All variables are defined in Appendix 4.B. The last two columns show t-stats and Wilcoxon-stats from the tests of equality of means and medians, respectively. *, **, *** stand for statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: Personal Characteristics

Variables	Sample firms		Control firms		Sample - controls	
	Mean	Median	Mean	Median	*t* -stats	Wilcoxon
CEO Age	54.1	53.5	52.9	53.0	1.01	0.66
Gender (% of female CEOs)	0.0%		0.4%		-1.00	
Education:						
PhD	20.0%		14.6%		0.87	
Graduate (MBA, Master)	32.0%		31.7%		0.04	
College	28.0%		28.5%		-0.06	
High School	6.0%		1.2%		1.38	
Unknown	14.0%		24.0%		-1.76*	
"Cautious" (#articles in the press)	0.26	0.00	0.35	0.00	-0.77	-0.67
"Confident" (#articles in the press)	0.98	0.50	0.55	0.00	2.88***	2.17**

Panel B: Indicators of personal wealth

Variables	Sample firms		Control firms		Sample - controls	
	Mean	Median	Mean	Median	*t* -stats	Wilcoxon
Forbes	30%		4%		3.82***	
Value of CEO shares - top tercile	68%		30%		5.21***	
Value of CEO shares - top quintile	40%		17%		3.04***	
Forbes/value of CEO shr - top tercile	76%		31%		6.59***	
Non-firm CEO wealth ($ MM)	49.5	3.7	184.7	6.3	-0.45	-1.50

Panel C: History with the firm

Variables	Sample firms		Control firms		Sample - controls	
	Mean	Median	Mean	Median	*t* -stats	Wilcoxon
Tenure as CEO (years)	2.6	1.0	4.1	3.0	-3.84***	-4.26***
Tenure with the firm (years)	9.0	3.7	9.9	7.1	-0.48	-1.99**
Founder	18%		17%		0.15	
Come-back CEO	4%		2%		0.53	
First-time CEO	46%		20%		4.12***	
First-time CEO with prior directorship	10%		11%		-0.42	
First-time CEO with prior appointment	26%		13%		2.32***	
# Years as a prior director	6.4	4.5	8.0	6.0	-1.30	-1.07
# Years as a prior director/executive	9.9	6.5	11.4	10.0	-0.85	-1.13
Continue as CEO	48%		54%		1.24	
Prct shares owned by the CEO	10.1%	3.8%	3.2%	1.2%	3.64***	5.06***

monetary goals. Also, they may exert sufficient power to draw serious private benefits.

History with the firm

In Panel C of Table 4.4, we present various indicators of the historical connections between the CEOs and their firms, both for CEOs working for $1 salaries and their comparable CEOs. We see that they are no more likely to be founders than CEOs of comparable firms. Nor are they more likely to be come-back CEOs, brought back to tide over a challenging period. In fact, at the time of the $1 salary adoption, both the mean and median comparisons show that the CEOs that work for a dollar-a-year have served fewer years as CEO with the firm. The difference in medians is statistically significantly different at the 1% level, 1 year versus 3 years.

There are two other notable significant differences in Panel C of Table 4.4. The proportion of CEOs in their first year of appointment (first-time CEOs) for our sample firms is 46%, while it is only about 20% for the control group. It appears that many CEOs in our sample are appointed with a $1 salary. It is unlikely that the two events are independent, suggesting that the appointment and the $1 salary arrangement are a joint event.[14] The other noteworthy connection is the relatively large ownership stake held by our sample CEOs, about 10% versus around 3.2%. Such stakes imply both greater commitment to shareholder value maximization as well as greater shareholder power for sample CEOs to pursue self-oriented objectives.

Next, we compare the characteristics of the firms whose CEOs work for a dollar-a-year salary against a comparable group of firms.

4.3.3 Firm characteristics

In Table 4.5, we present a comparison of a number of characteristics of our sample and control firms, including measures for size, growth, risk, capital structure, past performance, and payout policies. If we require both significant differences in mean and median, there are no remarkable differences between the two groups, suggesting that the sample firms resemble other firms in their industries on average and are well-matched. However, that the differences are not significant for certain firm characteristics is informative too. Thus, it is worth pointing out that, whether we use a book measure, ROA, or market measures, LT Abnormal returns, LT CAR, or Alpha, the sample firms did not underperform in the three years prior to the adoptions of $1 CEO salaries. In fact, the median ROA was a positive 3% for firms adopting $1 CEO salaries, while it was 3.8% for control firms. This suggests that on average it was not a recent crisis that led to the

[14] This observation is reminiscent of Khurana's (2002) claim that CEO appointments are not made in a classical labor market, but rather could be motivated by the publicity they might engender, etc.

adoptions, though it does not mean that there were no concerns about future performance.

It is also worth noting that means and medians for size, measured as total book assets or market cap, are not statistically different between the sample and control groups of firms. According to Gabaix and Landier (2008) firm size is an important factor in the determination of total compensation of CEOs. Also, features such as institutional ownership are also likely affected by firm size, making our sample and control well-matched.

4.3.4 Corporate governance

In Table 4.6, we examine a number of governance features.

Boards of directors

There is disagreement on what constitutes a more effective board. Hermalin and Weisbach (2003) in their survey on research on boards report the following empirical regularities: Firms with smaller boards have better performance (Yermack, 1996), but board independence is not related to firm performance. The evidence on CEO/Chairman duality is limited, but again its impact on the firm has been questioned. More recently, Coles, Daniel, and Naveen (2008) have argued that the impact of board size and independence depend on the nature of business of the firm, and that one size does not fit all. As for compensation, Core, Holthausen and Larcker (1999) report higher compensation when board size is large and there are more outside directors. Also CEO pay is higher when the CEO chairs the board (Cyert, Kang, and Kumar, 2002, and Core, Holthausen, and Larcker, 1999). These issues are moot for our sample firms, however, because none of the board characteristics – size, independence, or duality of chairman and CEO – are reliably significantly different (i.e., mean and median are both significantly different).

Ownership structure

Institutional investors may be considered more sophisticated investors with a superior ability to monitor managers, which may explain the improvements in profitability for firms targeted by institutions (Nesbitt, 1994, and Smith, 1996). Institutions also appear to monitor managers in control-related situations such as takeovers and proxy fights (Brickley, Lease, and Smith, 1988, and Agrawal and Mandelker, 1990). Furthermore, Hartzell and Starks (2003) find that institutional monitoring is associated with lower CEO compensation and higher pay-for-performance sensitivity. Consequently, we examine institutional ownership as a measure of non-CEO shareholder power.[15]

Table 4.6 shows that sample firms have mean and median institutional ownership of

[15]To be sure, the monitoring role of institutions has been questioned in the literature. Some researchers have argued that institutions are myopic, and "vote with their feet."

Table 4.5: Firm characteristics

"Sample firms" are not repeated. Whenever the CEO of a "sample firm" earns a $1 (or less) salary for more than 1 consecutive year, only the first year is considered. Control firms are from the CRSP universe, matched with sample firms by 4-digit SIC codes and year. The table summarizes the results for 50 sample firms and 246 control firms. Accounting variables are from Compustat as of the end of the respective fiscal year. Stock price data are from CRSP. Variables expressed in dollars are adjusted to reflect 2005 prices. All variables are defined in Appendix 4.B. The last two columns show t-stats and Wilcoxon-stats from the tests of equality of means and medians, respectively. *, **, *** stand for statistical significance at 10%, 5%, and 1% levels, respectively.

Variables	Sample firms		Control firms		Sample - controls	
	Mean	Median	Mean	Median	*t*-stats	Wilcoxon
Firm size						
Total assets ($bl)	14.5	1.8	10.8	2.0	0.69	-0.31
Market value ($bl)	26.6	4.2	24.2	5.3	0.23	-0.79
Growth						
Tobin's Q	2.88	1.86	3.30	1.67	-0.74	-0.14
Sales growth (3 years)	0.49	0.15	0.23	0.13	3.23***	0.36
Assets growth (3 years)	0.74	0.13	0.39	0.17	1.92*	-1.15
Change capex (-1, +2)	1.58	0.43	0.50	0.05	2.17*	1.52
Past sales/assets growth	0.05	-0.02	-0.03	-0.04	2.56**	0.97
Risk changes						
Total Risk	-0.13	-0.09	-0.11	-0.03	-0.14	-0.11
Systematic Risk	0.14	-0.06	0.16	0.22	-0.12	-0.36
Idiosyncratic risk	-0.20	-0.10	-0.22	-0.18	0.16	0.21
Volatility						
Avg. beta (ex-ante)	1.18	1.19	1.30	1.22	-0.99	-0.68
Avg. beta (ex-post)	1.21	1.08	1.35	1.18	-1.00	-1.46
Change in beta	0.02	-0.21	0.06	0.11	-0.30	-1.60
Volatility	0.49	0.44	0.53	0.50	-0.90	-0.30
Capital Structure						
Leverage	0.57	0.56	0.50	0.49	1.58	1.63
Change in leverage	0.01	0.01	0.01	0.00	0.11	0.00
Coverage ratio	79.0	2.7	280.6	3.0	-0.46	-0.08
Z-score	8.81	3.12	11.01	4.05	-0.50	-1.16
Past performance (three years)						
ROA	0.02	0.03	0.05	0.04	-2.23**	-2.24**
LT abnormal ret	0.90	-0.07	0.92	-0.03	-0.04	-0.01
LT CAR	0.35	0.22	0.52	0.28	-1.02	-0.89
Alpha (10^3)	0.64	0.38	0.60	0.30	0.17	0.06
Dividends & Cash						
Cash/ Total assets	0.12	0.08	0.13	0.09	-0.34	-0.54
FCF/ Total assets	-0.04	-0.01	-0.02	-0.02	-0.33	-0.52
Dividend yield	0.01	0.00	0.01	0.00	-1.64	-1.18
Dividend payout	0.14	0.00	0.14	0.00	0.04	-0.90

Table 4.6: Corporate governance

"Sample firms" are not repeated. Whenever the CEO of a "sample firm" earns a $1 (or less) salary for more than 1 consecutive year, only the first year is considered. Control firms are from the CRSP universe, matched with sample firms by 4-digit SIC codes and year. The table summarizes the results for 50 sample firms and 246 control firms. Except from institutional ownership, data come from IRRC. All variables are defined in Appendix 4.B. Whenever data on sample firms are missing we obtain them manually from Proxy Statements. The last two columns show t-stats and Wilcoxon-stats from the tests of equality of means and medians, respectively. *, **, *** stand for statistical significance at 10%, 5%, and 1% levels, respectively.

Variables	Sample firms		Control firms		Sample - controls	
	Mean	Median	Mean	Median	*t*-stats	Wilcoxon
Board						
Size	8.8	8.0	8.8	8.0	-0.02	-0.03
Number of independents	5.3	5.0	5.8	5.0	-1.13	-0.62
Prct independents	59%	63%	65%	67%	-2.10**	-1.61
also chairman)	74%	100%	65%	100%	1.26	1.25
Ownership						
CEO	10.1%	3.8%	3.2%	1.2%	5.34***	5.06***
Institutional ownership	53%	56%	61%	62%	-2.78**	-2.13**
Presence of inst. blockholder	84%	100%	89%	100%	-0.91	-0.91
Anti-takeover protections						
G-index	8.2	8.0	8.5	8.0	-0.67	-0.61
E-index	1.8	1.0	1.9	2.0	-0.37	-0.58
Compensation committee						
Independent committee	34%	0%	67%	100%	-4.52***	
Presence of a blockholder	2%	0%	6%	0%	-1.63	

53% and 56%, respectively, and that these are statistically significantly different at the 1% level from the corresponding figures of 61% and 62%, respectively, for the control group of firms. These findings support the view that non-CEO shareholder power is relatively weak among sample firms.

CEO ownership

CEO ownership cuts both ways. Increases in CEO ownership better align interests of the CEO with shareholders, but it also empowers him to exert greater control at a possible expense to other shareholders (Morck, Shleifer, and Vishny, 1988, and McConnell and Servaes, 1990). A CEO with a sizeable stake may be more interested in drawing private benefits of control and using the firm to expand his perquisite consumption.

