Discretion in Bonus Plans

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Abstract

This study examines discretionary bonus payments by firms to senior-level executives. The primary hypothesis based on the model developed in the paper is that discretionary bonus payments occur when the outcome of the objective performance measure is either low or high, but not when the outcome of the objective measure falls in the medium range. The prediction regarding the occurrence of discretionary bonus payments is obtained in a conventional agency theory model. In empirical tests I contrast this hypothesis with an alternative prediction obtained from managerial power theory. Based on a sample collected from public sources, I find evidence supporting the agency theory but only very limited support for the managerial power theory. In particular, discretionary bonus payments occur significantly more often and are higher when the objective performance falls in the tails of the distribution but are not related to executive power.

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1. Introduction

This paper studies discretionary bonus payments. Discretionary bonus payments are bonus payments that are not determined by a strict formulaic approach.[1] For example, Sun Microsystems' chief executive officer Scott McNealy did not receive a bonus according to his bonus formula for fiscal year 2005; however, he was paid a $1.1 million discretionary bonus outside the formula. Companies are not contractually obligated to make these discretionary bonus payments. Thus, it seems puzzling that we observe this kind of payment. The study addresses the question why companies pay discretionary bonus payments to their executives.

First, I investigate when discretionary payments may occur in an *optimal* contract using an analytical model. The model is based in a conventional moral hazard setting. However, in contrast to traditional agency models, the contract that is studied includes not only an objective performance measure but also a subjective performance measure.[2] The model developed in this paper extends Rajan and Reichelstein (2007). In the framework of the model, discretionary bonuses are interpreted as payments based

[1] As has been pointed out by the prior literature (see, e.g., Core, Guay, and Verrecchia (2003)), the annual bonus constitutes only a modest amount of the total compensation paid to top executives. However, understanding discretionary bonus payments is interesting since it provides insights into the behavior of the compensation committee with respect to discretionary payments. In other words, it is conceivable that compensation committees apply their choices with respect to discretionary bonus payments to other forms of compensation that may constitute larger portions of the total compensation, such as stock options. Moreover, studying discretionary bonus payments allows for comparisons with the rich literature addressing bonus payments.

[2] Following Rajan and Reichelstein (2007) and Murphy and Oyer (2003), objective performance measures (e.g., audited financial data) are thought of as verifiable and contractible. (See, e.g., the *News & Observer* on July 25, 2006 for an example of a law suit where employees sued their company for not paying bonuses based on audited financial information). In contrast, subjective performance measures are viewed as non-verifiable by courts, and therefore as non-contractible. Subjective measures may only be observable to the principal or to the principal and the agent. Subjective performance measures include measures based on the principal's subjective assessment of the agent's performance – for example, whether an agent helped improve the "work environment."

on the subjective performance measure. My model yields the prediction that discretionary bonus payments occur when the outcome of the objective performance measure is either low or high, but not when the outcome of the objective performance measure falls in the medium range.

The prediction that discretionary bonus payments occur only when the outcome of the objective performance measure is either high or low is contrasted in the empirical analysis with a prediction based on managerial power theory. Managerial power theory predicts a positive relationship between discretionary bonus payments and the power of the executives in the company. Thus, managerial power theory suggests that discretionary bonus payments are more likely to occur in companies with weak corporate governance structures. According to managerial power theory, executives that have considerable power over the board of directors and the compensation committee receive significantly higher compensation above the level explained by standard economic factors (see, e.g., Lambert et al. (1993), Boyd (1994), Core et al. (1999)). Discretionary bonus payments may be one way in which powerful executives achieve such excess pay (see e.g., Bebchuk et al. 2002).

The hypotheses generated from the model developed in the paper and managerial power theory that are contrasted in this study are tested using a sample collected from public sources. The data is gathered from companies' Forms 8-K and proxy statements starting in August 2004 when the updated SEC regulation regarding the disclosure of discretionary bonus payments in Forms 8-K became effective. The regulation requires companies to disclose the amounts of discretionary bonuses paid to the top five executives. Thus, the sample includes explicit information on the amount of discretionary bonus payments; it spans the time period of August 2004 to September 2006, and consists of 568 firm-years.

The results of the analyses support the hypothesis derived from the model developed in the paper: Companies are more likely to pay discretionary bonuses and, on average, pay higher discretionary bonuses when the objective outcome falls in the tails of the distribution. Conversely, the results provide limited support for the hypothesis that there is a positive relationship between discretionary bonuses and the power of the executives in the companies. The results support the notion that companies use discretionary bonus payments in a way that is consistent with optimal contracting and not as predicted by managerial power theory. This result is particularly surprising considering that several parties such as the press and shareholder activists have criticized discretionary bonuses as a form of rent extraction by executives.[3]

The paper contributes to the literature on discretion in bonus plans in several ways. First, the model in Rajan and Reichelstein (2007) is extended to the case where the informativeness of the subjective performance has a more general structure. The model developed in this paper yields the new prediction that discretionary bonus payments occur when the outcome of the objective performance measure is either low or high, but not when the objective outcome falls in the medium range. Second, this study is one of the first to link discretionary bonus payments to corporate governance. Although shareholder activists and the press have portrayed discretionary bonus payments as a form of rent extraction, researchers have not examined the relationship between discretionary bonus payments and executive power. Third, the sample used in this study

[3] See, e.g., *San Jose Mercury News* on October 26, 2005 or *The New York Times* on June 1, 2006.

improves upon existing empirical work by using an explicit measure of discretion for companies in a wide array of industries. Finally, the study introduces a new method for measuring discretion when there is no explicit information on whether a company made discretionary bonus payments.

The remainder of the paper is organized as follows. The next section reviews related studies in both the analytical and empirical literature. Section 3 develops the analytical model and the research hypotheses. Section 4 describes the sample and measures used in the empirical analysis. Section 5 discusses the research design and the empirical results. Section 6 provides a summary and conclusion, as well as directions for future research.

2. Literature review

2.1 Analytical research

Analytical research has modeled discretionary bonus payments as the result of implicit incentive contracts based on non-contractible performance measures.[4] There are different mechanisms through which implicit contracts can be enforced. One stream of this literature has analyzed implicit contracts in infinite horizon settings.[5] In those models, the implicit contract is enforced through the principal's concern for his reputation. A different branch of the literature has examined implicit contracts in one-period settings.[6] In these studies, the implicit contract is enforced through the principal's

[4] Implicit contracts are agreements that are not legally enforceable. They are sustained through economic mechanisms and constitute equilibria in a game-theoretic sense (see, e.g., Bull (1987)).

[5] The papers by Bull (1987), Baker et al. (1994), Pearce and Stacchetti (1998), Levin (2003), and Budde (2006) are in that group.

[6] Baiman and Rajan (1995), MacLeod (2003), Rajan and Reichelstein (2006), and Rajan and Reichelstein (2007) are part of this second stream of the literature.

committing to pay out a fixed amount of money, a "bonus pool", that is independent of the outcome of the non-contractible performance measure.

Several papers analyze the simultaneous use and interplay of implicit and explicit incentive contracts. Baker et al. (1994) examines an incentive contract involving a contractible and a non-contractible performance measure in an infinite horizon setting. More precisely, the authors assume that the principal considers an infinite number of future periods in deciding whether to honor the implicit contract. Since companies' planning horizons are likely to be much shorter, the model in Baker et al. (1994) does not seem to be most suitable for my setting. Baiman and Rajan (1995) and Rajan and Reichelstein (2006) analyze the interplay of contractible and non-contractible performance measures in one-period settings where the principal contracts with multiple agents simultaneously through the use of bonus pools. The two papers assume that the contractible and non-contractible performance measures are independent across the agents. Since the contractible measures in executives' bonus plans are likely to be correlated across executives, the models in Baiman and Rajan (1995) and Rajan and Reichelstein (2006) also do not seem to be a good fit for my setting.

Rajan and Reichelstein (2007) (hereafter RR) analyzes incentive contracts involving a contractible and a non-contractible performance measure in a one-period model. The authors consider a one-agent as well as a multiple-agent setting. For the one-agent setting, the paper shows that the non-contractible measure may only be used when the outcome of the contractible measure is the worst possible. RR further shows that this "compression result" is not obtained when the principal contracts with multiple agents using a bonus pool. An appealing feature of the models in RR is that the size of the bonus pool that the principal commits to paying out is a function of the objective performance measure. This structure seems to capture executives' bonus plans well. The single-agent, single-period model in RR is the basis for the model in this paper.

2.2 Empirical research

The empirical literature addressing discretion in bonus plans is a small yet growing research area. Ittner et al. (2003) and Moers (2005) analyze the effects of discretion in the bonus plan of an individual company, respectively. Both studies document that discretion can lead to biases in employee evaluation, which causes questionable payments to plan participants. Ittner et al. (2003) and Moers (2005) are also limited by a focus on the effects of discretion, as opposed to the determinants of discretion in bonus plans.

Another stream of the literature has investigated the determinants of discretion in bonus plans. Murphy and Oyer (2003) and Gibbs et al. (2004) address the question of when discretion is used in bonus plans.[7] Murphy and Oyer (2003) analyzes a proprietary dataset where the primary hypotheses focus on the weight placed on individual performance metrics. The basic assumption is that individual performance measures are more likely to be influenced by discretionary choices than financial measures. However, individual performance measures are frequently objective (e.g., completion of a succession plan or sale of a product line), and this raises some concern about the degree of measurement error in the analysis in Murphy and Oyer (2003).

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[7] There are other studies that have addressed this question more indirectly. Bushman et al. (1996) and Ittner et al. (1997) analyze the use of individual and non-financial performance measures in CEO bonus plans, respectively. Hayes and Schaefer (2000) implicitly investigate whether companies use performance measures that are only observable to the parties of the contract.

Gibbs et al. (2004) analyzes a proprietary dataset covering department managers of auto dealerships. The authors test a set of hypotheses using the discretionary bonuses paid to the department managers. The strongest results of the study are that discretionary bonus payments are positively related to the amount spent on personal training, to the extent of organizational interdependencies, and to the difficulty of meeting a performance target that has high consequences for failure. Moreover, the study shows that the effects of discretionary bonus payments depend on the amount of trust between the contracting parties. One distinction between this study and Gibbs et al. (2004) is that senior-level executives are the subjects as opposed to managers in car dealerships. Therefore, my setting is substantially different from the setting in Gibbs et al. (2004).