Table 4.6 shows that CEOs of firms adopting $1 CEO salaries have noticeably higher mean and median stakes in the firm. The figures are 10.09% and 3.75%, respectively, compared with only 3.21% and 1.15%, respectively, for the control group. That is, CEOs for adopting firms hold more than three times the stakes held by CEOs of control firms. It is easy to imagine that CEOs in our sample are more powerful and wield much greater control over their firms compared to other CEOs.

Anti-takeover protection measures

Adoptions of anti-takeover provisions protect CEOs against hostile takeovers and are associated with higher executive compensation (Borokhovich, Brunarski, and Parrino, 1997). Shareholder rights have been proxied with the extent of antitakeover defense provisions. The Investor Responsibility Research Center has published since 1990 details on 24 distinct corporate governance provisions for about 1500 firms. Gompers, Ishii, and Metrick (2003) and Bebchuk, Cohen, and Ferrell (2005) have used this data to develop the G- and E-indexes. We compare these indexes for the sample and control firms, and, as reported in Table 4.6, do not find any significant differences.

Compensation committee

Given that the $1 CEO salary requires the approval of the compensation committee, we examine whether the committee is composed of independent directors and if there is a blockholder present on the committee. Bebchuk, Grinstein and Peyer (2010) find that having a compensation committee that is independent and that includes a blockholder reduces the odds of opportunistic timing of executives' option grants. As Table 4.6 shows, only 34% of the firms adopting $1 CEO salaries have an independent committee compared to more than 67% among the control group (difference is significant at the 1% level). Few compensation committees have a blockholder present among sample or control firms, though the sample firms seem to have even fewer, 2% only (difference approaching 10%

Table 4.7: Compensation variables

"Sample firms" are not repeated. Whenever the CEO of a "sample firm" earns a $1 (or less) salary for more than 1 consecutive year, only the first year is considered. Control firms are from the CRSP universe, matched with sample firms by 4-digit SIC codes and year. The table summarizes the results for 50 sample firms and 246 control firms. All variables are adjusted to reflect 2005 prices. For definitions see Appendix 4.B. The last two columns show t-stats and Wilcoxon-stats from the tests of equality of means and medians, respectively. *, **, *** stand for statistical significance at 10%, 5%, and 1% levels, respectively.Except from institutional ownership, data come from IRRC. All variables are defined in Appendix 4.B. Whenever data on sample firms are missing we obtain them manually from Proxy Statements. The last two columns show t-stats and Wilcoxon-stats from the tests of equality of means and medians, respectively. *, **, *** stand for statistical significance at 10%, 5%, and 1% levels, respectively.

Variables	Sample firms		Control firms		Sample - controls	
	Mean	Median	Mean	Median	*t*-stats	Wilcoxon
Salary ($'000)	0	0	674	610	13.61***	*
Bonus ($'000)	161	0	696	438	-2.91***	-6.87***
Total Current Compensation	161	0	1,369	1,082	-5.91***	-9.68***
Other Annual ($'000)	61	0	40	0	0.68	0.36
Restricted Stock Grants ($'000)	764	0	516	0	0.64	-1.01
LTIP Payouts ($'000)	65	0	367	0	-0.84	-1.95*
All Other Total ($'000)	1,157	0	252	12	1.80*	-4.77***
Total Compensation	2,208	26	2,544	1,288	-0.35	-7.81***
Gain from stock holdings ($'000)	76,594	2,078	112,578	183	-0.15	1.48
Option Grants ($'000)	12,676	3,349	5,853	1,343	2.16**	0.92
Total incl gain from stk. holdings	77,242	2,583	114,803	2,296	-0.15	0.42
Total incl option grants	14,883	4,466	8,397	3,681	1.92*	1.11

level of significance).

Overall, we find relatively weak institutional hold, strong CEO control, and fewer independent committees among firms adopting $1 CEO salaries, which is a combination that should make CEOs with $1 salary relatively more powerful.

4.3.5 Compensation characteristics

Next, we examine how the total compensation and its components differ between the sample group of CEOs that work for a dollar-a-year salary and a control group of CEOs working for comparable firms. All dollar amounts are converted to 2005 dollars.

In Table 4.7, we present the mean and median amounts of income derived by sample and control group CEOs for a number of components of executive compensation.[16] By

[16]Relative to the S&P 500 firms in Frydman and Jenter (2010, Figure 2, Panel B) and in our Table 4.7, we see that means are much larger than medians, and that there is clear skewness to the right. The options component of total median compensation is much larger among our sample firms (75%) than for the controls (36%) or the

design, sample CEOs have lower salary. However, they also have sizably lower mean (median) bonus, $161,490 ($0) compared to $673,590 ($610,440), with the differences being statistically significant at the 1% level. Consequently, total current cash compensation, which is defined by Compustat as salary plus bonus, is lower by about $1.2 million. That is, CEOs who accept to work for a dollar-a-year salary give up a large certain amount in exchange for items that potentially gain from equity-based awards.

Next, we consider Total Compensation, excluding stock grants. While CEOs of sample firms receive significantly lower median Total Compensation, there is no difference in mean Total Compensation. But, without grants of options, which are the most important source of income for our sample CEOs, we still cannot judge whether they have lower overall current income, in cash plus securities. So, we turn to the rows for Options Grants and Total Compensation Incl. Option Grants. The mean and median for Option Grants are both greater for the $1 CEOs, though only the mean differences are significant.[17] Risk-averse managers are reasonably expected to seek more in risky options in exchange for what they give up in certain current salary (Hall, 2003). However, the reward seems excessive, with the median value of additional options value for sample firms exceeding that for control by three times the lost amount of salary. Mean differences in values of options are even larger. If the exchange is limited to options for salary, it would appear that the firm gains in terms of taxes. While up to $1 m in salary is deductible, there is no limit on deductions on performance-based compensation like stock awards.

Next, we see that CEOs with $1 salaries seem to do just as well or better in Total Compensation when we include Option Grants. Total Compensation Incl. Option Grants is greater for $1 salary CEOs, whether we look at mean or median, with the mean difference significant at the 10% level. This would support the view that the loss due to the $1 salary is recovered (or even more than recovered) through other compensation. In particular, CEOs with $1 salaries give up at the median $610 K in salary, but gain more than that with $2 m. in incremental option awards. Even as attention is focused on the cut in salary, the total compensation of the average CEO seems not to be reduced. But, this inference is based on average differences without taking into account individual firm characteristics.

Going beyond the univariate analysis, we recognize that total compensation is expected to vary according to the economic attributes of the firm. In particular, CEOs com-

S&P 500 sample (36% in 2004 in their Figure 2 Panel B), reflecting a shift from salary to pay through options. Finally, the median level of total compensation is lower for our sample firms.

[17] For the period of this study, the valuation of option grants came under Accounting Principles Board, Opinion No. 25, Accounting for Stock Issued to Employees, whereby in-the-money warrants were valued at stock price minus exercise price. It is these valuations that were reported, and are used in our analysis. After 2005, under FASB 123, the new standard calculates grant date values using an option pricing model.

mand larger total compensation if firm size, risk, performance, and growth opportunities are larger (Demsetz and Lehn, 1985; Smith and Watts, 1992; Core, Holthausen, and Larcker, 1999; and Cyert, Kang, and Kumar, 2002, Core and Guay, 2002, and Chhaochharia and Grinstein, 2009). Larger, riskier, growth-oriented firms are more complex and require superior managerial talent. Also, CEOs demand more compensation if they have a proven track record of delivering profitability. Better boards exert better control, while more entrenched CEOs may extract larger compensation. Consequently, we regress the natural log of total compensation on firm size (natural log of firm's assets), risk (standard deviation of firm's daily stock market return over the prior 12-month period or beta riskiness), performance (ROA), board size, and log CEO tenure, lagged Tobin's Q and an indicator variable (which is one for $1 CEO salary firms and zero otherwise). Regression results are presented in Table 4.8. We use two definitions of total compensation in the regressions as dependent variables: (1) Total Current Cash Compensation, and (2) Total Compensation Including Options Granted (ExecuComp definition, TDC1). Our variable of interest is the indicator variable that identifies CEOs earning a dollar-a-year salary.

The results clearly show that, on average, the total current cash compensation of $1 CEOs is statistically significantly lower than that of their peers. For instance, the total current cash compensation of $1 CEOs is, on average, 96% lower than that of comparable CEOs. This is of course not a surprise since by design we are comparing firms with no salary and little bonus against other firms.

Adding option grants and stocks for the total compensation (TDC1), we find that the coefficient of $1 CEO is not statistically significant anymore. That is, CEOs with $1 salaries do not seem to earn a distinguishably different total compensation compared to other CEOs. In the univariate comparison, we reported higher mean total income for CEOs with $1 salaries. Overall, we conclude that CEOs with $1 salaries appear to make up in option grants what they gave up in salary and bonus since their total compensation is about the same as that for CEOs of comparable firms.[18] This is consistent with the view that the cut to a $1 salary was camouflage.

Next, we test for our different explanations for why $1 CEO salaries are adopted.

[18] Sundaram and Yermack (2007) highlight the importance of another not-so-visible form of compensation, pension. We are able to find detailed information on pension plans for only 18 of our sample firms. When we compare these plans with those in place in the year prior to the adoptions of $1 CEO salaries, we discern no obvious changes in plans to ascribe additional income from pension when $1 CEO salaries are adopted. There are too few cases of information on severance agreements in the proxy statements to merit a similar general observation.

Table 4.8: Regressions of total compensation

The observations used in these regressions include "sample firms" and "control firms". "Sample firms" are those which CEO earns a salary of $1 (or less). "Sample firms" are not repeated: whenever the CEO earns $1 (or less) for more than one consecutive year, only the first year is considered. "Control firms" are from CRSP/ Compustat universe, matched with sample firms by 4-digit SIC codes and year. The table shows OLS regressions of total compensation. Variables expressed in dollars are adjusted to reflect 2005 prices. All variables are defined in Appendix 4.B. White-robust t-stats (absolute value) are shown in parenthesis. *, **, and *** stand for statistical significance at 10%, 5%, and 1% levels, respectively.

	Log total cash compensation		Log total compensation incl. options granted	
	(1)	(2)	(3)	(4)
Log of total assets (t-1)	0.092	0.152*	0.220**	0.195**
	(0.88)	(1.83)	(2.07)	(2.24)
ROA (past 3-year average)	1.344	1.462	2.138	2.256
	(0.97)	(1.04)	(1.35)	(1.37)
Board size	0.022	0.051	0.043	0.046
	(0.45)	(0.97)	(0.81)	(0.82)
Log CEO tenure	-0.043	-0.001	0.074	0.055
	(0.27)	(0.01)	(0.50)	(0.37)
Tobin's Q (t-1)	-0.019	-0.030	0.046	0.046
	(0.77)	(1.35)	(1.14)	(1.21)
Total risk (t-1)	-0.369*		0.191	
	(1.96)		(1.23)	
Beta (t-1)		-0.181		0.269*
		(0.99)		(1.94)
$1 CEO	-3.200***	-3.176***	-0.626	-0.577
	(3.77)	(3.70)	(1.07)	(1.01)
Constant	9.242***	5.871***	4.279**	5.588***
	(3.93)	(6.46)	(2.39)	(8.87)
Observations	273	273	283	283
R -squared	0.30	0.29	0.08	0.08

4.4 Testing the alignment hypothesis

In this section, we focus on a test of the factors that determine which firms will adopt a $1 CEO salary according to the Alignment Hypothesis. Other predictions of this hypothesis, such as the subsequent value effects of the adoptions of $1 CEO salaries, are examined separately in later sections.

According to the Alignment Hypothesis, one-dollar CEO salaries are adopted by firms in greater need of alignment of CEO-shareholders interests and/or in possession of more growth options by shifting to a largely stock and options based compensation.[19] From the perspective of greater need for alignment, we predict that firms with $1 salary CEOs will be larger, have greater free cash flow, lower leverage, and larger delta values. (Definitions of these measures and others are provided in Appendix 4.B.) The reasons are the following: Jensen and Meckling (1976) argue that larger firms tend to be opaque and are prone to greater managerial agency problems. Firms with greater free cash flow, and less leverage to reduce discretionary free cash flow, are also likely to have more managerial agency problems, according to Jensen (1986). Delta is the dollar change in the CEO's stock and options holdings for a 1% change in the stock price of the firm (sensitivity of pay to performance). Firms with high delta values have recognized in the past a greater need for alignment of CEO-shareholders interests, assuming optimal compensation in the past.

From the perspective of encouraging more risk-taking, we predict that firms with $1 CEO salaries will have higher ratios of market-to-book value of assets, greater historic use of options in the CEO compensation package, as well as larger vega values. Many researchers have used market-to-book value of assets to measure growth opportunities (e.g., Bryan, Hwang, and Lilien, 2000; Kole, 1997; Bizjak, Brickley, and Coles, 1993; Graver and Graver, 1993, etc.). Since options increase in value when the underlying assets experience more volatility, they have been used in executive compensation to incent managers to take greater risks (by undertaking growth opportunities). The past use of more options by the firm will therefore be an indicator of the presence of growth opportunities and the need for greater risk-taking incentives. Vega is the dollar change in CEO options holdings for a 1% change in stock return volatility, which is the sensitivity of the manager's wealth to stock return volatility and captures the extent to which incentives have been used at the firm to help overcome managerial aversion to risk.

In Table 4.9, we present four different specifications testing the Alignment Hypoth-

[19] Indeed, the median ratio of options plus stocks to total compensation (stocks+options/TDC1) for the 20 comparable cases where the CEO was also at the firm in the previous year, t-1, goes from 64.6% to 98.9% from t-1 to t. The difference is significant at the 5% level.

Table 4.9: Probit regressions – alignment hypothesis

The observations used in these regressions include "sample firms" and "control firms". "Sample firms" are those in which the CEO earns a salary of $1 (or less). "Sample firms" are not repeated. Whenever the CEO earns $1 (or less) for more than one consecutive year, only the first year is considered. "Control firms" are from the CRSP universe, matched with sample firms by 4-digit SIC codes and year. The dependent variable is a dummy variable that equals 1 when the CEO earns a salary of $1 (or less), and 0 otherwise. All variables are defined in Appendix 4.B. "Delta" and "Vega" are measured in $105 units. The table reports marginal effects of the probit regressions. White-robust t-stats (absolute values) are shown in parenthesis. *, **, and *** stand for statistical significance at 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
Log total assets (t-1)	-0.018	0.008		
	(0.85)	(0.42)		
FCF/ Total assets (t-1)	-0.044	-0.014		
	(0.26)	(0.10)		
Leverage (t-1)	0.027	-0.071		
	(0.18)	(0.53)		
Delta (t-1)		-0.019		
		(0.53)		
Market-to-book (t-1)			-0.006	-0.005
			(1.08)	(0.93)
Total options (t-1)			0.030**	0.022
			(2.53)	(1.46)
Volatility (t-5:t-1)			-0.055	-0.061
			(0.71)	(0.75)
Vega (t-1)				4.093
				(0.58)
Observations	166	135	258	243
Pseudo R-squared	0.01	0.00	0.03	0.03
Actual Prob.	0.14	0.09	0.14	0.14

esis. The findings do not support the view that $1 CEO salaries are adopted because there are greater agency problems among these firms or larger growth opportunities, and therefore a need for alignment of interests through extreme measures in the structure of compensation. In untabulated results, we attempt many other combinations of independent variables, but arrive at the same inference. These non-findings are important because they contradict the most frequently reported claim in the proxy statements that $1 CEO salaries are adopted to better align the interests of the CEOs with shareholders, along the lines of the optimal contracting approach.

4.5 Testing the signaling/managerial power hypotheses

In this section, we focus on a test of the factors that determine which firms adopt

a $1 CEO salary according to the Signaling and Managerial Power Hypotheses. Other predictions of these hypotheses, such as the subsequent value effects of the adoptions of $1 CEO salaries, are examined separately in later sections.

Testable implications

According to the Signaling Hypothesis, one-dollar salaries are adopted by well-governed firms to identify credible CEOs who can successfully address the concerns about the firms' prospects. In contrast, the Managerial Power Hypothesis predicts that one-dollar salaries are adopted by firms with weak governance and wealthier CEOs who pursue a personal agenda at a possible cost to shareholders. Some of the predictors of the Signaling Hypothesis for the adoption of $1 CEO salaries, like the nature of corporate governance, are the same as those for the Managerial Power Hypothesis, though the signs of the effects are the opposite. So, we develop the testable forms of the two hypotheses together.

For governance, we consider various board characteristics (size, independence, duality), ownership structure (CEO and institutional ownership), anti-takeover protection measures (G- and E-indexes), and whether or not the compensation committee is independent.

For concerns regarding the prospects of the firm, we consider recent profitability, using an accounting measure, ROA, and market-based measures, LT abnormal returns, and LT CAR. (The results are similar when Alpha is the performance measure). While the proxy statements generally stress underperformance, we extend our analysis to include cases where the concern is about losing out on growth opportunities. We therefore include Tobin's Q and asset growth as independent variables.

To assess if the CEO belongs among the wealthiest individuals in the US, we consider whether his holdings in the firm place him in the top tercile, and whether or not a CEO is listed among the top 400 richest individuals in Forbes.

Findings

Table 4.10 presents probit analyses of the factors that affect the likelihood that a firm will adopt a $1 CEO salary. Consistent with the univariate comparison, we see that firms with larger CEO ownership are more likely to adopt $1 CEO salaries. The coefficient of CEO ownership is positive and statistically significant in all specifications (at the 5% or better level). The economic magnitude of the coefficient suggests that, ceteris paribus, a one percentage point increase in CEO ownership is associated, on average, with a 0.6% increase in the probability of being a $1 CEO. This is supportive of both the Signaling and Managerail Power Hypotheses. Larger CEO stakes signal greater confidence, but they also imply a stronger CEO. The other ownership factor, however, contradicts the

Signaling Hypothesis and supports the Managerial Power Hypothesis. The coefficient of institutional ownership is negative and significant in all specifications (at 5% level in 3 out of 4 specifications), suggesting that a one percentage point increase in institutional ownership is associated with an average decrease in the probability of being a firm with a $1 CEO of about 0.25%. Together, these findings on ownership suggest that firms with CEOs with greater shareholder power are more likely to adopt $1 salaries, as predicted by the Managerial Power Hypothesis.

The negative significant coefficient (at the 1% level) on the indicator variable for an independent compensation board is also consistent with the Managerial Power Hypothesis. The Signaling Hypothesis predicts the opposite sign, denoting better governance.

In every specification, we find that the CEO being among the richest is a significant predictor for the adoption of a $1 salary. The coefficient of "Top tercile – Value of CEO shares" is positive and statistically significant (at the 1% level) in all specifications. The economic magnitude of the coefficient suggests that the richest CEOs are, on average, about 20% more likely to be $1 CEOs.

For further robustness checks, we refer to specification 6 as our base case. In untabulated findings, we find similar results for our base case when the wealth of the CEO is captured through an indicator variable for membership in Forbes' list of the richest individuals. Similarly, repeating the base case with year fixed-effects and clustering the standard errors by industry leads to the same conclusions. These findings are consistent with the Managerial Power Hypothesis because more salary dollars may mean less to them and so there is a greater likelihood that the very richest will want to pursue non-monetary agendas, which is detrimental to other shareholders. Overall, the evidence supports the Managerial Power Hypothesis.

4.6 CEO overconfidence

So far we have tested whether $1 CEO salaries are adopted so as to draw personal benefits. Now, we examine the possibility that the CEO does not necessarily plan to benefit himself at an expense to shareholders. That is, his intentions are not in conflict with the interests of other shareholders. Rather, the CEO accepts the $1 salary bet because he is overconfident. That is, as in the Signaling Hypothesis, the CEO is willing to bet that he can successfully carry out his turnaround strategy, but his faith in his ability/strategy may be mistaken in this instance. According to Ben-David, Graham, and Harvey (2007), based on a survey, executives are indeed "miscalibrated," and ,"(t)he pervasive effect of this miscalibration suggests that the effect of overconfidence should be explicitly modeled

Table 4.10: Probit regressions – signaling and camouflage hypothesess

The observations used in these regressions include "sample firms" and "control firms". "Sample firms" are those in which the CEO earns a salary of $1 (or less). "Sample firms" are not repeated. Whenever the CEO earns $1 (or less) for more than one consecutive year, only the first year is considered. "Control firms" are from the CRSP universe, matched with sample firms by 4-digit SIC codes and year. The dependent variable is a dummy variable that equals 1 when the CEO earns a salary of $1 (or less), and 0 otherwise. All variables are defined in Appendix 4.B. The table reports marginal effects of the probit regressions. White-robust t-stats (absolute values) are shown in parenthesis. *, **, and *** stand for statistical significance at 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log total assets (t-1)	-0.009	0.007	-0.010	-0.001	0.003	0.011	-0.008
	(0.47)	(0.39)	(0.56)	(0.07)	(0.17)	(0.65)	(0.46)
ROA (t-1)	-0.205	-0.315*	-0.118	-0.173	-0.107	-0.145	-0.048
	(1.14)	(1.66)	(0.67)	(0.99)	(0.63)	(0.91)	(0.29)
Leverage (t-1)	0.290**	0.270*	0.174	0.270*	0.171	0.141	0.217
	(2.09)	(1.81)	(1.23)	(1.87)	(1.25)	(1.00)	(1.63)
Assets growth	0.019	-0.025	0.026*	0.015	0.021	0.022*	0.024*
(past 3-year average)	(1.24)	(0.85)	(1.72)	(1.03)	(1.47)	(1.79)	(1.82)
Prct Shares owned	0.007***	0.008**	0.006**	0.006**	0.006**	0.006**	0.006**
by the CEO	(2.64)	(2.30)	(2.36)	(2.30)	(2.25)	(2.47)	(2.28)
Top tercile -	0.194***	0.178***	0.210***	0.201***	0.216***	0.206***	0.204***
Value of CEO share	(3.39)	(2.95)	(3.77)	(3.45)	(3.79)	(3.80)	(3.58)
Institutional Ownership				-0.263**	-0.285**	-0.227**	-0.247**
				(2.09)	(2.33)	(2.05)	(2.00)
Board size				-0.010	-0.013	-0.010	-0.011
				(1.09)	(1.45)	(1.10)	(1.23)
Prct independents				0.084	0.112	0.222	0.079
				(0.54)	(0.75)	(1.41)	(0.54)
"Confident" (# articles)							0.051**
							(2.24)
"Cautious" (# articles)							-0.010
							(0.35)
Independent committee						-0.141***	
						(3.03)	
Presence of blockholder						-0.057	
						(0.60)	
Change capex (-1, +2)		0.028**					
		(2.09)					
Tobin's Q (t-1)			-0.019*		-0.023**	-0.014*	-0.018**
			(1.80)		(2.30)	(1.77)	(2.14)
LT abnormal return			-0.062		0.010		
(past 3 years)			(1.55)		(1.12)		
LT CAR (past 3 years)			0.022				
			(1.63)				
Observations	262	210	262	262	261	262	262
Pseudo R-squared	0.18	0.21	0.21	0.20	0.23	0.26	0.25
Actual Prob.	0.18	0.17	0.18	0.18	0.18	0.18	0.18

when analyzing corporate decision-making."[20]

Measuring overconfidence

We examine whether CEOs of firms adopting $1 salaries are indeed more overconfident. For this purpose, we follow the media-based procedure described in Malmendier, Tate, and Yan (2010), and Malmendier and Tate (2005) because we do not have access to their "Longholder" data. But, they show that the media-based measure of overconfidence is correlated with their options-based measure. Moreover, Hayward and Hambrick (1999) find that media praise can cause CEO overconfidence. We follow their procedure with one difference, which is that we employ a wider set of media outlets. Though this increased the collection task considerably, it helped increase coverage of sample and control CEOs.