Murphy and Oyer (2003) and Gibbs et al. (2004) test hypotheses that are largely based on the notion in "traditional" agency theory that the relative weights on performance measures depend on the signal-to-noise ratios (see Holmstrom (1979) and Banker and Datar (1989)). More precisely, these two papers test the prediction that discretion is used more in situations where the financial measures are either noisy or not very informative about the agent's performance. Murphy and Oyer (2003) as well as Gibbs et al. (2004) find mixed results for the predictions from "traditional" agency theory. In particular, neither study finds support for the prediction that discretion is positively related to the noise in financial measures. This study develops and tests predictions that are based on a model involving a contractible and a non-contractible performance measure. Thus, my hypotheses differ substantially from those developed using "traditional" agency theory.

3. Analytical model and hypotheses development

3.1 Economic theory

This section describes a model that shows that discretionary bonus payments may be part of an optimal contract. The contract studied here may include an objective as well as a subjective performance measure. The set-up of the model is as follows. The principal seeks to motivate the agent to take a given action, a^h, at minimal cost. This action is more costly for the agent than a less productive action, a^l. The principal can use both an objective performance measure, x, which is verifiable and contractible and a subjective performance measure, y, which is non-verifiable and therefore non-contractible in designing the contract.[8] Both performance measures are informative about the agent's action and the outcomes of both measures are binary. The informativeness of the objective performance measure is captured by:

$$p^h \equiv \text{Prob}\left[x = x^h \mid a = a^h\right] > p^l \equiv \text{Prob}\left[x = x^h \mid a = a^l\right].$$

The informativeness of the subjective performance measure may depend on the outcome of the objective performance measure. In particular, the probability that the outcome of the subjective performance measure is high, given that the agent took action a^i and that the outcome of the objective performance measure is x^j, is captured by q^i_j where $i, j \in \{l, h\}$. This structure of the informativeness of the subjective measure constitutes a

[8] Examples of objective performance measures that are frequently used are accounting-based measures such as earnings, revenue, or cash flow. Examples of subjective performance measures include subjective assessments of the agent's performance by the principal: Whether the agent negotiated new deals with major customers or suppliers that are likely to pay off in the future, whether the agent worked well as a team member, whether the agent was a good leader, assessment of the agent's initiative, or whether the agent trained subordinates well.

relaxation of the assumption in RR that the informativeness of the subjective measure is constant for all outcomes of the objective measure. The monotone likelihood ratio property (MLRP) is assumed to hold for both performance measures.[9]

Since the subjective performance measure, y, is non-contractible it can only be used in implicit contracts. Implicit contracts cannot be enforced by courts but only by economic mechanisms. Following MacLeod (2003), one such mechanism is for the principal to commit to paying out a certain amount, a "bonus pool", for each outcome of the objective performance measure. If the outcome of the subjective performance measure is low, the principal can give some of the bonus pool to an outside third party, such as a charity. In other words, for a given outcome of the objective performance measure, the principal has an implicit contract with the agent that specifies how the bonus pool will be divided between the agent and the third party, based on the outcome of the subjective measure. Since the principal is indifferent between paying out the entire bonus pool to the agent and giving part of it to a third party, it is assumed that the principal will honor the implicit contract with the agent.

The bonus pool corresponding to the objective outcome j, where $j \in \{l,h\}$, is denoted by w^j. The implicit contract between the principal and the agent is as follows: For the objective outcome j and the subjective outcome k where $j,k \in \{l,h\}$, the principal "promises" the agent the compensation payment s^{jk}, which satisfies the

[9] In the context of my model, the density $p^j(a)$ satisfies the MLRP if $\frac{p^j(a^l)}{p^j(a^h)}$ is monotone decreasing in j. The MLRP implies that higher outcomes of the performance measure are indicative of higher effort on the part of the agent.

inequality $w^j \geq \max\{s^{jh}, s^{jl}\}$. Any difference between the bonus pool w^j and the actual compensation payment s^{jk} is paid to the outside third party. The risk-averse agent is assumed to have additively separable preferences over wealth, $U(\cdot)$ and cost of effort, $e(\cdot)$. His expected utility, exclusive of the cost of effort, is denoted by:

$$E[U(s^{jk}) \mid a^h] \equiv [U(s^{hh}) \cdot q_h^h + U(s^{hl}) \cdot (1-q_h^h)] \cdot p^h + [U(s^{lh}) \cdot q_l^h + U(s^{ll}) \cdot (1-q_l^h)] \cdot (1-p^h).$$

The principal's optimization problem is as follows:

Program P1: $\underset{w^j, s^{jk}}{\text{Min}} \; [w^h \cdot p^h + w^l \cdot (1-p^h)]$

subject to:

(i) $E[U(s^{jk}) \mid a^h] - e(a^h) \geq \overline{U}$,

(ii) $E[U(s^{jk}) \mid a^h] - e(a^h) \geq E[U(s^{jk}) \mid a^l] - e(a^l)$,

(iii) for all j,k: $w^j - s^{jk} \geq 0$.

The solution to program P1, $\{\widehat{w^l}, \widehat{w^h}, \widehat{s^{hh}}, \widehat{s^{hl}}, \widehat{s^{lh}}, \widehat{s^{ll}}\}$, characterizes the optimal incentive contract. In the following results, I will say that the subjective performance measure is used when the outcome of the objective performance measure is $x = x^j$ if the solution to P1 is such that $Min(\widehat{s^{jh}}, \widehat{s^{jl}}) < \widehat{w^j}$; I will say that the subjective measure is not used if the solution to P1 is such that $Min(\widehat{s^{jh}}, \widehat{s^{jl}}) = \widehat{w^j}$. In other words, the subjective performance measure is used if the payment to the agent depends on the outcome of y. All proofs are in the Appendix.

Proposition (1):

It is never optimal to use the subjective metric, y, for both outcomes of the objective performance measure, x.

Proposition (1) establishes that the optimal contract is such that $\widehat{w^j} = \widehat{s^{jh}} = \widehat{s^{jl}}$ for either $x = x^l$ or $x = x^h$, or both. In other words, the optimal contract is such that the payment to the agent does not depend on the subjective performance measure for at least one of the two possible outcomes of the objective performance measures. In stating the next results, I will use the following notation in presenting the results: $Q^L \equiv \frac{1-q_l^l}{1-q_l^h}$ and $Q^H \equiv \frac{1-q_h^l}{1-q_h^h}$ where $Q^L, Q^H \in (1,\infty)$. Q^L and Q^H reflect the informativeness of the subjective performance measure. In particular, if the subjective performance measure is not very informative in the sense that q_l^l is close to q_l^h and q_h^l is close to q_h^h, Q^L and Q^H are close to 1. Conversely, if the subjective performance measure is very informative in the sense that $q_l^h \to 1$ and $q_h^h \to 1$, Q^L and Q^H approach infinity. I will also use the notation

$$P^* = \frac{1 - T \cdot \dfrac{p^l \cdot (1-p^h)}{p^h \cdot (1-p^l)}}{1-T}, \text{ where } T = \frac{V\left(\overline{U} + \dfrac{e(a^l)\cdot p^h - e(a^h)\cdot p^l}{(p^h - p^l)}\right)}{V\left(\overline{U} + \dfrac{e(a^h)\cdot(1-p^l) - e(a^l)\cdot(1-p^h)}{(p^h-p^l)}\right)}, \text{ and}$$

$V(\cdot)$ represents the derivative of the inverse of the agent's utility function, $U^{-1}(\cdot)$. Note that $P^* \in (1,\infty)$ depends on p^l and p^h but is independent of q_l^l, q_l^h, q_h^l and q_h^h. P^* is increasing in the informativeness of the objective performance measure.

The next results provide sufficient conditions under which the subjective performance measure is used for the low outcome of x and for the high outcome of x, respectively.

<u>Proposition (2a):</u>

The subjective performance measure, y, is used when the outcome of the objective performance measure, x, is low (but not when the outcome of x is high) if the following conditions are satisfied:

(1) $$P^* < Q^L \text{ and } Q^H < P^* \cdot \left[\frac{p^h \cdot (1-p^l)}{p^l \cdot (1-p^h)} \right].$$

Propositions (1) and (2a) are consistent with the result in RR that the subjective performance measure may only be used when the outcome of the objective performance measure is low. The next proposition constitutes a departure from the result in RR. As discussed above, my setup deviates from the setup in RR in that the informativeness of the subjective performance measure may depend on the outcome of the objective performance measure. A necessary condition for the next proposition is that the informativeness of the subjective performance measure depends on the outcome of the objective performance measure.

Proposition (2b):

The subjective performance measure, y, is used when the outcome of the objective performance measure, x, is high (but not when the outcome of x is low) if the following conditions are satisfied:

(2) $$Q^L < P^* \text{ and } P^* \cdot \left[\frac{p^h \cdot (1-p^l)}{p^l \cdot (1-p^h)}\right] < Q^H .$$

To summarize Propositions (1), (2a), and (2b), the optimal contract in the setting where the principal has access to an objective, contractible performance measure and a subjective, non-contractible performance measure and where the objective measure has two possible outcomes, is such that the subjective measure is either not used at all or for only one of the objective outcomes. For example, suppose $U(s) = 2\sqrt{s}$; $p^h = 0.6$; $p^l = 0.3$; $q_h^h = q_l^h = 0.7$; $q_h^l = q_l^l = 0.4$; $e(a^h) = 2.5$; $e(a^l) = 0$ and $\overline{U} = 5$. Then $Q^L = Q^H = 2$; $P^* = 1.21$ and $P^* \cdot \left[\frac{p^h \cdot (1-p^l)}{p^l \cdot (1-p^h)}\right] = 4.25$. In this case, the conditions in (1) are satisfied and the subjective measure is used for $x = x^l$. In particular, the payments are $s^{hh} = s^{hl} = 23.15$; $s^{lh} = 7.88$; and $s^{ll} = 0.42$. Now, if the informativeness of the subjective measure when the objective outcome is low is reduced to $\{q_l^h = 0.45,\ q_l^l = 0.4\}$, and the informativeness of the subjective measure when the objective outcome is high is increased to $\{q_h^h = 0.9,\ q_h^l = 0.2\}$, then $Q^L = 1.09$, $Q^H = 8$, and P^* and $P^* \cdot \left[\frac{p^h \cdot (1-p^l)}{p^l \cdot (1-p^h)}\right]$ are as before. In this case, the conditions in (2) are satisfied and the subjective measure is used for $x = x^h$. In particular, the payments are $s^{hh} = 21.78$; $s^{hl} = 0.25$ $s^{lh} = s^{ll} = 9.00$.