We read articles from a variety of sources for all our sample and control firms: the main financial press (Wall Street Journal, Financial Times, Business Week, and The Economist), online financial news (PR News Wire and Business Wire), and the regular press (NY Times, Washington Post, Boston Globe, USA Today, The Times, The Guardian, and The Independent). An article is classified as "confident" when it mentions the CEO as using the words "confident", "optimistic", "confidence" or "optimism"; and it is classified as "cautious" when the CEO uses the words "reliable", "practical", "conservative", "frugal", or "steady". We exclude the article from analysis if it was a reprint of an earlier article already included in our analysis. Whenever we find no articles about the CEO, we set the corresponding variable to be zero.

We conduct our media-based analysis twice. Since many of our sample CEOs are first-time CEOs, we first study them in the year of adoption of $1 CEO salaries, making for a CEOs to CEOs comparison with our control group of firms. The findings are reported in Panel A of Table 4.11. However, the adoption of a $1 CEO salary could itself distort media coverage and make sample CEOs appear bolder and overconfident. To avoid that possibility, we also undertake a news analysis for the year prior to the year of adoption of $1 CEO salaries. The findings for the prior year are reported in Panel B of Table 4.11.

Comparison of CEO overconfidence

From a comparison of both mean and median articles per firm for sample versus control CEOs, the sample firms are found to be significantly more "confident." The mean number of "confident" articles is 0.98 for $1 CEOs, which is significantly higher than the mean of 0.55 for control group CEOs (the difference is statistically significant at the 5% level). The medians are 0.5 and zero, respectively, and also statistically significant at the

[20]CEO overconfidence is not necessarily harmful to shareholders, since overconfident CEOs are associated with greater innovation (Hirshleifer, Low, and Teoh, 2010). However, the greater innovation is in the more innovative industries, while $1 CEO salary firms come from a wide variety of industries.

Table 4.11: CEO overconfidence

"Sample firms" are those in which the CEO earns a salary of $1 (or less). "Sample firms" are not repeated. Whenever the CEO earns $1 (or less) for more than one consecutive year, only the first year is considered. "Control firms" are from the CRSP universe, matched with sample firms by 4-digit SIC codes and year. Figures in Panel 4.A include articles published in the year when the CEO started earning a dollar-salary and Panel 4.B includes articles published in the previous year. As described in Appendix B, the articles are from a variety of sources and their classification as "confident" or "cautious" follow the methodology of Malmendier and Tate (2005). *, **, and *** stand for statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: Articles in the year in which the CEO started earning a dollar-a-year salary

Variables	**Total #articles**	**Average #articles**		**Median #articles**		**Sample - controls**			
	Mean	Mean	Median	Mean	Median	Mean	Median	*t* -stats	Wilcoxon
Number of articles									
Confident	184	49	135	0.98	0.55	0.50	0.00	2.88***	2.17**
Cautious	98	13	85	0.26	0.35	0.00	0.00	-0.68	0.67
Total	282	62	220						
Number of observations	296	50	246	50	246	50	246		

Panel B: Articles in the year before the CEO started earning a dollar-a-year salary

Variables	**Total #articles**	**Average #articles**		**Median #articles**		**Sample - controls**			
	Mean	Mean	Median	Mean	Median	Mean	Median	*t* -stats	Wilcoxon
Number of articles									
Confident	127	31	96	0.62	0.39	0.00	1.00	1.85*	1.40
Cautious	50	2	48	0.04	0.20	0.00	0.00	-1.74*	-1.73*
Total	177	33	144						
Number of observations	296	50	246	50	246	50	246		

5% level. There is no significant difference in the "cautious" articles between the two groups.

For the prior year, the mean for the "confident" articles for the $1 CEOs is 0.62, while the mean for the control group is 0.39, with the difference being statistically significantly different at the 10% level. The median is higher for the control firms, 1 versus 0, but the difference is not statistically significant. However, the mean and median number of articles per firm suggests that the $1 CEOs are less cautious than the control group CEOs. The means are 0.04 and 0.2, respectively, with the difference statistically significant at the 10% level. The medians are both zero, but still different at again the 10% level.

Overall, our findings from both analyses in Panel A and Panel B of Table 4.11 show that $1 CEOs are relatively overconfident compared to control group CEOs. Thus, this evidence points to an important personal characteristic that distinguishes the $1 CEO from other CEOs.

Overconfidence and the adoption of $1 CEO salaries

In specification (7) of Table 4.10, we augment our base case and include our "confident" and "cautious" measures as additional factors that may predict whether the firm will adopt a $1 CEO salary. The benefit of this multivariate approach is that other factors that can affect media coverage, like firm size, are now automatically controlled for in our base case. The findings show that the coefficient on "confident" is positive and statistically significant (5% level), which means that firms with overconfident CEOs are more likely to adopt $1 CEO salaries. The other independent variables continue to have coefficients with the same signs and significance as before.

4.7 The value effects of adopting a $1 CEO salary

The predictions of the Alignment and Signaling Hypotheses are the opposite to those of the Managerial Power Hypothesis in terms of the post-adoption performance of firms with $1 CEOs.[21] The Alignment and Signaling Hypotheses predict that the adoptions are value-creating, while the Managerial Power Hypothesis predicts that firm value is adversely affected. We test these predictions with an examination of long-term stock returns.

Studying long-term performance using a measure of LT buy-and-hold abnormal returns creates measurement problems due to overlapping returns of individual firms, as

[21] To assess the value effects of adoptions of $1 CEO salaries through an event study, we search for announcements of these adoptions and find only 14 such events. Even these 14 events are not "clean" since they include statements regarding accompanying restructuring, and show an insignificant stock price reaction over the 2-day and 3-day windows surrounding the announcement.

Table 4.12: Value effects of adopting a $1 CEO salary (portfolio approach)

In Panel A "sample firms" are those in which the CEO earns a salary of $1 (or less). "Sample firms" are not repeated. Whenever the CEO earns $1 (or less) for more than one consecutive year, only the first year is considered. "Control firms" are from the CRSP universe, matched with sample firms by 4-digit SIC codes and year. Figures in Panel 4.A include articles published in the year when the CEO started earning a dollar-salary and Panel 4.B includes articles published in the previous year. As described in Appendix 4.B, the articles are from a variety of sources and their classification as "confident" or "cautious" follow the methodology of Malmendier and Tate (2005). In Panel B, the calendar time analysis is based on monthly returns. Data are from CRSP/ Compustat. "Sample firms" are those in which the CEO earns a salary of $1 (or less). "Sample firms" are not repeated. Whenever the CEO earns $1 (or less) for more than one consecutive year, only the first year is considered. "Control firms" are the matched firms from the same 4-digit SIC code in the same year as the adoption of the $1 CEO salary. The dependent variable is the equally-weighted monthly return (of a portfolio of sample firms, control firms, or the difference between the two) minus the risk-free rate and the independent variable is the CRSP value-weighted return index minus the risk-free rate. Returns are computed starting from January of the first year post adoption of a $1 CEO salary to one and three years later, as indicated. *t*-stats (absolute values) are shown in parenthesis. *, **, and *** stand for statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: Three-year post-performance after the adoption of $1 CEO salary

Measure	**Total #articles**			**Average #articles**			**Sample - controls**	
	Mean	Median	N	Mean	Median	N	*t*-stats	Wilcoxon
LT abnormal ret	-0.02	-0.23	43	0.20	-0.03	242	-0.84	-1.72*
LT CAR	-0.08	0.14	43	0.34	0.30	242	-3.40***	-2.55***
Alpha (10^3)	-0.14	0.40	44	0.77	0.72	207	-3.57***	-2.79***

Panel B: Long-term performance - calendar time approach

	1 year post adoption of $1 salary			**3 year post adoption of $1 salary**		
	Sample	Control	Sample-control	Sample	Control	Sample-control
Alpha	0.001	0.001	-0.007	-0.002	0.004	-0.010**
	(0.11)	(0.20)	(1.28)	(0.32)	(1.21)	(2.11)
Excess return	1.436***	1.270***	-0.051	1.319***	1.180***	-0.002
	(8.60)	(13.06)	(0.38)	(11.88)	(16.41)	(0.02)
Observations	168	168	168	192	192	192
R-squared	0.31	0.51	0.001	0.43	0.59	<0.001

explained by Brav (2000). Nevertheless, in Table 4.12 Panel A, we examine these buy-and-hold returns, and find that firms with $1 CEO salaries underperform significantly in the post-adoption period. One way to overcome the problems with buy-and-hold long-term abnormal returns is to use calendar time returns. In Table 4.12 Panel B, we analyze long-term performance using calendar time returns and estimating a single factor model. We compute monthly returns of two portfolios (sample firms versus control firms) every month ranging from January of the first year post adoption of a $1 CEO salary to one, or three years later, as indicated in the table. The dependent variable is the equally-weighted monthly return minus the risk-free rate and the independent variable is the CRSP value-weighted return index minus the risk-free rate. To infer whether sample firms underperform control firms in the long run, we estimate regressions on the difference of monthly returns of the two portfolios (sample – controls). A negative and statistically significant alpha indicates that sample firms underperform their peers. In Table 4.12 Panel B, we look ahead to the one-year and three-year windows. Arguably, one year is too short a window. We find no statistically significant difference there. In three years post the adoption, the firms with $1 CEO salaries underperform significantly relative to the control firms. Moreover, the underperformance is economically substantial, to the tune of nearly 1% per month.

There is reason to believe that the actual long-term returns of sample firms are actually worse than those captured in Table 4.12 Panel B. The analysis in Table 12 Panel 4.12 suffers from survival bias since firms must last all three years for the returns shown in the 3-year window. Later, we see that the delisting rates of our sample firms are significantly greater than those for the control firms.

To avoid the survival bias, we undertake an alternative analysis to assess the value impact of the $1 CEO adoptions. Assuming that the market looks ahead and impounds future performance in current firm value, we expect that firms with $1 CEO salaries will have lower Tobin's Q values at the time of adoptions according to the Managerial Power Hypothesis. This is what we examine in Table 4.13.

The regressions of Tobin's Q (measured as of the fiscal year-end when the CEO starts earning a dollar-a-year salary) show that firms with $1 CEO salaries have, on average, lower valuations than their peers. For instance, regression (1) of Table 4.13 shows that, holding everything else constant, the average Tobin's Q of sample firms is, on average, 0.81 lower than that of comparable firms. We follow the literature and include controls for size, profitability, leverage, and growth, along with our variable of interest – the indicator variable for a $1 CEO – as well as a control for the percentage of shares owned by the CEO and the level of institutional ownership. These findings are also consistent with the

Table 4.13: Value effects of adopting a $1 CEO Salary (Tobin's Q)

The observations used in these regressions include "sample firms" and "control firms". "Sample firms" are those in which the CEO earns a salary of $1 (or less). "Sample firms" are not repeated. Whenever the CEO earns $1 (or less) for more than one consecutive year, only the first year is considered. "Control firms" are from the CRSP universe, matched with sample firms by 4-digit SIC codes and year. Data are mainly from Compustat and Execucomp. All variables in dollars are adjusted to reflect 2005 prices. To control for selection bias affecting firms, which CEOs earn a salary of $1 (or less), we use Heckman's (1979) procedure. The first-stage regression (selection equation) is a probit model that estimates the likelihood of a firm having a $1 CEO. The dependent variable is a dummy that equals 1 if the CEO of a firm earns $1 (or less) and zero otherwise. The dependent variable in the second-stage equations (valuation equations) is the Tobin's q as of the fiscal-year end (winsorized at the 1% and 99% percentiles). All variables are defined in Appendix 4.B. White-robust *t*-stats (absolute values) are shown in parenthesis. *, **, and *** stand for statistical significance at 10%, 5%, and 1% levels, respectively.

		Heckman's correction	
			Selection equation
	Tobin's Q	Tobin's Q	$1 CEO
	(1)	(2)	(3)
Log total assets (t-1)	-0.021	-0.049	-0.001
	(0.14)	(0.35)	(0.07)
ROA (t-1)	12.086***	12.361***	-0.173
	(4.54)	(4.61)	(0.99)
Leverage (t-1)	-4.201***	-5.427***	0.270*
	(4.85)	(4.56)	(1.87)
Assets growth (past 3-year average)	0.421*	0.285	0.015
	(1.75)	(1.10)	(1.03)
Prct Shares owned by the CEO	0.030	-0.026	0.006**
	(1.06)	(0.87)	(2.30)
$1 CEO	-0.807**	-1.171**	
	(2.03)	(2.54)	
Institutional ownership			-0.263**
			(2.09)
Constant	4.799***	8.684***	
	(4.45)	(4.35)	
Lambda		-1.652**	
		(2.28)	
Board size			-0.010
			(1.09)
Prct independents			0.084
			(0.54)
Top tercile - Value of CEO shares			0.201***
			(3.45)
Observations	257	257	262
R-squared	0.29	0.31	
Pseudo R-squared			0.20
Actual Prob.			0.18

Managerial Power Hypothesis.

A Tobin's Q analysis has its own problems, unfortunately. To correct for sample selection bias affecting firms with a dollar-a-year salary CEO, we implement Heckman's (1979) procedure. The first-stage regression (selection equation) is a probit model that estimates the probability of a firm having a $1 CEO salary. This is similar to the regressions shown in Table 4.9 with an additional instrumental variable, "Top tercile – Value of CEO shares". Equation (2) is the second-stage regression, which is identical to equation (1) plus an additional variable, "Lambda", generated from the first-stage regression that attempts to correct for sample-selection bias. The results consistently show that firms with $1 CEO salaries tend to have lower Tobin's Q, which again supports with the Managerial Power Hypothesis.

4.8 The potential for public outrage

We have already noted in Table 4.6 that CEOs with $1 salaries hold ownership stakes in their firms that are over three times those held by CEOs of comparable firms. Moreover, institutions have smaller holdings in firms with $1 CEO salaries. The average percentage of independents is also relatively low. Arguably, these are just the CEOs who do not have to take a cut in salary. Even if they make it up in the less visible form of equity-based compensation, they are replacing certain income with uncertain income. But, according to the Managerial Power Hypothesis these CEOs are constrained not by the limits of their power against their boards, but by the adverse effects of a negative story in the Wall Street Journal about stealing from the firm. It is the risk of media coverage and public outrage over the benefits they draw from their firms that leads them to adopt ruses like the $1 salary. Consequently, we document whether CEOs of $1 salaries have a demonstrable risk of public outrage.

We search Factiva and Lexis-Nexis and read stories about the CEO that makes him vulnerable to public outrage, including reports that cover the following: underperformance or slowdown at the firm; recent interest in his pay; cost-cutting, pay cuts or layoffs at his firm; divorce proceeding that may expose his wealth; chairman took a $1 salary; and, about his significant holdings and voting power. In Table 4.14, we list these for the 26 cases where we found explicit stories in the media. In addition, it should be noted that whenever a CEO holds a significant fraction of the stock of a firm, there is a presumption of power at the firm and the drawing of undeserved benefits. If we use 5% holdings of the stock, there are 23 such cases among of $1 CEOs. Not double-counting the 9 cases overlapping between CEOs in Table 4.14 and those that hold more than 5% of their firm's stock, we have a total of 40 CEOs or 80% of our sample at risk of public outrage. It is not

Table 4.14: Potential for public outrage over CEO benefits from firm

Year	Company	CEO	Possible reasons for outrage
1993	Lawter International Inc	Daniel J. Terra	Lawter's stock has languished for two years.
1994	Triarc	Nelson Peltz	1) The company was struggling when boughted by Mr. Peltz in 1993.2) Mr. Peltz's previous high pay at another company Triangle attracted notice of press.
1996	El Paso Corp	William A. Wise	The firm initiated a company-wide cost reduction plan.
1996	Masco Corp	Richard A. Manoogian	1) Mr. Manoogian's high pay was often mentioned in the press. 2) The stock performance was
1996	Autonation Inc	H. Wayne Huizenga	Mr. Huizenga didn't want to be accused of having two companies competing for his time and attention.
1996	L A Gear Inc	Stanley P. Gold	1) The company was struggling 2) The former CEO, Mr Greenberg, initiated a salary cut, but was considered to be not enough.
1996	Viacom	Sumner M. Redstone	Mr. Redstone was involved in divorce process with his wife Phyllis Redstone.
1997	Fruit Of The Loom Ltd	William F. Farley	1) Previously, Mr Farley's higher pay attracted notice. 2) The firm was under restructuring, closing down 23 plants laying off 8,000 employees.
1997	Netscape Communication	James L. Barksdale	The company had a big lost in sales and was planning to cut 400 jobs
1998	Apple Inc	Steven P. Jobs	The former CEO, Gil Amelio, was ousted by the board of directors after crippling financial losses
1998	Metaldyne Corp	Frank M. Hennessey	Company's stock price performance was disappointing
1998	Pepsico Inc	Roger A. Enrico	PepsiCo's international beverage operations ran into trouble
2000	Oracle Corp	Lawrence J. Ellison	Previous year's high pay attracted notice (ranked as #2 in Forbes)
2000	Conseco Inc	Gary C. Wendt	1) Mr. Wendt's pay attracted notice, especially his $30m "golden hello" and options worth over $20m. 2) His ex-wife Lorna Wendt got $20 million in parting, but had appealed and sought an additional $3m
2000	Extended Stay America	George D. Johnson, Jr.	The chairman of the board, H. Wayne Huizenga, took no salary or bonus.
2001	Plains Resources Inc	James C. Flores	The firm was in trouble in previous year.
2001	Siebel Systems Inc	Thomas M. Siebel	The profit declined
2002	Bank Of Hawaii Corp	Michael E. O'Neill	The company was under restructuring
2002	Ford Motor Co	William Clay Ford, Jr.	The company announced to cut 35,000 jobs
2002	Lilly (Eli) & Co	Sidney Taurel	Eli Lilly is making substantial cutbacks in 2002 following the loss of patent protection for its top-selling antidepressant Prozac. The company froze salaries for its employees in 2002 at 2001
2002	COGNEX Corp	Robert J. Shillman	There was a slowdown in the Corporation's business
2002	Cisco Systems Inc	John T. Chambers	The company was in the process of eliminating 8,500 positions to offset falling revenues and earnings
2002	Franklin Covey Co	Robert A. Whitman	The Company reported a decline in its revenue
2003	Micron Technology Inc	Steven R. Appleton	In previous year, the firm froze its hiring and cut the pay of its management team
2004	Duke Energy Corp	Paul M. Anderson	In previous year, the company cut 2,000 jobs -- about 8 percent of its work force
2005	Google Inc	Eric E. Schmidt	Mr. Schmidt's significant ownership and voting power attracted attention

surprising that this group has chosen to adopt $1 salaries as camouflage for their benefits.

4.9 Additional analyses and discussion

Alternative Controls: All other firms on ExecuComp

To ensure that our findings are not driven by our choice of controls, we repeat our analysis without exercising discretion in the selection of controls, taking all non-sample firms as controls. To be sure, this is not a preferred methodology. Given that many of our sample firms are large, this procedure will allow for many small firms to be a part of the control group. Moreover, this is too large a sample to hand-collect all the variables employed in our base case.

The probit analysis with unmatched controls is shown in Table 4.15 Panel A. The basic findings from our earlier analysis continue to hold. As before, firms with $1 CEO salaries have CEOs with larger ownership stakes in their firms (1% or 5% level of significance), and institutional holdings are lower (10% level). But, we also see several board differences between sample and control firms. Further suggesting weak governance, we see that sample firms have lower proportion of independent directors (mostly 1% level), and an absence of blockholders on the compensation committee (1% level). The one contrary finding is that sample firms are expected to have smaller boards, which is arguably an indicator of better boards.

There is one troubling finding in Table 4.15 Panel A. We see that larger firms are expected to adopt $1 CEO salaries. This is likely the result of too many unmatched small firms entering the control group. That, in turn suggests that the matching is not well achieved through this procedure.

In Table 4.15 Panel B, we examine the long-term performance in the post-adoption period. We see that the here again, the sample firms underperform. The average monthly returns are -0.9% less for sample firms for the 3-year window, which are substantially poorer returns.

Alternative performance measures: bankruptcies, and delistings

In Table 4.16, we find that 40% of the firms have disappeared within 3 years, which is consistent with the poor post-adoption performance we have documented so far. There are more bankruptcies according to UCLA's LoPucki Bankruptcy Database and Chapter11Library.com. There are also significantly more delistings. These findings are consistent with the poor post-adoption performance we have reported above.

Restructuring: What do the CEOs do after adopting a $1 CEO salary?

We approach this issue from two perspectives, examining in each case the capital ex-

Table 4.15: Alternative controls - all other firms in Execucomp

Panel A and B repeat analyses in Table 4.10 and Table 4.12 Panel B, respectively, using all other firms in Execucomp as the control group.

Panel A : Probit regressions – "Signaling" and "Managerial Power" Hypotheses

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log total assets (t-1)	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(6.66)	(5.37)	(6.78)	(9.53)	(10.39)	(11.30)	(11.34)
ROA (t-1)	-0.000***	-0.000***	-0.000***	-0.000	-0.000*	-0.000	-0.000**
	(2.11)	(1.79)	(2.64)	(1.15)	(1.94)	(1.52)	(2.01)
Leverage (t-1)	0.000	0.000	0.000	0.000	0.000*	0.000	0.000*
	(0.29)	(0.30)	(0.31)	(1.25)	(1.72)	(1.38)	(1.69)
Assets growth	0.000	0.000	-0.000	-0.000	-0.001	-0.002	-0.002*
(past 3-year average)	(0.24)	(0.27)	(0.23)	(0.47)	(1.62)	(1.58)	(1.96)
Prct Shares owned	0.000***	0.000***	0.000***	0.000***	0.000**	0.000**	0.000**
by the CEO	(4.38)	(4.68)	(4.43)	(2.60)	(2.52)	(2.57)	(2.52)
Top tercile -	0.007***	0.008***	0.007***	0.010***	0.009***	0.009***	0.008***
Value of CEO share	(9.36)	(8.92)	(9.07)	(5.79)	(5.60)	(5.77)	(5.66)
Institutional Ownership				-0.000*	-0.000*	-0.000*	-0.000*
				(1.74)	(1.70)	(1.87)	(1.84)
Board size				-0.001***	-0.001***	-0.001***	-0.001***
				(7.06)	(7.20)	(7.40)	(7.38)
Prct independents				-0.000**	-0.000***	-0.000***	-0.000***
				(2.25)	(2.94)	(2.67)	(3.03)
Independent committee				0.001	0.001	0.001	0.001
				(0.96)	(1.09)	(1.05)	(1.12)
Presence of blockholder				-0.002***	-0.002***	-0.002***	-0.002***
				(3.00)	(3.05)	(2.90)	(3.00)
Change capex (-1, +2)		0.000					
		(1.46)					
Tobin's Q (t-1)					0.001***		0.000***
					(3.89)		(3.19)
LT abnormal return			0.000			0.000**	0.000
(past 3 years)			(1.29)			(1.89)	(1.17)
Year fixed-effects	Y	Y	Y	Y	Y	Y	Y
Industry fixed-effects	Y	Y	Y	Y	Y	Y	Y
Observations	14,508	11,167	14,498	5,819	5,818	5,819	5,818
Pseudo R-squared	0.19	0.20	0.20	0.29	0.30	0.20	0.20
Actual Prob.	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Panel B: Long-term performance – calendar time approach

	1 year post adoption of $1 salary			**3 year post adoption of $1 salary**		
	Sample	Control	Sample-control	Sample	Control	Sample-control
Alpha	0.001	0.005***	-0.007	-0.002	0.004**	-0.009*
	(0.11)	(2.91)	(1.09)	(0.32)	(2.53)	(1.89)
Excess return	1.436***	0.990***	0.445***	1.319***	1.027***	0.288***
	(8.60)	(24.03)	(2.75)	(11.88)	(27.06)	(2.70)
Observations	168	168	168	192	192	192
R-squared	0.31	0.78	0.04	0.43	0.79	0.04

Table 4.16: Bankruptcies, mergers, and delistings (next three years)

	Sample firms		**Control firms**		**Sample - controls**
	N	%	N	%	***t* -stats**
Bankruptcies	3	6%	0	0%	2.96 ***
Mergers	6	12%	30	12%	-0.41
Delistings	11	22%	33	13%	2.32 **

penditures of the firm. Though not the only form, we expect the 3-year changes in capital expenditures to be a likely indicator of restructuring undertaken by the CEO. As noted in Table 4.5, firms adopting $1 CEO salaries have a larger change in capital expenditures from the year prior to the adoption of a $1 CEO salary to two years after it, capex (-1, +2). Compared to non-adopting control firms, Table 4.5 shows that sample firms have a higher mean and median capex (-1, +2), though only the mean difference is statistically significant (5% level). This is suggestive of restructuring activity.