In terms of the intuition for the results, consider the case where $q_h^h = q_l^h (= q^h)$, $q_l^l = q_h^l (= q^l)$ and therefore $Q^L = Q^H$. RR show that in this case (1) collapses to the single condition $P^* < Q^L$ $(= Q^H)$, which is *necessary and sufficient* for the subjective measure to be useful.[10] We can observe that using the subjective performance measure entails an additional cost compared to using a contractible performance measure. Specifically, the principal incurs the cost of giving part of the bonus pool to a third party with probability $(1-p^h)\cdot(1-q^h)$. Therefore, the cost of using the subjective performance measure is decreasing in the informativeness of the measure, as reflected in q^h. So, the informativeness of the subjective measure has to exceed a threshold in order to be useful because, otherwise, it is too expensive to use the measure. When $Q^L > P^*$, the subjective measure is only used for the lowest outcome of the objective performance measure for the following reason. First, note that the only way that the subjective measure can be used is by reducing the payment to the agent for low outcomes of the subjective measure. In other words, the subjective measure can only be used as a punishment. Because lower outcomes of x are more indicative of low effort (by MLRP) and because the agent is risk-averse, the punishment is most efficiently used for the lowest outcome of x. Now, if $Q^H > Q^L$, the intuition is similar to the case where

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[10] RR show that if $Q^L = Q^H$, it is never optimal to use the subjective measure when the outcome of the objective measure is high.

$Q^H = Q^L$. If the conditions in (1) are satisfied, y is informative enough so that it is not too expensive to use it. Moreover, y is used for the low outcome of x since the increased informativeness of y for the high outcome of x does not outweigh the attractiveness of punishing at the low outcome of x. If the conditions in (2) are satisfied, it is again too expensive to use the subjective measure for the low outcome of x. Moreover, the informativeness of y for the high outcome of x is now high enough that it becomes attractive to use the subjective measure at the high outcome of x.

A natural question at this point is what the optimal contract looks like when the objective performance measure has more than two outcomes. In particular, the question is whether the subjective measure would ever be used for intermediate values of the objective measure. In order to address this question, I will now consider the setting where the objective performance measure has three possible outcomes.[11] The set-up of the model is as before with the exception that now, $x \in \{x^l, x^m, x^h\}$.[12] The probability distributions of x now are:

$$p_j^i \equiv \text{Prob}[x = x^j \mid a = a^i]$$

where $i \in \{l, h\}$ and $j \in \{l, m, h\}$. Analogous to the case where the objective performance measure has two outcomes, the probability that the outcome of the subjective performance measure is high is denoted by q_j^i where, now, $i \in \{l, h\}$ and $j \in \{l, m, h\}$. The principal's optimization problem now becomes:

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[11] I restrict attention to the case where the objective performance measure has three outcomes since my ultimate goal is to derive predictions for the empirical analysis. The case where the objective performance measure has n outcomes adds little insight for the empirical predictions and would complicate the analysis.

[12] In particular, the agent's action and the outcome of the subjective performance measure are still binary and the MLRP is again assumed for both performance measures.

Program P2: $\underset{w^j, s^{jk}}{\text{Min}} [w^h \cdot p_h^h + w^m \cdot p_m^h + w^l \cdot (1 - p_h^h - p_m^h)]$

subject to:

(i) $E[U(s^{jk}) \mid a^h] - e(a^h) \geq \overline{U}$,

(ii) $E[U(s^{jk}) \mid a^h] - e(a^h) \geq E[U(s^{jk}) \mid a^l] - e(a^l)$,

(iii) for all j, k: $w^j - s^{jk} \geq 0$ (six constraints).

The solution to P2 characterizes the optimal contract and sheds light on the question of when the subjective performance measure is used in the case where the objective measure has more than two possible outcomes. In stating the next result, I will use the notation $Q^M \equiv \frac{1 - q_m^l}{1 - q_m^h}$.

<u>Proposition (3):</u>

When the objective performance measure, x , *has three possible outcomes the subjective performance measure,* y , *will never be used for the intermediate outcome of the objective performance measure if* $Q^L \geq Q^M$.

The intuition for Proposition (3) is similar to the intuition for Propositions (2a) and (2b). In particular, as long as the informativeness of the subjective measure for the high objective outcome is not too high, the subjective measure is used for the low outcome of the objective measure since that is most effective to use it there. If the informativeness of the subjective measure for the high objective outcome is high enough, it becomes attractive to use the subjective measure at the high objective outcome.

To summarize the Propositions above, the optimal contract when the principal has access to both a contractible and a non-contractible performance measure is such that the subjective performance measure is either not used at all or only for the lowest or the highest outcome of the objective performance measure. This result is particularly interesting considering that it is in contrast to the informativeness principle in Holmstrom (1979). According to the informativeness principle, if y was contractible, it would be used in the optimal contract (for all outcomes of the objective measure) since y is incrementally informative to x. The informativeness principle does not apply to subjective performance measures because the principal incurs an additional cost, in the form of paying part of the bonus pool to a third party, in using them.

My analytical predictions are broadly consistent with the results in the variance investigation literature.[13] The models in that literature analyze the situation where the principal can commit ex ante to buying an additional, contractible performance measure for a fixed cost after the outcome of the first performance measure is revealed. The aggregate findings in the variance investigation literature are that it is optimal for the principal to commit to buying the second performance measure for either low and/ or high outcomes of the first performance measure.[14] Even though my setting has some resemblance with the typical setting in the variance investigation literature, it differs from

[13] That stream of literature includes Baiman and Demski (1980), Lambert (1985), Dye (1986) and, more recently, Fagart and Sinclair-Desgagne (2007).

[14] More precisely, the findings are that it is optimal for the principal to commit to buying the second signal for all outcomes of the first signal that are below a first threshold and/ or for all outcomes of the first signal that are above a second threshold.

the analysis in, for example, Baiman and Demski (1980). Importantly, my analysis is conducted in a discrete world. Moreover, since obtaining the second performance measure is costless in my set-up, the principal only incurs the additional cost when the agent's payment depends on the outcome of the second signal. Also, since the principal cannot commit to payments based on the subjective measure, he will never reward the agent for a high outcome of the subjective measure, but only punish him for low outcomes.

The propositions above form the basis for the empirical prediction below. The propositions yield predictions for the use of the subjective performance measure. As discussed above, I interpret discretionary bonus payments as the result of implicit bonus contracts based on subjective performance measures. (All hypotheses are stated in the alternative form).

H1: Discretionary bonus payments occur when the outcome of the objective performance measure is either low or high, but not when the outcome of the objective performance measure falls in the medium range.

3.2 Managerial power theory

The preceding hypothesis follows from the notion that discretionary bonus payments are part of the optimal incentive contract. Additionally, discretionary bonus payments may conceivably occur in settings where the executives have considerable power over the board of directors and the compensation committee. It has been documented (see, e.g., Lambert et al. (1993), Boyd (1994), Core et al. (1999)) that CEO power is associated with significantly higher excess pay (i.e., compensation above the level explained by standard economic factors). It has been suggested (see Core et al. (1999), Bebchuk et al. (2002)) that a company's ownership and board structure are two important determinants of CEO power. In particular, it has been argued that a CEO's power is higher if, e.g., the CEO is also the board chair; the board consists of more internal board members (directors who are managers, retired managers, family members of management); the board consists of more directors that have been appointed by the CEO; or if there are no outside blockholders that own substantial percentages of the shares outstanding.

Discretionary bonus payments may be one way in which powerful executives increase their pay levels. Bebchuk et al. (2002) argues that an important factor in executives' ability to extract rents is the amount of "outrage" that a proposed pay package would create. If the outrage over a pay package is sufficiently high and widespread, it imposes significant costs, which limit the amount of rents that the executive can extract. Bebchuk et al. (2002) further argues that the outrage costs depend on the extent to which the rent extraction can be easily and distinctly identified. The authors argue that, under the managerial power approach, executives prefer compensation structures that enable the extraction of rents to be camouflaged as optimal contracting.

As suggested in the preceding section, discretionary bonus payments may be part of the optimal incentive contract. Moreover, the incentive plans that shareholders approve typically allow for the payment of discretionary bonuses. Stated differently, companies can usually pay out discretionary bonuses without the approval of shareholders. Therefore, it is difficult for outsiders to determine whether a discretionary bonus payment is paid in accordance with the optimal incentive contract or whether the discretionary payment constitutes rent extraction. Following the arguments provided by Bebchuk et al. (2002), discretionary bonus payments may be an effective way for powerful executives to extract rents. Based on this argument, we can formulate the next hypothesis.

H2: There is a positive relationship between the occurrence of discretionary bonus payments and the power of the executives in the company.

4. Samples and measures

I define "discretionary bonuses" as payments that would not have been paid according to the explicit contract entered into before the agent's actions are taken. This definition includes bonuses that are paid according to implicit incentive contracts based on non-contractible performance measures. The definition excludes bonuses that are paid according to explicit incentive contracts based on contractible performance measures. In addition, the definition excludes payments such as signing bonuses and severance payments that are based on explicit contracts.

4.1 Sample

The sample used in this study is collected from public sources and consists of two subsamples: (i) A sample of companies that paid discretionary bonuses ("discretionary sample") and (ii) a control sample that did not make these types of payments to executives ("non-discretionary sample").