In an alternative view, consider the actual capex (-1, +2) as the best forecast of the capital expenditures that the $1 salary CEO is proposing, a variable that reflects his turnaround plan. In that case, the capex (-1, +2) is factored into the likelihood that the CEO will win approval. Indeed, in Specification (2) in Table 4.10, we see that capex (-1, +2) is a significant predictor of the adoption of a $1 CEO salary.

4.10 Conclusion

We study the motives and impact of $1 CEO salaries. Our sample consists of 50 CEOs of U. S. listed firms over the years, 1992-2005. While the arrangement is not common, the firms adopting it appear to be quite ordinary in many ways. Compared to other firms in their industry in the years of their adoptions of $1 CEO salary, they have similar average size, growth, and riskiness. On average, their stock has also not underperformed. Even the CEOs accepting $1 salaries are similar in age and education to CEOs of other comparable firms. They are also not overrepresented by founders or comeback CEOs stepping up to rescue their legacies. If anything, they have a significantly shorter past association with the firm compared to the control group of CEOs. Why then do these firms and their CEOs, and not so many others, adopt $1 CEO salaries, and what is the resulting impact on their firms? Prior research has not addressed these questions.

In this chapter, we empirically examine a number of hypotheses to explain why some CEOs work for a $1 salary. It has been asserted that the $1 salary is a facade behind which CEOs collect large not-so-visible forms of compensation. Indeed, we find that $1 CEOs

do not lose out in terms of total compensation. They make up through stocks and options what they give up in salary. We also rule out the most frequent claim made in proxy statements that such a drastic cut in salary is meant to shift incentives towards equity-based payoffs in order to better align CEO-shareholders interests (or to incent the CEO to take greater risks). We do not find that the likelihood of adoption of $1 CEO salary is greater for firms with more managerial agency problems or greater growth potential. Thus, adoptions of one-dollar CEO salaries appear to be motivated by other considerations than obtaining the optimal compensation structure.

We propose two other alternative hypotheses, a Signaling Hypothesis and a Managerial Power Hypothesis, to explain the phenomenon. According to the Signaling Hypothesis, the CEO credibly signals his ability by betting his current income in exchange for a larger payoff later. We find that, as predicted, $1 CEOs have relatively larger equity stakes compared with CEOs at comparable firms, and this reinforces the notion that they have "skin in the game." We expect only capable CEOs to agree to this bargain, just as we expect boards to sign off only if they believe that the candidate is deserving. As a result, we expect the compact to be value-creating. The Signaling Hypothesis fails this crucial test. Firms with one-dollar CEO salaries have lower long-term returns in the post-adoption period, and higher rates of delistings. Markets seem to anticipate their underperformance since the Tobin's Q for firms with $1 CEO salaries is lower.

Finally, we examine the Managerial Power Hypothesis, which states that the $1 CEO salary is the camouflage allowing the CEO to pursue a self-serving personal agenda. According to this hypothesis, powerful CEOs adopt $1 salaries to prevent outrage over their total compensation. This hypothesis is supported by the data, since the total compensation of CEOs with $1 salaries is similar to that of CEOs at comparable firms. Also consistent with this hypothesis, the CEO wields greater shareholder power at firms with $1 CEO salaries, since we find that their equity stakes are larger at these firms while the institutional holdings are comparatively low. Such powerful CEOs need not take a cut in salary, except for its camouflage value. There are also behavioral reasons that suggest that the CEO may be pursuing a self-serving agenda at firms with $1 CEO salaries. We find that CEOs at firms with $1 CEO salaries are more overconfident individuals, and consequently may be placing greater faith than deserved on their strategies for their firms. We also find them to be richer than CEOs at comparable firms, which can lead them to value non-monetary objectives more. As predicted, firms underperform following the adoptions of $1 CEO salaries. Overall, the evidence is supportive of the Managerial Power Hypothesis.

Appendix 4.A Reasons for a $1 CEO salary

(Quotes from proxy statements)

Panenergy Corp., Dennis R. Hendrix, 1992

> "In November 1990, Mr. Hendrix and the Company entered into an agreement whereby he would receive no salary for 1991, 1992, and 1993. Instead, Mr. Hendrix was awarded 300,000 shares of restricted Common Stock under the terms of the 1990 LTIP as compensation for that period...Effective February 24, 1993, the agreement with Mr. Hendrix was amended to extend the term through November 1996 and to award him an additional 300,000 shares of restricted Common Stock in lieu of salary for the period November 1993 through November 1996."

Lawter International Inc., Daniel J. Terra, 1993

> "Mr. Terra has been authorized to receive but has waived his annual salary from the Company since 1982. In addition, Mr. Terra does not receive grants of stock options under the Company's stock option plan. "

Grand Casinos Inc., Lyle Berman, 1993

> "Prior to July 31, 1994, Messrs. Berman and Taube received benefits and in lieu of salary were compensated under the Company's Incentive Plan."

Wendy's/Arby's Group Inc. (formerly Triarc), Nelson Peltz, 1994

> "Peltz gave up his cash salary in return for payout in options for the following years Dr. Santoro became Acting Chief Executive Officer of the Company on April 17, 1994 and Chief Executive Officer in May 1994."

Epicor Software Corp., Carmelo J. Santoro, 1995

> "Dr. Santoro received a directors fee for service on the Board in lieu of salary. Dr. Santoro resigned as Chief Executive Officer in February 1996, when Mr. Klaus joined the Company."

El Paso Corp., William A. Wise, 1996

> "Mr. Wise's base salary was eliminated and replaced with long-term awards ofstock options and restricted stock, the majority of which vest only after the expiration of specified time periods and only if certain performance targets are met within those periods. This change is consistent with Company-wide cost reduction initiatives and is intended to align Mr. Wise'scompensation more directly with stockholder value."

Masco Corp., Richard A. Manoogian, 1996

> "Mr. Manoogian's salary and bonus were reduced at his request, effective January 1, 1996, to $1 per year. Mr. Manoogian requested the Compensation Committee of the Board of Directors to implement this reduction to reflect his commitment to enhance stockholder value and his personal disappointment with the Company's stock price performance in recent years."

Autonation Inc., H. Wayne Huizenga, 1996

> "Mr. Huizenga is not paid any cash salary or bonus... Compensation Committee believes that tying the remuneration of Messrs. Huizenga and Berrard to the performance of Republic's Common Stock will enhance the long-term performance and stability of Republic by providing Messrs. Huizenga and Berrard the incentive to expand the Company's businesses and bring Republic to increased levels of profitability in future years...provides an incentive to each of them to maximize shareholder value..."

L A Gear Inc., Stanley P. Gold, 1996

> "At Mr. Gold's request, he did not receive any salary or other cash compensation during fiscal 1996 for his services as Chief Executive Officer of the Company."

CBS Corp. (formerly Viacom), Sumner M. Redstone, 1996

> "Mr. Redstone has waived payment of any salary or bonus compensation for his services as Chief Executive Officer of the Company. A special grant under the 1994 LTMIP of stock options to purchase 1,000,000 shares of Class B Common Stock was awarded to Mr. Redstone in January 1996 to reflect his assumption of additional responsibilities as Chief Executive Officer."

Intl Game Technology, Charles N. Mathewson, 1997

> "As Chief Executive Officer, he receives no base salary. The Committee, based on its subjective evaluation of Mr. Mathewson's performance, granted Mr. Mathewson stock options in February 1996 to acquire 1,000,000 shares of the Company's Common Stock."

Fruit Of The Loom Ltd. -CL A, William F. Farley, 1997

> "Mr. Farley elected to forego $950,000 of his salary in 1997, 1998 and 1999 in consideration of the grant of options under the terms of the Executive Equity Investment Program."

Borders Group Inc., Robert F. DiRomualdo, 1997

> "Messrs. DiRomualdo, Mrkonic,... were granted options in lieu of cash payment for 100% of their salary and bonus..."

Netscape Communications Corp., James L. Barksdale, 1997

> "For 1997, Mr. Barksdale elected to receive a salary of $1.00 and to return an option grant of 300,000 shares made in April 1997. Mr. Barksdale believes that his compensation should be linked to the long-term interests of Netscape's stockholders. Accordingly, through his ownership position in Netscape's Common Stock, Mr. Barksdale's pecuniary interests are aligned with those of Netscape's stockholders. For the same reasons, Mr. Barksdale has elected to receive a salary of $1.00 for 1998."

Gulfstream Aerospace, Thoedore J. Forstmann, 1997

> "The Company does not have a chief executive officer, but has a five-person Management Committee chaired by Mr. Theodore J. Forstmann, who receives no cash compensation for his services to the Company, and including W.W. Boisture, Jr., Chris A. Davis, James T. Johnson and Bryan T. Moss."

Checkers Drive-In Restaurant, C. Thomas Thompson, 1997

> "C. Thomas Thompson served as Chief Executive Officer from December 17, 1996 to November 9, 1997 and received no compensation for his duties as an officer of the ompany during fiscal year 1997, except for stock options granted to Mr. Thompson in fiscal year 1997 as reported in the table set forth under "Option Grants in Last Fiscal Year.""

Apple Inc., Steven P. Jobs, 1998

> "The Compensation Committee recognizes that Mr. Jobs' level of stock ownership significantly aligns his interests with those of the Company's shareholders"

Macdermid Inc., Daniel H. Leever, 1998

> "Under the terms of the plan, no base salary was paid to Mr. Leever."

Metaldyne Corp., Frank M. Hennessey, 1998

> "The annual salary and bonus of the Company's Chairman, Richard A.Manoogian, of $573,000, was reduced at his request, effective January 1, 1998, to $1 per year. Frank M. Hennessey, who became the Company's Vice Chairman and CEO in early 1998, also requested that he receive annual salary and bonus of $1 for 1998. The Compensation Committee believes that replacing all of the cash compensation ... with compensation that is tied to the value of Company Common Stock over an extended period of time firmly links the interests of the Company's leaders with those of stockholders... Messrs. Manoogian and Hennessey first requested in 1998 that their salary and bonus be reduced to $1 to demonstrate their commitment to enhance stockholder value and their disappointment with the Company's recent stock price performance..."

Pepsico Inc., Roger A. Enrico, 1998

> "At Mr. Enrico's request, the Committee approved a reduction in Mr. Enrico's annual salary from $900,000 to $1, and recommended to the Board of Directors that it consider using the savings to support front line employees(scholarship for children of PepsiCo's sales people, truck drivers, manufacturing plant workers and other front line employees). In January 1999, the Board approved annual charitable contributions of approximately $1,000,000 to fund additional scholarships for children of PepsiCo's front line employees."

Capital One Financial Corp., Richard D. Fairbank, 1998

> "Under a compensation package approved by the Board of Directors on December 18, 1997 (EntrepreneurGrant II), Messrs. Fairbank and Morris agreed to give up their entire salary and all benefits under the Stock Purchase Plan, the Savings Plan and the company's Unfunded Excess Savings Plan (the "Excess Savings Plan") through 2000 in exchange for an award of performance-based options... Compensating the CEO in stock options, in lieu of cash compensation, provides a strong alignment between the CEO's financial rewards and the value he delivers to stockholders."

Univision Communications Inc., A. Jerrold Perenchio, 1998

> "Mr. Perenchio, Univision's Chairman and Chief Executive Officer, serves without salary, bonus or equity-based compensation. As a significant stockholder and holder of majority voting power, Mr. Perenchio remains highly motivated to increase Univision's stockholder value and to incentivize management to do the same.

Leggett & Platt Inc., Felix E. Wright, 1999

> "... includes stock options for 52,118 shares awarded Mr. Wright in lieu of $709,084 of 1999 bonus and 50,294 shares awarded in lieu of $658,614 of 1999 salary and certain other benefits.

ZIX Corp., David P. Cook, 1999

> "Since Mr. Cook's compensation is entirely stock based, his interests are aligned precisely with those of our stockholders. Our Board believed that the employment arrangement was appropriate in light of Mr. Cook's demonstrated prior success in founding and nurturing start-up and development-stage enterprises."

AES Corp., Dennis W. Bakke, 1999

> "Mr. Bakke was compensated solely by the grant of stock options (in lieu of a cash salary and cash bonus). The Committee believes that this method of compensation will align Mr. Bakke's compensation more closely with the financial interests of the Company's other shareholders."

Cameron International Corp. (formerly Cooper Cameron Corporation), Sheldon R. Erikson, 1999

> "The Board believes that the future success of the Company is dependent upon the quality and continuity of management, and that compensation programs, such as stock option grants and options in lieu of salary, are important in attracting and retaining individuals of superior ability and in motivating their efforts on behalf of the Company. The Company's options in lieu of salary program allows executive officers and key employees the election to receive stock options in lieu of salary for all or a portion of their annual salary."

MarchFirst Inc., Robert F. Bernard, 1999

> "Without any base salary or bonus paid in cash, the CEO's compensation has been entirely dependent on the creation of incremental market value through setting strategic direction and achieving targeted financial performance."

Agribrands International Inc., William P. Stiritz, 1999

> "Prior to our Spin-off from Ralston, it was established that our Chief Executive Officer would receive stock options in lieu of salary for a period of five years. This decision was based on a desire to (1) ensure retention of our Chief Executive Officer for the first five years of operation for the new company, (2) provide appropriate compensation for our Chief Executive Officer without the need for substantial cash outlays, and (3) fully align the interests of our Chief Executive Officer with those of our shareholders."

Washington Group International Inc., Dennis R. Washington, 1999

> "In lieu of salary, Mr. Washington was awarded an option as of April 8, 1999, to purchase 2,000,000 shares."

Kinder Morgan Inc., Richard D. Kinder, 2000

> "Mr. Kinder, at his initiative, accepted a salary of $1 per year to demonstrate his belief in our long term viability."

Oracle Corp., Lawrence J. Ellison, 2000

> "CEO's compensation plan for fiscal year 2000-2003 consists of no salary and no bonus. Instead, during fiscal year 2000, on June 4, 1999, he was granted an option to purchase 10,000,000 shares of the Company's Common Stock (40,000,000 shares as adjusted for the Company's two 2-for-1 stock splits effective January 18, 2000 and October 12, 2000) at the fair market value at the time of grant. The changes to the Chief Executive Officer's compensation plan more closely align his compensation with the Company's stock performance ..."

Conseco Inc., Gary C. Wendt, 2000

> "For the first two years of his employment agreement Mr. Wendt is entitled to receive no salary... The Compensation Committee seeks to align the interests of senior executive management with the interests of shareholders by providing for a substantial portion of the compensation paid to such officers to be tied directly to the financial results of the Company and the performance of the Common Stock."

Discount Auto Parts Inc., Peter J. Fontaine, 2000

> "Mr. Fontaine was initially granted a base salary of $192,400 for fiscal 2000, which was unchanged from his base salary for fiscal 1999... Effective July 8, 1999, however, Mr. Fontaine, in consultation with the Compensation Committee, elected to eliminate any base salary and to be compensated solely through the annual bonus."

Extended Stay America Inc., George D. Johnson, Jr., 2000

> "The Company does not pay Mr. Johnson any cash salary or bonus but rather compensates him exclusively through stock option grants. We believe that tying Mr. Johnson's remuneration to the performance of the Company's Common Stock will motivate Mr. Johnson to maximize stockholder value and is consistent with our policy of compensating the Company's senior executives, like Messrs. Huizenga and Johnson, primarily through annual stock option grants."

Plains Resources Inc., James C. Flores, 2001

> "Pursuant to his employment agreement, Mr. Flores received, in lieu of base salary, an option under our 2001 plan to purchase 1,000,000 shares of our common stock at an exercise price of $23.00 per share."

Siebel Systems Inc., Thomas M. Siebel, 2001

> "In addition, the salary of Mr. Siebel was reduced to $1 at his request in January 2001 as part of our cost control initiatives, and remained at that level for the next three years. Effective January 1, 2004, Mr. Siebel's salary was restored to $1,000,000."

Helix Energy Solutions Group (formerly Cal Dive International), Owen Kratz, 2001

> "During 2000, the Board of Directors approved a "Stock Option in Lieu of Salary Program" for Mr. Kratz. ... the Committee believes the executive officer compensation program provides incentive to attain strong financial performance and is strongly aligned with shareholder interests."

Bank Of Hawaii Corp., Michael E. O'Neill , 2002

> "To ease the expense burden of the Company... Mr. O'Neill elected to waive his base salary and any bonus for 2002 and 2003."

Ford Motor Co., William Clay Ford, Jr., 2002

> "at Mr. Ford's request, the Committee and Mr. Ford agreed that Mr. Ford would forego any new compensation (including salary, bonus, or other awards) until such time as the Committee and Mr. Ford determine that our Automotive sector has achieved sustained profitability."

Lilly (Eli) & Co., Sidney Taurel , 2002

> "In light of the reduction in the company's Prozac sales, Mr. Taurel voluntarily reduced his base salary to $1.00 for the year 2002. The company did not offset this reduction in salary by any additional compensation but provided a benefits allowance to preserve his employee benefits at their normal level. Mr. Taurel requested this reduction to demonstrate his confidence in the company's future results and to set an example for employees."

COGNEX Corp., Robert J. Shillman, 2002

> "Mr. Shillman elected to forego his 2002 base salary due to the slowdown in the Corporation's business ..."
>
> "Dr. Shillman elected to forgo his base salary of $350,000 in 2008, 2007 and 2006, as well as his annual bonus of $44,100, $52,500 and $130,200 in 2008, 2007 and 2006, respectively, and, as requested by him, we donated these amounts to a public charity. Although these amounts were donated, they are included in the amount shown in the "Total Compensation" column."

Cisco Systems Inc., John T. Chambers, 2002

> "On April 1, 2001, Mr. Chambers requested that his base salary be lowered to a rate of $1.00 annually (until the recognition of a recovery in Cisco's performance). On May 11, 2001, the Committee agreed to honor this request until such a time as the Committee deems it appropriate to return Mr. Chambers' base salary to a market competitive level."

Franklin Covey Co., Robert A. Whitman, 2002

> "The agreement has an initial term expiring August 31, 2007, and provides for an annual base salary of $500,000... Mr. Whitman has voluntarily not taken his base salary or bonus compensation since May 2001."

Micron Technology Inc., Steven R. Appleton, 2003

> "In June 2001, Mr. Whitman asked the Committee to discontinue paying his salary and annual incentives until the Company's performance improves."

Bombay Co., Inc., James D. Carreker, 2003

> "Pursuant to his employment agreement, he was entitled to receive a base salary of $600,000 or, if he elected to receive his base salary in the form of restricted stock vesting in full at the end of three years, he was entitled to a grant of restricted stock valued at 1.25 times base salary."

CPI Corp., David M. Meyer, 2004

> "Mr. Meyer's compensation reflects the Company's commitment to aligning executive compensation with stockholder value."

Duke Energy Corp., Paul M. Anderson, 2004

> "When Anderson returned, he decided to pass up a salary as a sign of his confidence in the company, opting instead to be paid only in Duke stock."

USANA Health Sciences Inc., Myron W. Wentz, 2004

> "The Company's Founder and Chairman, Dr. Myron W. Wentz, has also served with the title of Chief Executive Officer of USANA since its inception. Dr. Wentz does not receive any compensation for his services and he has in the past declined to accept any options or other awards under any stock option or stock incentive plan that he might otherwise have been entitled to receive as an executive officer."

Fossil Inc., Kosta N. Kartsotis, 2005

> "For 2005, the CEO requested that he receive no salary... However, in light of the request by the CEO, a 2005 salary level of $0 was approved. The CEO did not receive any grants of stock options in 2005... Mr. Kartsotis is one of the initial investors in our Company and expressed his belief that his primary compensation is met by continuing to drive stock price growth."

Google Inc., Eric E. Schmidt, 2005

> "In 2004, Eric, Sergey and Larry requested that their salaries each be reduced to $1 per year. However, due their strong leadership and Google's strong overall performance, we offered each of them market-competitive salaries at the beginning of each of 2005-now. Due to their own preferences not to receive salary compensation, Eric, Sergey and Larry each rejected these offers and continue to receive base salaries of $1."

Appendix 4.B List of variables

$1 CEO: dummy variable that equals 1 if the CEO earns a dollar-a-year (or less) salary, and zero otherwise.

years as a prior director (and/or executive): number of years as a board director (and/ or executive) prior to becoming a $1 CEO (Source: Bloomberg).

All other total: compensation that does not belong under other categories, which includes items such as: (1) Severance payments, (2) Debt forgiveness, (3) Imputed interest, (4) Payouts for cancellation of stock options, (5) Payment for unused vacation, (6) Tax reimbursements, (7) Signing bonuses, (8) 401K contributions, (9) Life insurance premiums (Source: Execucomp).

Alpha: intercept of the market model estimated over the three-year period using daily returns (Source: CRSP).

Assets growth (3 years): 3-year average of the annual growth rate of assets (Source: Compustat).

Beta: beta coefficient estimated from the market model based on stock daily returns over an entire fiscal year.

Board size: total number of directors that compound the board (Source: IRRC).

Bonus: the dollar value of a bonus earned by the named executive officer during the fiscal year (Source: Execucomp)

"Cautious/Confident" (# articles in the press): number of articles about the CEO published in a variety of sources: the main financial press (Wall Street Journal, Financial Times, Business Week, and The Economist), online financial news (PR News Wire and Business Wire), and the regular press (NY Times, Washington Post, Boston Globe, USA Today, The Times, The Guardian, and The Independent). An article is classified as "confident" when it mentions the CEO as using the words "confident", "optimistic", "confidence" or "optimism"; and it is classified as "cautious" when the CEO uses the words "reliable", "practical", "conservative", "frugal", or "steady". This methodology is based on Malmendier and Tate (2005).

CEO Age: age of the CEO measured in years (Source: IRRC). "Change in capex (-1, +2)": relative change in capital expenditures from one year before the CEO earns $1 salary to two years after (Source: Compustat).

Come-back CEO: dummy variable that equals 1 if the CEO was re-hired as a CEO by the company, and zero otherwise (Source: Execucomp).

Continue as a CEO: dummy variable that identifies whether the CEO kept his job after the last year he received $1 salary (Source: Execucomp).

Coverage ratio: operating income after depr./ interest expenses (Source: Compustat).

Delta: the dollar change in the CEO stock and option holdings for a 1% change in the stock price (Source: CRSP/ Execucomp).

Dividend payout: total dividends/ net income (Source: Compustat).

Dividend yield: dividends per share/ stock price (fiscal year-end; close) (Source: CRSP).

Duality: dummy variable that equals 1 if the CEO is also the chairman, and zero otherwise (Source: IRRC).

Education: four dummy variables that identify whether the CEO has a PhD, Graduate (MBA, Master), College, or High School education (Source: Hoovers and Bloomberg).

FCF/Total assets: free cash flow/ total assets, where "free cash flow" = net income – capital expenditures – changes in working capital + depr. and amortizations (Source: Compustat).

First-time CEO: dummy variable that equals 1 if the CEO became a CEO in the year he starts earning $1, and zero otherwise (Source: Bloomberg).

First-time CEO with any prior appointment: identifies first-time CEOs with prior appointments as director and/ or executives (Source: Bloomberg).

First-time CEO with prior directorship: dummy variable that equals 1 if the CEO simultaneously is a "first-time CEO" and had a prior appointment as a board director (Source: Bloomberg).

Forbes: dummy variable that equals 1 if the CEO is in the Forbes 400 list of wealthy people, and zero otherwise (Source: Forbes Magazine).

Founder: dummy variable that identifies whether the CEO is a founder of the company (Source: Compact Disclosure).