The discretionary sample is collected by taking advantage of the updated SEC regulation regarding disclosure requirements in Forms 8-K that became effective in August, 2004. In particular, companies are required to disclose payments of material cash bonuses if the bonuses are not paid in accordance with the bonus formula.[15] Since

[15] More precisely, according to a statement by the Division of Corporation Finance of the SEC dated November 23, 2004: "Payment of a cash bonus must be disclosed under Item 1.01 of Form 8-K if the registrant exercised discretion to pay the bonus even though the specified performance criteria were not satisfied". See also, e.g., Morrison Foerster (http://www.mofo.com/news/updates/files/update02002.html).

companies may disclose the required information in a subsequent proxy statement if they fail to file a Form 8-K, the discretionary sample consists of companies that disclose discretionary bonus payments in either a Form 8-K or a proxy statement between August 23, 2004 and September 20, 2006.[16] The sample is constructed based on a keyword search of Forms 8-K and proxy statements contained in the database "Lexis/Nexis Research" using several different search strings.[17] To be included in the discretionary sample, the company must disclose a dollar amount for the discretionary bonus payment in the Form 8-K or proxy statement.

In order to ensure that the bonus payment is indeed discretionary in the sense it is defined above, documents that stated that the discretionary bonus was paid according to an employment agreement, a separation agreement, or a promotion agreement are deleted. Also, documents where it is not clear whether the bonus is discretionary or not are deleted. Furthermore, cases where the recipient of the discretionary bonus is in charge of a business unit are removed from the sample. For the documents generated by the Form 8-K search strings, I further deleted documents for which (i) I could not obtain the relevant proxy statement, or (ii) the manager is not a named officer. For the documents generated by the proxy statement search strings, I deleted the documents that are already contained in the Form 8-K sample. The discretionary sample consists of 87

[16] More precisely, if companies fail to timely file a Form 8-K, a safe harbor rule applies as long as the information is disclosed in a Form 10-Q or a Form 10-K relating to the period in which the event occurred. See, e.g., Morrison Foerster, (http://www.mofo.com/news/updates/files/update02002.html).

[17] I searched the Forms 8-K using the keywords "discretionary bonus", "discretionary cash bonus", "one (-) time bonus", "special bonus", "additional bonus", "discretionary award", "discretionary cash award", "special award", "special cash award", "discretionary payment", "discretionary cash payment" and "Item 1.01". I searched the proxy statements using the keywords "discretionary bonus", "discretionary cash bonus", "special bonus", "one (-) time bonus", "special award", "additional bonus", "discretionary cash payment", "discretionary payment", "special cash award", "discretionary cash award" within 5 words of the keywords "granted", "awarded", "agreed", "amount", "received", "paid", "approved", or "recognition".

firm-years from the search of Forms 8-K and 129 firm-years from the search of proxy statements for a total of 216 firm-years and 190 firms.

The non-discretionary sample consists of companies that do not disclose information about discretionary bonus payments in either a Form 8-K or a proxy statement over the period between August 23, 2004 and September 20, 2006. Since some hypotheses tests require information on the target bonus, the non-discretionary sample is constructed by applying several search strings related to target bonuses to the proxy statements contained in "Lexis/Nexis Research" that were *not* identified by Lexis/Nexis when constructing the discretionary sample.[18] To be included in the non-discretionary sample, the company must disclose either the amount of the target bonus or the maximum bonus.[19] Documents where the information on the target or maximum bonus is only available for managers that are in charge of a business unit are excluded from the sample. Moreover, in order to minimize the influence of signing bonuses, documents where the managers had a different position in the year before are also excluded from the sample. For a subset of 50 companies, I extensively searched the proxy statement and the Forms 8-K for information regarding discretionary bonuses. Using several broad keyword searches, I could not find any information regarding the payment of discretionary bonuses.[20] The non-discretionary sample consists of 352 firm-years and 283 firms. The

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[18] I used the keywords "target bonus", "maximum bonus", "bonus target", "targeted bonus" within 5 words of the keywords "base salary".

[19] To be included in the sample, the company must either disclose a dollar amount or provide a percentage of base salary.

[20] I searched the proxy statement using the following keywords: "discretion(ary)", "special", "one (-) time", "addition", "subjective", and "recognition". I searched all Forms 8-K that are filed between the filing date of the proxy statement and the filing date of the previous proxy statement that contain an "Item 1.01" using the following keywords: "bonus", "discretion", "special", "addition", "one (-) time".

final sample consists of 568 firm-years and 473 firms. Table 1 documents the sample collection process.

4.2 Measures

Discretionary bonus payment

The hypotheses require a measure of discretionary bonus payments. The construct is measured in two ways: (i) Using an indicator variable that is set equal to 1 if a discretionary bonus payment was made, and 0 otherwise *(DISC1)* and (ii) using the magnitude of the discretionary bonus payment *(DISC2)*. The indicator variable capturing whether a discretionary bonus was paid is used to test the prediction of the model in Section 3 regarding the *occurrence* of discretionary bonus payments. In order to address the issue that the incentive effects of discretionary bonuses may vary with the *size* of the discretionary payments, the indicator variable is complemented by the measure based on the magnitude of the discretionary bonus payments.

The model developed in Section 3 yields predictions with respect to the use of subjective performance metrics. The two measures of discretionary bonus payments (*DISC1* and *DISC2*) are intended to capture the theoretical construct of the use of subjective measures. Discretionary bonus payments are interpreted as the result of the following situation: The contract includes a subjective measure and the outcome of the subjective measure is favorable and a discretionary bonus is paid as a reward. The measures do not capture the situation where the contract includes a subjective measure but the outcome is unfavorable and the plan participant is not paid a discretionary bonus. Since the model yields predictions with regard to the *use* of the subjective metric, the measure *DISC1* reflects the construct used in the analytical model more closely. The measure *DISC2* reflects the *magnitude* of the discretionary bonus payments, which is further removed from the construct used in the model.

Objective outcome

Hypothesis 1 requires a measure of the outcome(s) of the objective performance measure(s). I measure this construct in two ways: (i) Using the bonus payment that was made according to the bonus formula *(PERF1)* and (ii) using the scaled analyst forecast error *(PERF2)*. Using the formula-based bonus payment seems natural since there is a one-to-one mapping between the outcome(s) of the performance measure(s) used in the bonus formula and the bonus payment based on the outcome(s). I also use the scaled analyst forecast error in order to see whether the results are robust for different measures of the objective outcome.

Executive power

Hypothesis 2 requires a measure of the power of the executives in the company. Following prior research (see Core et al. (1999), Larcker et al. (2006)), I measure executive power using information on (i) characteristics of the board of directors *(APPO, OLDO, BUSYO, BDSIZE, STAGGER, LEAD)* , and (ii) the ownership structure of the company *(NBHOLD, NACTIVE, UNEQUAL)*. These data were collected for year 2002.[21]

Control variables

I control for industry membership, as measured by SIC codes, in order to capture differences in general compensation practices across industries. For example, Murphy (1999) documents that utility companies generally use less performance-based

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[21] Efforts to update and extend this data are in progress.

compensation compared to companies in other industries. All measures are defined and summarized in Table 2.

4.3 Descriptive statistics

Table 3 provides information on the industry composition of the discretionary and the non-discretionary subsamples. Both subsamples are fairly consistent with the industry composition of the Compustat population. However, the discretionary subsample is slightly over-weighted in the electrical, water transport, and retail apparel industries and somewhat under-weighted in the depositories and trusts industries. The non-discretionary subsample is over-weighted in the chemicals, insurance, and business services industries and also somewhat under-weighted in the depositories and trusts industries.

Table 4 provides descriptive statistics for the variables used in the analysis. Panel A provides descriptive statistics for the discretionary subsample and Panel B provides descriptive statistics for the non-discretionary subsample. For the discretionary sample, the mean (median) value of *DISC2*, which captures the ratio of (discretionary bonus / salary), is 36% (19%). The mean (median) dollar amount of the discretionary bonuses paid is $200,000 ($61,000). The descriptive statistics for *PERF1*, which captures the ratio of (formula bonus/ target bonus), indicate that the companies in the discretionary sample, on average, performed worse than the companies in the non-discretionary sample. In particular, the descriptive statistics for *PERF1* show that for the companies in the discretionary sample, on average, the executive did not achieve the target bonus, whereas for the companies in the non-discretionary sample, on average, the executives achieved a performance around the target level. The mean (median) values for *PERF1* are 0.83 (0.80), and 1.06 (1.00) for the discretionary and non-discretionary sample, respectively. The descriptive statistics for *PERF2*, which captures the companies' performance relative to the mean analyst forecast at the beginning of the respective fiscal year, also indicate that the companies in the discretionary sample performed worse than the companies in the non-discretionary sample. The mean (median) values for *PERF2* are -0.90 (0.00), and -0.18 (0.16) for the discretionary and non-discretionary sample, respectively. Moreover, the Q1 (Q3) values for *PERF2* are -1.45 (1.00), and -0.61 (0.72) for the discretionary and non-discretionary sample, respectively. This suggests that the distribution of the discretionary sample has more weight in the tails, which is consistent with the hypothesis that discretionary bonuses occur when the objective performance is either low or high.

The values for the variables that measure executive power are fairly consistent for the two subsamples. In particular, on average, around two-thirds of the outside directors were appointed by existing inside directors *(APPO)*; approximately 10% of the outside directors are older than 70 *(OLDO)*; approximately 8-10% of the outside directors serve on four or more other boards *(BUSYO)*; the average board has between 8 and 9 members *(BDSIZE)*; there are two blockholders *(NBHOLD)* and six to seven activists *(NACTIVE)*. Moreover, around two-thirds of the companies have a staggered board *(STAGGER)*, between 7-11% have a lead director *(LEAD)*, and around 10% of the companies have unequal voting rights across shareholders or dual classes of stock *(UNEQUAL)*.

5. Research design and empirical results

5.1 Determinants of discretionary bonus payments

Hypothesis 1 predicts that discretionary bonuses occur when the objective performance is either low or high, but not when the objective outcome falls in the medium range. Figure 1 shows the distributions of the discretionary and the non-discretionary subsamples across different levels of the objective performance, as measured by *PERF1* or *PERF2*.

Figure 1a shows the distributions of the discretionary and the non-discretionary subsamples across different levels of *PERF1*, which is computed by (formula bonus/ target bonus). The distributions are bounded below by zero since companies do not pay negative bonuses. Moreover, we can observe that the distribution for the discretionary subsample substantially differs from the distribution for the non-discretionary subsample. In particular, over 30% of the companies in the discretionary subsample did not pay a formula bonus; conversely, only around 7% of the companies in the non-discretionary subsample did not pay a formula bonus. We can also observe that the distribution for the discretionary subsample has more probability mass in the upper tail, compared to the distribution for the non-discretionary subsample. Figure 1b shows the distributions across different levels of *PERF2*, which captures the company's performance relative to the mean analyst forecast. The distributions in Figure 1b exhibit the same characteristics as the distributions in Figure 1a: The distribution of the discretionary subsample appears to have more probability mass in the tails, compared to the distribution of the non-discretionary subsample. Figures 1a and 1b provide some preliminary support for the prediction in hypothesis 1 that discretionary bonuses are paid when the outcome of the objective measure is either low or high, but not when the objective outcome falls in the medium range.

To investigate the two research hypotheses, I first run a logit model using the indicator variable *DISC1*, which captures whether a discretionary bonus was paid, as the dependent variable. Hypothesis 1 predicts that discretionary bonuses occur when the objective performance is either low or high, but not when the objective outcome falls in the medium range. I use indicator variables in order to capture whether a company's objective performance is low or high. In particular, I create two dummy variables: *LOW* and *HIGH*. When the objective performance is measured by *PERF1* (= (formula bonus/ target bonus)), *LOW* is set equal to 1 if *PERF1* is 0, and *HIGH* is set equal to 1 if *PERF1* is between 1.9 and 2.1. These cutoff values are chosen based on the minimum and maximum bonuses that can be paid according to bonus formulas. Naturally, the minimum bonus amount that can be paid is $0. Typically, the maximum bonus amount that can be paid is equal to two times the target bonus.[22] When the objective performance is measured by *PERF2* (= ((Actual EPS – mean analyst forecast)/ Price)*100), *LOW* is set equal to 1 if *PERF2* is in the bottom 15% of the distribution, and *HIGH* is set equal to 1 if *PERF2* is in the top 15% of the distribution.[23] Hypothesis 2 predicts that discretionary bonuses occur in situations where the executives have considerable power over the board of directors and the compensation committee. In order to address hypothesis 2, I include the measures of executive power. In order to facilitate the

[22] The dataset provided by the human resources consulting firm described below includes information on the relationship between maximum and target bonus amounts. Most firms in that dataset have a maximum bonus that is equal to two times the target bonus. The results are qualitatively the same for other cutoff values for the maximum bonus.

interpretation (and potentially control for measurement error), I also estimate the models using three factors *(IMONITOR, BCHARTER, EMONITOR)* that capture the measures of executive power; the factors are obtained using exploratory principal component analysis (PCA).[24] The measures *BUSYO*, *BDSIZE*, and *NACTIVE* have positive loadings on the factor *IMONITOR*, which can be interpreted as internal monitoring. Therefore, the factor takes on high values for companies that have a high percentage of outside directors that serve on four or more boards, that have large boards, and that have a high number of activists. The factor *BCHARTER*, which captures the charter of a board, is positively related to the measures *STAGGER* and *UNEQUAL*.[25] The factor *EMONITOR*, which reflects the amount of external monitoring, is positively related to the measure *APPO* and negatively related to the measures *LEAD* and *NBHOLD*. Thus, this factor takes on high values for companies where a high percentage of the outside directors were appointed by existing inside directors, where there is no lead director, and where there are few blockholders. Finally, industry fixed effects are also included as control variables.

Table 5 presents the results of the logit regression analysis. The dependent variable for all models is *DISC1*, which is an indicator variable that is equal to 1 if the company is in the discretionary subsample and 0 otherwise. Models Ia, Ib, Ic, and Id are estimated using *PERF1* (= (formula bonus/ target bonus)) as the measure of objective performance. Models Ia and Ib do not include the measures of executive power; model Ic

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[23] The results remain qualitatively unchanged if the cutoff values are changed to the bottom and top 10% or 20%.

[24] Only the factors that have eigenvalues greater than one are retained. The solution is arrived at by using oblique rotation that allows the retained factors to be correlated in order to enhance interpretability of the PCA solution. Following Grice and Harris (1998), the factors are computed using the average equal-weighted sum of the standardized indicators associated with each factor.

includes the measures of executive power in raw form and model Id includes the measures of executive power based on the three PCA factors. For all four models Ia – Id, the coefficients on *LOW* are positive and statistically significant and for the models Ib – Id, the coefficients on *HIGH* are also positive and significant.[26] These results indicate that companies are more likely to pay discretionary bonuses when the objective outcome is either low or high. Thus, the findings support hypothesis 1, which predicts that discretionary bonuses occur when the objective outcome is either low or high, but not when the objective outcome falls in the medium range. Model Id suggests that discretionary bonus payments are not significantly related to the power of the executives in the companies. In particular, the coefficients on all three factors are insignificant. Moreover, we can observe that including the measures of executive power in the model does not change the findings with respect to the first hypothesis. Models IIa, IIb, IIc, and IId are estimated using *PERF2* (= ((Actual EPS – mean analyst forecast)/ Price)*100) as the measure of objective performance. These results are largely consistent with the findings in models Ia – Id. However, the results with respect to the variable *HIGH* are somewhat weaker than in models Ia – Id. In particular, although the coefficients on *HIGH* remain positive, they are not significant at conventional levels. In model IId, the coefficient on *BCHARTER* is significantly negative. This finding suggests that companies that either have a staggered board or unequal voting rights or both are *less* likely to use discretionary bonus payments. This result does not support the prediction

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[25] In computing the score for this factor, I incorporate the fact that *STAGGER* and *UNEQUAL* are substitute mechanisms. In particular, companies that have a staggered board are unlikely to also have unequal voting rights and vice versa.

[26] The coefficient on *HIGH* in model Ia is marginally not significant at conventional levels.

that there is a positive relationship between discretionary bonus payments and executive power.

The magnitude of the discretionary bonus can be used as an alternative measure of discretionary bonus payments. In order to analyze this outcome variable, I conduct a tobit analysis using *DISC2* (= (discretionary bonus/ salary)) as the dependent variable. The results are summarized in Table 6. Models Ia, Ib, Ic, and Id are estimated using *PERF1* (= (formula bonus/ target bonus)) as the measure of objective performance. Models Ia and Ib do not include the measures of executive power; model Ic includes the measures of executive power in raw form and model Id includes the measures of executive power in the form of three factors. Consistent with the results for the logit analyses, for all four models Ia – Id, the coefficients on *LOW* and *HIGH* are positive and statistically significant. These results indicate that companies pay higher discretionary bonuses when the objective outcome is either low or high, which supports the hypothesis that discretionary bonuses are used when the objective outcome falls in the tails of the distribution. Consistent with the findings for the logit analysis, model Id suggests that there is no significant relationship between the magnitude of discretionary bonus payments and the power of the executives in the companies. We can observe that including the measures of executive power in the model does not change the findings with respect to the first hypothesis. Models IIa, IIb, IIc, and IId are estimated using *PERF2* (= ((Actual EPS – mean analyst forecast)/ Price)*100) as the measure of objective performance. For all four models IIa – IId the coefficients on both *LOW* and *HIGH* are positive and statistically significant. Model IId suggests that there is a positive relationship between the magnitude of discretionary bonus payments and the power of the executives in the companies. In particular, the coefficient on *IMONITOR*, which captures the internal monitoring, is positive and statistically significant.

Taken together the logit and tobit analyses provide support for hypothesis 1 and only little support for hypothesis 2. The findings indicate that companies are more likely to pay discretionary bonuses and pay higher discretionary bonuses when the outcome of the objective measure is either low or high. The results provide fairly limited support for the hypothesis that discretionary bonus payments are positively related to executive power.

5.2 Additional analyses

Essentially all the companies in the discretionary subsample provide reasons for the payments in the proxy statement or Form 8-K. In some cases, the discretionary bonuses are paid for the achievement of milestones, such as the completion of an acquisition or a merger. Discretionary bonus payments based on such milestones could be based on explicit contracts that were agreed upon beforehand, and would therefore not fit my definition of discretionary bonus payments. I recorded the reasons that companies provide for the discretionary payments when constructing the sample and coded the companies as "milestone-companies" if the discretionary bonus was related to one of the following events: IPO, acquisition, sale of assets, refinancing of debt, merger, litigation. I repeat the logit and tobit analyses for the subsample of companies that did not pay the discretionary bonus in connection with a milestone. The results are consistent with the results for the full sample; they are summarized in Table 7.

As discussed above, the prediction that follows from the model developed in the paper differs from the predictions that are based on "traditional" agency theory.

"Traditional" agency yields the prediction that discretionary bonus payments are used more in situations where the objective measures are noisy or not very informative about the agent's actions in the sense that the agent's actions are not reflected in the objective measures until future periods (see, e.g., Gibbs et al. (2004) and Murphy and Oyer (2003)). In order to facilitate comparisons with the prior literature, I repeat some of the logit analyses and include a measure of the noise in financial performance metrics (*NROA*) and a measure of the investment opportunities of the company (*M/B*).[27] *NROA* is measured by the time series variability in median industry return on assets. *M/B* is the market-to-book ratio. The results are summarized in Table 8. We can observe that including the two variables does not change the findings with respect to the hypotheses analyzed in this paper.

I use the bonus that is paid out according to the formula as a measure of the outcome of the objective performance measure (*PERF1*). Companies may use performance measures that are also subject to discretion. In particular, companies may use measures of individual performance. Essentially all companies in the sample disclosed information on the performance measures that are used in the bonus formula. I repeated the logit and tobit analyses on the subsample of companies that only use financial performance measures. The (unreported) results are consistent with the results for the full sample.

The sample used in the analyses is based on information that companies publicly disclose. Although companies are required to disclose discretionary bonus payments in a

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[27] The two measures are chosen by following the prior literature. See, e.g., Bushman et al. (1996) and Ittner et al. (1997).