Gain from stockholdings = (# shares held by the CEO*stock price at the beginning of the fiscal year)*annual stock return (Source: Execucomp/ CRSP).

Gender: dummy variable that equals 1 if the CEO is a female, and zero otherwise (Source: IRRC).

G-Index the Gompers, Ishii, and Metrick (2003) corporate governance indexes.

E-index the Bebchuk, Cohen, and Ferrell (2005) corporate governance indexes.

Idiosyncratic risk: natural log of the annualized variance of the residuals from the market model (estimated for every fiscal year). The market model is estimated with five leads and five lags of CRSP value-weighted daily returns (Source: CRSP).

Independent committee: dummy variable that equals one if all the compensation committee members are independent; and zero otherwise.

Institutional ownership: percentage of stock held by institutions, as reported by as of the fiscal-year end (Source: Thomson Financial 13-F).

Lambda: inverse Mills ratio to correct for potential sample bias.

Leverage: total liabilities/ total assets (Source: Compustat).

LT abnormal ret: three-year cumulative return on the stock minus the three-year cumulative return on the CRSP VW index (Source: CRSP).

LT CAR: the sum, over a three-year period, of the difference between stock daily returns and the daily return on CRSP VW index (Source: CRSP).

LTIP payouts: amount paid out to the executive under the company's long-term incentive plan. These plans measure company performance over a period of more than one year (generally three years). (Source: Execucomp).

Market-to-book: market value of equity/ book value of equity, winsorized at the 1% and 99% percentiles (Source: Compustat/ CRSP).

Market value: the sum of total liabilities plus the market value of equity (shares outstanding*stock price) at the fiscal year-end. In $MM, adjusted to reflect 2005 prices (Source: CRSP/ Compustat).

Non-firm CEO wealth: estimate of CEO non-firm wealth used in Dittmann and Maug (2007), calculated by cumulating all historical cash inflows and outflows as documented in Execucomp.

Option grants: value of option-related awards (e.g. options, stock appreciation rights, and other instruments with option-like features). Valuation is based upon the value of options that vested during the year as detailed in FAS123R. The amount here is the cost recorded by the company on its income statement as well as any amounts that were capitalized on the balance sheet for the fiscal year. It discloses the cost that was charged to the company (and thus to shareholders) for the year, as distinct from the grant date fair value of the awards (Source: Execucomp).

Options exercised: value realized from option exercises during the year. This value is calculated as of the date of exercise and is based on the difference between the exercise price and the market price of the stock on the exercise date (Source: Execucomp).

Other annual: the dollar value of other annual compensation not properly categorized as salary or bonus. This includes items such as: (1) Perquisites and other personal benefits, (2) Above market earnings on restricted stock, options/SARs or deferred compensation paid during the year but deferred by the office, (3) Earnings on long-term incentive plan compensation paid during the year but deferred at the election of the officer, (4) Tax reimbursements, (5) The dollar value of difference between the price paid by the officer for company stock and the actual market price of the stock under a stock purchase plan that is not generally available to shareholders or employees of the company (Note: This does not include value realized from exercising stock options). (Source: Execucomp).

Percentage held by top-five institutions: the sum of the five largest institutional holdings (Source: Thomson Financial 13-F).

Prct independents: total number of directors that are not employees or affiliated to the firm / board size (Source: IRRC).

Prct of shares owned by the CEO: number of shares held by the CEO divided by the total shares outstanding (in %). (Source: Execucomp).

Presence of an inst. blockholder is a dummy variable that equals 1 if the firm has an institutional shareholder holding more than 5% of the company stock, and zero otherwise (Source: Thomson Financial 13-F).

Presence of blockholder (comp. committee): dummy variable that equals 1 if at least one of the compensation committee members is a blockholder with the total voting power larger than one percent.

Restricted stock grants: value of restricted stock granted during the year (determined as of the date of the grant). (Source: Execucomp).

Risk changes: variables under this category are computed as the difference between the three-year average of each annual risk measure after the first year the CEO earns $1(or less), minus the three-year average of the same annual risk measure before the first year the CEO earns $1. Risk changes are measured in terms of "Total Risk", "Systematic Risk", and "Idiosyncratic Risk".

ROA: net income/ total assets (Source: Compustat). Note: in the probit regressions it is used a 3-year average of ROA prior to the year of $1 salary.

Salary: the dollar value of the base salary earned by the named executive officer during the fiscal year (Source: Execucomp).

Sales growth (3 years): 3-year average of the annual growth rate of sales, winsorized at 1% and 99% levels (Source: Compustat).

Systematic risk: natural log of the annualized variance of the product between beta and the daily market return (CRSP value-weighted index) over an entire fiscal year (Source: CRSP).

Tenure as CEO: number of years as a CEO (Source: Execucomp).

Tenure with the firm: number of years the CEO works for the firm (Source: Execucomp).

Tobin's Q = (total assets – total equity + market value of equity)/total assets) as of the fiscal-year end, winsorized at the 1% and 99% percentiles (Source: CRSP/ Compustat).

Top tercile-Value of CEO shares: dummy variable that equals 1 if the value of the CEO stockholdings is in the top tercile of both sample and control firms, and zero otherwise (Source: Execucomp).

Total assets: value of total assets ($MM) as of the fiscal-year end (Source: Compustat).

Total compensation: Salary + Bonus, + Other Annual + Total Value of Restricted Stock Granted + Long-Term Incentive Payouts + All Other Total (Source: Execucomp).

Total Compensation Incl Options Exercised: Salary + Bonus, + Other Annual + Total Value of Restricted Stock Granted + Value Realized From Option Exercises during the year + Long-Term Incentive Payouts + All Other Total (Source: Execucomp, definition TDC2).

Total Compensation Incl Option Grants: Salary + Bonus, + Other Annual + Total Value of Restricted Stock Granted + Total value of Options Granted (using Black-Scholes) + Long-Term Incentive Payouts + All Other Total (Source: Execucomp, definition TDC1).

Total current compensation: Current compensation, or SALARY + BONUS (Source: Execucomp, definition TCC).

Total options = options granted + unexercised exercisable options + unexercised unexercisable options (Source: Execucomp). "Total risk": natural log of the annualized variance of daily returns of an entire fiscal year (Source: CRSP).

Vega is the dollar change in the CEO option holdings for a 1% change in the stock volatility (Source: CRSP/ Execucomp).

Volatility: past 60-month standard deviation of stock returns.

Z-score = 0.33*EBIT/total assets + 0.999*net sales/total assets + 0.6*Mkt value of equity/total liabilities + 1.2*working capital/total assets + 1.4*retained earnings/total assets (Source: Compustat).

Note: all variables expressed in US$ are adjusted to reflect 2005 prices.

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About the Author

Dan Zhang (1982, China) received her bachelor's degree in Economics with honors from Zhejiang University in 2005. In the same year, she went to the Netherlands to study her master's degrees. She obtained the MSc in Economics *cum laude* at Tilburg University and the ERIM Research Master in Finance at Erasmus University Rotterdam. In 2008, she joined the Erasmus School of Economics as a PhD candidate in Finance. During her PhD studies, she spent four months doing research at the finance department of the Stern School of Business at New York University.

Dan's PhD research is in the area of executive compensation and corporate governance. She has presented her work at various international conferences, such as European Finance Association Annual Meeting (Germany, 2010), Financial Management Association Annual Meeting (US, 2011), International Conference on Corporate Governance (UK, 2010), and Accounting Research Workshop (Switzerland, 2011). Her paper "Restricting CEO Pay", co-authored with Ingolf Dittmann and Ernst Maug, received Highly Commended Paper Award at the International Conference on Corporate Governance and is published in the Journal of Corporate Finance.

At Erasmus University Rotterdam, Dan has taught the Seminar Advanced Corporate Governance in the master program of Financial Economics and supervised bachelor's and master's theses. She also worked part-time at Erasmus Data Service Centre (EDSC) to provide the assistance on financial databases for students and researchers at the Erasmus University Rotterdam.

Starting from August 2012, Dan will join BI Norwegian Business School in Oslo as an assistant professor of Finance.

Summary

This dissertation focuses on how executive compensation is designed and its implications for corporate finance and government regulations. Chapter 2 analyzes several proposals to restrict CEO compensation and calibrates two models of executive compensation that describe how firms would react to different types of restrictions. We find that many restrictions on CEO compensation would have unintended consequences. Restrictions on total realized (ex-post) payouts lead to higher average compensation, higher rewards for mediocre performance, lower risk-taking incentives, and the fact that some CEOs would be better off with a restriction than without it. Restrictions on total ex-ante pay lead to a reduction in the firm's demand for CEO talent and effort. Restrictions on particular pay components, and especially on cash payouts, can be easily circumvented. Chapter 3 examines how executive dividend protection affects corporate payout policy. I find that the dividend protection on executive restricted stock and option grants is associated with higher dividend payouts and lower share repurchases. Using the 2003 tax reform as an exogenous shock in dividend payouts, I provide further evidence that executive dividend protection causes changes in dividend payout policies. Chapter 4 studies a special subset of CEOs who works for a one-dollar annual salary. Rather than being the sacrificial acts they are projected to be, our findings suggest that some adoptions of one-dollar CEO salaries are opportunistic behavior of the wealthier, more overconfident, influential CEOs. Overall, these findings support the literature which claims that CEOs employ camouflage in compensation schemes to reduce the likelihood of public outrage over private benefits.

Nederlandse Samenvatting (Summary in Dutch)

Dit proefschrift richt zich op het ontwerp van het beloningsbeleid voor topbestuurders en de invloed daarvan op de ondernemingsfinanciering en regelgeving. In Hoofdstuk 2 worden een aantal voorstellen besproken om het beloningsbeleid van topbestuurders in te perken. Verder geef ik aan hoe ondernemingen reageren op verschillende types restricties door twee verschillende modellen te kalibreren. Ik laat zien dat de meeste restricties op het beloningsbeleid onbedoelde bijgevolgen hebben en identificeer ik restricties die gemakkelijk te omzeilen zijn. In Hoofdstuk 3 wordt onderzocht hoe dividendbescherming van bestuurders hun dividenduitkeringsbeleid beïnvloed. Ik laat zien dat dividendbescherming op restricted stock en opties is gerelateerd aan hogere dividenduitkeringen en een lagere inkoop van eigen aandelen. Ik gebruik de belastinghervorming in 2003 in de Verenigde Staten als een exogene schok om aan te tonen dat dividendbescherming leidt tot een verandering in uitbetaling van dividend. In Hoofdstuk 4 bestudeer ik een speciale groep topbestuurders die een jaarsalaris hebben van één dollar. Hoewel dit lijkt op een opoffering, laat ik zien dat in een aantal gevallen dit eerder het gevolg lijkt te zijn van opportunistisch gedrag van de rijkere, meer zelfoverschattende, en invloedrijkere topbestuurders. Deze bevindingen sluiten aan bij de academische literatuur die beweert dat topbestuurders camouflagetechnieken gebruiken binnen hun beloningsbeleid om zo de kans op maatschappelijke onvrede te verkleinen.

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ESSAYS IN EXECUTIVE COMPENSATION

This dissertation focuses on how executive compensation is designed and its implications for corporate finance and government regulations. Chapter 2 analyzes several proposals to restrict CEO compensation and calibrate two models of executive compensation that describe how firms would react to different types of restrictions. We find that many restrictions would have unintended consequences. We also identify restrictions that can be easily circumvented. Chapter 3 examines how executive dividend protection affects corporate payout policy. I find that the dividend protection on executive restricted stock and option grants is associated with higher dividend payouts and lower share repurchases. Using the 2003 tax reform as an exogenous shock in dividend payouts, I provide further evidence that executive dividend protection causes changes in dividend payout policies. Chapter 4 studies a special subset of CEOs who works for a one-dollar annual salary. Rather than being the sacrificial acts they are projected to be, our findings suggest that some adoptions of one-dollar CEO salaries are opportunistic behavior of the wealthier, more overconfident, influential CEOs. Overall, these findings support the Managerial Power Hypothesis in the literature, which claims that CEOs employ camouflage in compensation schemes to reduce the likelihood of public outrage over private benefits.

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