Form 8-K or a proxy statement, the regulation is still fairly new and it is possible that some companies do not disclose the information. In other words, the sample may be subject to selection bias.

In order to address this concern, I have repeated some of the analyses using a sample collected from a proprietary dataset. In comparison to the sample collected from public sources, the sample collected from the proprietary dataset is less likely to be subject to selection bias. The sample is based on a dataset that is provided by a human resources consulting firm. The dataset includes detailed information on the bonus plans used in the companies and also on the bonus plan participants. In particular, the dataset includes information on the performance measures used in the companies' bonus plans and the weights put on the performance measures. Moreover, the dataset provides information on the eligibility criteria for the bonus plans and the following information on the plan participants: Their position, their organizational unit, their reporting level and the person they report to, and their actual, target, and maximum bonus. The sample includes 234 companies for the year 2005.[28]

For the companies in the proprietary sample, I do not have explicit information on whether a discretionary bonus was paid. Therefore, I develop a measure that is intended to capture whether a particular company is likely to have made discretionary bonus payments. The measure is based on the assumption that, for a given firm-year, the executives that participate in the bonus plan have the same bonus formula (the same underlying performance measures, and the same relationship between the outcome of the performance measures and the bonus payment, scaled by the target bonus). Given this

[28] Efforts to expand the proprietary sample to additional years are in progress.

assumption, we would expect to observe the same ratio of (actual bonus/ target bonus) across the executives if there are no discretionary payments. The measure I develop is an indicator variable that is set equal to 1 if, for a given firm, at least one of the executives has a ratio of (actual bonus/ target bonus) that substantially deviates from the median of this ratio for the group of executives.[29] The preliminary results for the logit analyses using this sample are summarized in Table 9. The coefficients on all variables are insignificant. Therefore, neither the hypothesis that discretionary bonus payments occur more frequently in the tails of the distribution nor the hypothesis that discretionary bonus payments are positively related to executive power is supported by the proprietary dataset. It is possible that this lack of findings is attributable to measurement error in the dependent variable. Efforts to refine the dependent variable for the proprietary dataset are in progress.

6. Conclusion and directions for future research

This study examines discretionary bonus payments. Building on RR, I develop an analytical model that forms the basis for the first hypothesis. The model yields the prediction that discretionary bonus payments occur when the objective outcome is either low or high, but not when the objective outcome falls in the medium range. In addition, I test whether discretionary bonus payments occur more often in companies where executives have substantial power over the board of directors and the compensation committee.

The analyses yield support for the prediction from the model: Discretionary bonus

[29] The measure does not identify companies that made discretionary payments to all executives as a fixed percentage of the target bonus. However, Murphy and Oyer (2003) document that these cases are rare.

payments occur significantly more often and, on average, are higher, when the objective outcome falls in the tails of the distribution. The findings provide fairly limited support for the prediction that discretionary bonuses are positively related to executive power.

This study is subject to some limitations. As discussed above, the sample collected from public sources may be subject to selection bias. Although companies are required to disclose discretionary bonus payments in a Form 8-K or a proxy statement, the regulation is still fairly new and it is possible that some companies do not disclose the information. Second, it is possible that there are determinants of discretionary bonus payments that are not considered in this study. Such omitted variables would raise concerns with respect to the empirical findings of the study.

There are multiple interesting questions related to the analyses in this paper for future research. First, the analytical model derived in this study yields additional predictions with regard to the use of discretionary bonus payments. Those predictions involve the informativeness of the subjective performance metric – a construct which has not been studied empirically. Finding empirical proxies for the informativeness of the subjective metric would allow the researcher to test additional predictions of the model and would constitute a contribution to the literature. Second, this study is confined to the analysis of discretionary bonus payments. An interesting question is whether companies make discretionary payments by the means of other forms of compensation, such as stock options or restricted stock. Third, it would be interesting to investigate whether the updated SEC regulation has had an impact on the use of discretionary bonus payments. It seems likely that the introduction of the disclosure requirement has made discretionary bonuses more transparent. Following the arguments in Bebchuk et al. (2002) increased transparency makes a compensation structure less attractive for rent extraction purposes. Therefore, we would expect rent extraction through the use of discretionary bonus payments to have decreased since the new regulation became effective.

References

Baiman, S., and J. Demski. 1980. Economically optimal performance evaluation and systems. *Journal of Accounting Research* 18 (October): 184-220.

Baiman, S., and M. Rajan. 1995. The informational advantages of discretionary bonus schemes. *The Accounting Review* 70 (October): 557-579.

Baker, G., R. Gibbons, and K. Murphy. 1994. Subjective performance measures in optimal incentive contracts. *Quarterly Journal of Economics* 109 (November): 1125-1156.

Banker, R., and S. Datar. 1989. Sensitivity, precision, and linear aggregation of signals for performance evaluation. *Journal of Accounting Research* 27 (Spring): 21-39.

Bebchuk, L., J. Fried, and D. Walker. 2002. Managerial power and rent extraction in the design of executive compensation. NBER working paper.

Budde, J. 2006. Performance measure congruity and the balanced scorecard. Working Paper, University of Bonn.

Bull, C. 1987. The existence of self-enforcing implicit contracts. *The Quarterly Journal of Economics* 102 (February): 147-159.

Bushman, R., R. Indjejikian, and A. Smith. 1996. CEO compensation: the role of individual performance evaluation. *Journal of Accounting and Economics* 21 (April): 161-193.

Bushman, R., and A. Smith. 2001. Financial accounting information and corporate governance. *Journal of Accounting and Economics* 32 (December): 237-333.

Boyd, B. 1994. Board control and CEO compensation. *Strategic Management Journal* 15 (June): 335-344.

Core, J., W. Guay, and R. Verrecchia. 2003. Price versus non-price performance measures in optimal CEO compensation contracts. *The Accounting Review* 78 (October): 957-981.

Core, J., R. Holthausen, and D. Larcker. 1999. Corporate governance, chief executive officer compensation and firm performance. *Journal of Financial Economics* 51 (March): 371-406.

Dye, R. 1986. Optimal monitoring policies in agencies. *Rand Journal of Economics* 17 (Autumn): 339-350.

Fagart, M., and B. Sinclair-Desgagne. 2007. Auditing policies and information systems in a principal-agent model. *Management Science* (forthcoming).

Gibbs, M., K. Merchant, W. Van der Stede, and M. Vargus. 2004. Determinants and effects of subjectivity in incentives. *The Accounting Review* 79 (April): 409-436.

Grice, J. and R. Harris. 1998. A comparison of regression and loading weights for the computation of factor scores. Multivariate Behavioral Research 33 (2): 221-247.

Hayes, R. and S. Schaefer. 2000. Implicit contracts and the explanatory power of top executive compensation for future performance. *Rand Journal of Economics* 31 (Summer): 273-293.

Healy, P. 1985. The effect of bonus schemes on accounting decisions. *Journal of Accounting and Economics* 7 (April): 85-107.

Holmstrom, B. 1979. Moral hazard and observability. *Bell Journal of Economics* 10 (Spring): 74-91.

Holthausen, R., D. Larcker, and R. Sloan. 1995. Annual bonus schemes and the manipulation of earnings. *Journal of Accounting and Economics* 19 (February): 29-74.

Ittner, C., D. Larcker, and M. Meyer. 2003. Subjectivity and the weighting of performance measures: evidence from a balanced scorecard. *The Accounting Review* 78 (July): 725-758.

Ittner, C., D. Larcker, and M. Rajan. 1997. The choice of performance measures in annual bonus contracts. *The Accounting Review* 72 (April): 231-255.

Lambert, R. 1985. Variance investigation in agency settings. *Journal of Accounting Research* 23 (Autumn): 633-647.

Lambert, R., D. Larcker, and K. Weigelt. 1993. The structure of organizational incentives. *Administrative Science Quarterly* 38 (September): 438-461.

Levin, J. 2003. Relational incentive contracts. *American Economic Review* 93 (June): 835-847.

MacLeod, W. 2003. Optimal contracting with subjective evaluation. *American Economic Review* 93 (March): 216-240.

Moers, F. 2005. Discretion and bias in performance evaluation: the impact of diversity and subjectivity. *Accounting, Organizations and Society* 30 (January): 67-80.

Murphy, K. 1999. Executive Compensation. *Handbook of Labor Economics*, Vol. III, Orley Ashenfelter and David Card, editors. North Holland.

Murphy, K. and P. Oyer. 2003. Discretion in executive incentive contracts. Working paper, University of Southern California and Stanford University.

Pearce, D., and E. Stacchetti. 1998. The interaction of implicit and explicit contracts in repeated agency. *Games and Economic Behavior* 23 (April): 75-96.

Rajan, M. and S. Reichelstein. 2006. Subjective performance indicators and discretionary bonus pools. *Journal of Accounting Research* 44 (June): 585-618.

Rajan, M. and S. Reichelstein. 2007. Objective versus subjective indicators of managerial performance. Working paper, Stanford University.

Appendix

Proof of Proposition (1): I proceed by characterizing the solution to program P1. Let λ and μ denote the Lagrange-multipliers for constraints (i) and (ii), respectively. Denote by β^{jk} the Lagrange-multiplier for the constraint $w^j - s^{jk} \geq 0$ (there are 4 such inequalities embedded in constraint (iii)). The first-order conditions for the optimal solution with regard to w^h and w^l are:

$$-p^h + \beta^{hh} + \beta^{hl} = 0 \tag{3}$$

$$-(1-p^h) + \beta^{lh} + \beta^{ll} = 0 \tag{4}$$

The first-order conditions for the optimal solution with regard to s^{hh}, s^{hl}, s^{lh}, and s^{ll} are:

$$\lambda \cdot p^h \cdot q_h^h \cdot U'(s^{hh}) + \mu \cdot \left[p^h \cdot q_h^h - p^l \cdot q_h^l \right] \cdot U'(s^{hh}) - \beta^{hh} = 0; \tag{5}$$

$$\lambda \cdot p^h \cdot (1-q_h^h) \cdot U'(s^{hl}) + \mu \cdot \left[p^h \cdot (1-q_h^h) - p^l \cdot (1-q_h^l) \right] \cdot U'(s^{hl}) - \beta^{hl} = 0; \tag{6}$$

$$\lambda \cdot (1-p^h) \cdot q_l^h \cdot U'(s^{lh}) + \mu \cdot \left[(1-p^h) \cdot q_l^h - (1-p^l) \cdot q_l^l \right] \cdot U'(s^{lh}) - \beta^{lh} = 0; \tag{7}$$

$$\lambda \cdot (1-p^h) \cdot (1-q_l^h) \cdot U'(s^{ll}) + \mu \cdot \left[(1-p^h) \cdot (1-q_l^h) - (1-p^l) \cdot (1-q_l^l) \right] \cdot U'(s^{ll}) - \beta^{ll} = 0. \tag{8}$$

By (5), (6), and MLRP,

$$\frac{\beta^{hh}}{p^h \cdot q_h^h \cdot U'(s^{hh})} = \lambda + \mu \cdot \left[1 - \frac{p^l \cdot q_h^l}{p^h \cdot q_h^h} \right] > \lambda + \mu \cdot \left[1 - \frac{p^l \cdot (1-q_h^l)}{p^h \cdot (1-q_h^h)} \right] = \frac{\beta^{hl}}{p^h \cdot (1-q_h^h) \cdot U'(s^{hl})}. \tag{9}$$

By (7), (8), and MLRP,

$$\begin{aligned} \frac{\beta^{lh}}{(1-p^h) \cdot q_l^h \cdot U'(s^{lh})} &= \lambda + \mu \cdot \left[1 - \frac{(1-p^l) \cdot q_l^l}{(1-p^h) \cdot q_l^h} \right] > \\ &\lambda + \mu \cdot \left[1 - \frac{(1-p^l) \cdot (1-q_l^l)}{(1-p^h) \cdot (1-q_l^h)} \right] = \frac{\beta^{ll}}{(1-p^h) \cdot (1-q_l^h) \cdot U'(s^{ll})}. \end{aligned} \tag{10}$$

It is clear that $w^h = \max\{s^{hh}, s^{hl}\}$ and $w^l = \max\{s^{lh}, s^{ll}\}$. To show that $s^{hh} \geq s^{hl}$, suppose that the opposite were true. Then, $s^{hh} < s^{hl} = w^h \Rightarrow \beta^{hh} = 0$ (by complementary slackness), which in turn would imply $\beta^{hl} = p^h$ (from (3)). But from (9),

$\beta^{hh} = 0 \Rightarrow \beta^{hl} < 0$, which is a contradiction. We must therefore have $w^h = s^{hh} \geq s^{hl}$. To show that $s^{lh} \geq s^{ll}$, suppose that the opposite were true. Then, $s^{lh} < s^{ll} = w^l \Rightarrow \beta^{lh} = 0$ (by complementary slackness), which in turn would imply $\beta^{ll} = (1 - p^h)$ (from (4)). But from (10), $\beta^{lh} = 0 \Rightarrow \beta^{ll} < 0$, which is a contradiction. We must therefore have $w^l = s^{lh} \geq s^{ll}$. Using these results, the principal's problem P1 can be re-cast as follows:

$$\underset{w^h, w^l, \delta, \varepsilon}{\text{Min}} [w^h \cdot p^h + w^l \cdot (1 - p^h)]$$

subject to:

$$\begin{aligned}&[U(w^h) \cdot q_h^h + (U(w^h) - \varepsilon) \cdot (1 - q_h^h)] \cdot p^h + \\ &[U(w^l) \cdot q_l^h + (U(w^l) - \delta) \cdot (1 - q_l^h)] \cdot (1 - p^h) - e(a^h) - \overline{U} \geq 0\end{aligned} \tag{11}$$

$$\begin{aligned}&[U(w^h) \cdot q_h^h + (U(w^h) - \varepsilon) \cdot (1 - q_h^h)] \cdot p^h + [U(w^l) \cdot q_l^h + (U(w^l) - \delta) \cdot (1 - q_l^h)] \\ &\cdot (1 - p^h) - e(a^h) - \{[U(w^h) \cdot q_h^l + (U(w^h) - \varepsilon) \cdot (1 - q_h^l)] \cdot p^l + [U(w^l) \cdot q_l^l + \\ &(U(w^l) - \delta) \cdot (1 - q_l^l)] \cdot (1 - p^l) - e(a^l)\} \geq 0\end{aligned} \tag{12}$$

$$\delta \geq 0 \tag{13}$$

$$\varepsilon \geq 0 \tag{14}$$

where (11) is the agent's (IR) constraint and (12) is the agent's (IC) constraint. Since both (11) and (12) are satisfied as equalities, it must be the case that:

$$\begin{aligned}u^h = U(w^h) = \overline{U} &+ \frac{e(a^h) \cdot (1 - p^l) - e(a^l) \cdot (1 - p^h)}{(p^h - p^l)} - \delta \cdot \frac{(1 - p^h) \cdot (1 - p^l) \cdot (q_l^h - q_l^l)}{(p^h - p^l)} \\ &- \varepsilon \cdot \frac{p^l \cdot (1 - p^h) \cdot (1 - q_h^l) - p^h \cdot (1 - p^l) \cdot (1 - q_h^h)}{(p^h - p^l)}\end{aligned} \tag{15}$$

and

$$\begin{aligned}u^l = U(w^l) = \overline{U} &+ \frac{e(a^l) \cdot p^h - e(a^h) \cdot p^l}{(p^h - p^l)} + \delta \cdot \frac{p^h \cdot (1 - p^l) \cdot (1 - q_l^l) - p^l \cdot (1 - p^h) \cdot (1 - q_l^h)}{(p^h - p^l)} \\ &+ \varepsilon \cdot \frac{p^l \cdot p^h \cdot (q_h^h - q_h^l)}{(p^h - p^l)}\end{aligned} \tag{16}$$

Thus, the problem in program P1 can be reduced to the following program:

Program P3: $\underset{\delta, \varepsilon}{\text{Min}}[Z(\delta, \varepsilon)] = \underset{\delta, \varepsilon}{\text{Min}}[p^h \cdot U^{-1}(u^h) + (1 - p^h) \cdot U^{-1}(u^l)]$

subject to:

(A1) $\delta \geq 0$

(A2) $\varepsilon \geq 0$

where $U^{-1}(\cdot)$ is the inverse of the agent's utility function, and u^h and u^l are given by the expressions in (15) and (16).

To show that the problem is well-defined, we can show that Z is convex in (δ, ε):

$$\frac{\partial^2 Z(\delta,\varepsilon)}{\partial \delta^2} = p^h \cdot V'(u^h) \cdot \left[\frac{(1-p^h)\cdot(1-p^l)\cdot(q_l^h - q_l^l)}{(p^h - p^l)} \right]^2 + (1-p^h)\cdot V'(u^l) \cdot \left[\frac{p^h \cdot (1-p^l)\cdot(1-q_l^l) - p^l \cdot (1-p^h)\cdot(1-q_l^h)}{(p^h - p^l)} \right]^2$$

$$\frac{\partial^2 Z(\delta,\varepsilon)}{\partial \varepsilon^2} = p^h \cdot V'(u^h) \cdot \left[\frac{p^l \cdot (1-p^h)\cdot(1-q_h^l) - p^h \cdot (1-p^l)\cdot(1-q_h^h)}{(p^h - p^l)} \right]^2 + (1-p^h)\cdot V'(u^l) \cdot \left[\frac{p^h \cdot p^l \cdot (q_h^h - q_h^l)}{(p^h - p^l)} \right]^2$$

$$\frac{\partial^2 Z(\delta,\varepsilon)}{\partial \delta \partial \varepsilon} = p^h \cdot V'(u^h) \cdot \left[\frac{(1-p^h)\cdot(1-p^l)\cdot(q_l^h - q_l^l)}{(p^h - p^l)} \right] \cdot \left[\frac{p^l \cdot (1-p^h)\cdot(1-q_h^l) - p^h \cdot (1-p^l)\cdot(1-q_h^h)}{(p^h - p^l)} \right] + (1-p^h)\cdot V'(u^l) \cdot \left[\frac{p^h \cdot p^l \cdot (q_h^h - q_h^l)}{(p^h - p^l)} \right] \cdot \left[\frac{p^h \cdot (1-p^l)\cdot(1-q_l^l) - p^l \cdot (1-p^h)\cdot(1-q_l^h)}{(p^h - p^l)} \right]$$

$$\frac{\partial^2 Z(\delta,\varepsilon)}{\partial \delta^2} \cdot \frac{\partial^2 Z(\delta,\varepsilon)}{\partial \varepsilon^2} - \left[\frac{\partial^2 Z(\delta,\varepsilon)}{\partial \delta \partial \varepsilon} \right]^2 = -\frac{(-1+p^h)\cdot p^h \cdot (p^l \cdot (-1+q_l^h) + p^h \cdot ((-1+q_h^h)\cdot(-1+q_l^l) + p^l \cdot}{(p^h - p^l)^2}$$
$$\frac{(-q_l^h + q_h^h + q_l^l - q_h^h \cdot q_l^l)) + (-1+p^h)\cdot p^l \cdot (-1+q_l^h)\cdot q_h^l)^2 \cdot V'(u^h)\cdot V'(u^l)}{(p^h - p^l)^2} \geq 0$$

To prove the result in Proposition 1, it suffices to show that the solution to program P3 is never such that $\delta^* > 0$ and $\varepsilon^* > 0$. The first-order conditions for the optimal solution with regard to δ and ε are:

$$-\frac{\partial Z(\delta,\varepsilon)}{\partial \delta}+\beta_1=0 \tag{17}$$

$$-\frac{\partial Z(\delta,\varepsilon)}{\partial \varepsilon}+\beta_2=0 \tag{18}$$

where:

$$\begin{aligned}\frac{\partial Z(\delta,\varepsilon)}{\partial \delta}=p^h\cdot V(u^h)\cdot(-1)\cdot\left[\frac{(1-p^h)\cdot(1-p^l)\cdot(q_l^h-q_l^l)}{(p^h-p^l)}\right]+(1-p^h)\cdot V(u^l)\cdot\\ \left[\frac{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)}{(p^h-p^l)}\right],\end{aligned} \tag{19}$$

$$\begin{aligned}\frac{\partial Z(\delta,\varepsilon)}{\partial \varepsilon}=p^h\cdot V(u^h)\cdot(-1)\cdot\left[\frac{p^l\cdot(1-p^h)\cdot(1-q_h^l)-p^h\cdot(1-p^l)\cdot(1-q_h^h)}{(p^h-p^l)}\right]+\\ (1-p^h)\cdot V(u^l)\cdot\left[\frac{p^h\cdot p^l\cdot(q_h^h-q_h^l)}{(p^h-p^l)}\right].\end{aligned} \tag{20}$$

$V(\cdot)$ represents the derivative of $U^{-1}(\cdot)$ and β_1, β_2 are the Lagrange-multipliers for constraint $(A1)$ and $(A2)$, respectively.

Now, suppose that $\delta^*>0$ and $\varepsilon^*>0$. $\delta^*>0$ and $\varepsilon^*>0 \Rightarrow \beta_1=0$ and $\beta_2=0$ (by complementary slackness). $\beta_1=0$ and $\beta_2=0 \Rightarrow \frac{\partial Z(\delta,\varepsilon)}{\partial \delta}=0$ and $\frac{\partial Z(\delta,\varepsilon)}{\partial \varepsilon}=0$ (from (17) and (18)), which in turn implies the following (by (19) and (20)):

$$\frac{V(u^l)}{V(u^h)}=\frac{p^h\cdot(1-p^l)\cdot(q_l^h-q_l^l)}{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)} \text{ and}$$

$$\frac{V(u^l)}{V(u^h)}=\frac{p^l\cdot(1-p^h)\cdot(1-q_h^l)-p^h\cdot(1-p^l)\cdot(1-q_h^h)}{(1-p^h)\cdot p^l\cdot(q_h^h-q_h^l)},$$

or, equivalently:

$$A\equiv\frac{p^h\cdot(1-p^l)\cdot(q_l^h-q_l^l)}{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)}=\frac{p^l\cdot(1-p^h)\cdot(1-q_h^l)-p^h\cdot(1-p^l)\cdot(1-q_h^h)}{(1-p^h)\cdot p^l\cdot(q_h^h-q_h^l)}\equiv B.$$

$$C=(A-B)=\frac{p^h\cdot(1-p^l)\cdot(q_l^h-q_l^l)}{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)}-\frac{p^l\cdot(1-p^h)\cdot(1-q_h^l)-p^h\cdot(1-p^l)\cdot(1-q_h^h)}{(1-p^h)\cdot p^l\cdot(q_h^h-q_h^l)}$$

$C=0$ only holds for generic parameter assignments. In other words, for a given set of parameters where $C=0$, changing the problem slightly results in $C\neq 0$. More precisely, suppose that for a given set of parameters, $\{p^h, p^l, q_h^h, q_l^h, q_h^l, q_l^l\}$, $C=0$. Then, changing one of the parameters slightly results in $C\neq 0$. To show this, it suffices to show that C is monotone increasing in one of the parameters. For example, we can show that C is monotone increasing in q_l^l:

$$\frac{\partial C}{\partial q_l^l}=\frac{p^h\cdot(p^h-p^l)\cdot(p^l-1)\cdot(q_l^h-1)}{(p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h))^2}>0. \qquad \blacksquare$$

Proof of Proposition (2a): Using the proof of Proposition 1, it suffices to show that under the conditions in (1), $\varepsilon^*=0$ and $\delta^*>0$.

$\beta_1\geq 0$ and $\beta_2\geq 0$ implies $\frac{\partial Z(\delta,\varepsilon)}{\partial\delta}\geq 0$ and $\frac{\partial Z(\delta,\varepsilon)}{\partial\varepsilon}\geq 0$ (by (15) and (16)), which in turn implies the following:

$$\frac{V(u^l)}{V(u^h)}\geq\frac{p^h\cdot(1-p^l)\cdot(q_l^h-q_l^l)}{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)}; \tag{21}$$

$$\frac{V(u^l)}{V(u^h)}\geq\frac{p^l\cdot(1-p^h)\cdot(1-q_h^l)-p^h\cdot(1-p^l)\cdot(1-q_h^h)}{(1-p^h)\cdot p^l\cdot(q_h^h-q_h^l)}. \tag{22}$$

(21), together with (1), yields the following relationship:

$$\frac{V(u^l)}{V(u^h)}\geq\frac{p^h\cdot(1-p^l)\cdot(q_l^h-q_l^l)}{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)}>\frac{V(l)}{V(h)},$$

which implies

$$\frac{V(u^l)}{V(u^h)}>\frac{V(l)}{V(h)} \tag{23}$$

where

$$V(l)=V\left(\overline{U}+\frac{e(a^l)\cdot p^h-e(a^h)\cdot p^l}{(p^h-p^l)}\right),\text{ and}$$

$$V(h) = V\left(\overline{U} + \frac{e(a^h)\cdot(1-p^l) - e(a^l)\cdot(1-p^h)}{(p^h - p^l)}\right).$$

(22) and (1) yield the following relationships:

$$\frac{V(u^l)}{V(u^h)} \geq \frac{p^l\cdot(1-p^h)\cdot(1-q_h^l) - p^h\cdot(1-p^l)\cdot(1-q_h^h)}{(1-p^h)\cdot p^l\cdot(q_h^h - q_h^l)};$$

$$\frac{V(l)}{V(h)} > \frac{p^l\cdot(1-p^h)\cdot(1-q_h^l) - p^h\cdot(1-p^l)\cdot(1-q_h^h)}{(1-p^h)\cdot p^l\cdot(q_h^h - q_h^l)}. \tag{24}$$

Combining (23) and (24), the following has to hold:

$$\frac{V(u^l)}{V(u^h)} > \frac{p^l\cdot(1-p^h)\cdot(1-q_h^l) - p^h\cdot(1-p^l)\cdot(1-q_h^h)}{(1-p^h)\cdot p^l\cdot(q_h^h - q_h^l)} \tag{25}$$

which implies:

$$\frac{\partial Z(\delta,\varepsilon)}{\partial \varepsilon} = p^h\cdot V(u^h)\cdot(-1)\cdot\left[\frac{p^l\cdot(1-p^h)\cdot(1-q_h^l) - p^h\cdot(1-p^l)\cdot(1-q_h^h)}{(p^h - p^l)}\right] +$$
$$(1-p^h)\cdot V(u^l)\cdot\left[\frac{p^h\cdot p^l\cdot(q_h^h - q_h^l)}{(p^h - p^l)}\right] > 0.$$

In other words, $\frac{\partial Z(\delta,\varepsilon)}{\partial \delta} \geq 0$ holds as a strict inequality, which implies $\beta_2 > 0$ (from (18)), which in turn implies $\varepsilon^* = 0$ (by complementary slackness).

To show that $\delta^* > 0$, suppose that $\delta^* = 0$. Then

$\frac{V(u^l)}{V(u^h)} = \frac{V(l)}{V(h)}$, violating (21). Therefore, $\delta^* \neq 0$.

It follows that $\beta_1 = 0$ and therefore, $\left.\frac{\partial Z(\delta,\varepsilon)}{\partial \delta}\right|_{\varepsilon=0} = 0$:

$$\left.\frac{\partial Z(\delta,\varepsilon)}{\partial \delta}\right|_{\varepsilon=0} = p^h \cdot V(H)\cdot(-1)\cdot\left[\frac{(1-p^h)\cdot(1-p^l)\cdot(q_l^h-q_l^l)}{(p^h-p^l)}\right]+(1-p^h)\cdot V(L)\cdot \left[\frac{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)}{(p^h-p^l)}\right]=0$$

or, equivalently:

$$\frac{V(L)}{V(H)}=\frac{p^h\cdot(1-p^l)\cdot(q_l^h-q_l^l)}{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)}$$

where

$$V(L)=V\left(\overline{U}+\frac{e(a^l)\cdot p^h-e(a^h)\cdot p^l}{(p^h-p^l)}+\delta\cdot\frac{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)}{(p^h-p^l)}\right)\text{, and}$$

$$V(H)=\left(\overline{U}+\frac{e(a^h)\cdot(1-p^l)-e(a^l)\cdot(1-p^h)}{(p^h-p^l)}-\delta\cdot\frac{(1-p^h)\cdot(1-p^l)\cdot(q_l^h-q_l^l)}{(p^h-p^l)}\right).$$

In order to show that there exists a $\delta^* > 0$, it suffices to show that (i) $Q(\delta)=\frac{V(L)}{V(H)}$ is increasing in δ and that (ii) there exists a $\hat{\delta}>0$ such that

$$Q(\hat{\delta})\geq\frac{p^h\cdot(1-p^l)\cdot(q^h-q^l)}{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)}.$$

<u>Part (i):</u>

$Q(\delta)=\frac{V(L)}{V(H)}$ is increasing in δ :

$$\frac{\partial Q(\delta)}{\partial\delta}=\frac{V'(L)\cdot\left(\frac{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)}{(p^h-p^l)}\right)\cdot V(H)+}{V(H)^2}$$
$$\frac{V(L)\cdot V'(H)\cdot\left(\frac{(1-p^h)\cdot(1-p^l)\cdot(q_l^h-q_l^l)}{(p^h-p^l)}\right)}{V(H)^2}\geq 0.$$

<u>Part (ii):</u>
Note that

$$\frac{p^h\cdot(1-p^l)\cdot(q_l^h-q_l^l)}{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)}<1.$$

Moreover, there exists a $\hat{\delta}>0$ such that $L=H$ and therefore $\frac{V(L)}{V(H)}=1$:

$$\hat{\delta}=\frac{e(a^h)-e(a^l)}{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)+(1-p^h)\cdot(1-p^l)\cdot(q_l^h-q_l^l)}$$

(L,H are >0 when $\delta=\hat{\delta}$).

Therefore, there exist a (unique) $\delta^*>0$ such that $\left.\frac{\partial Z(\delta^*,\varepsilon)}{\partial\delta}\right|_{\varepsilon=0}=0$. ■

Proof of Proposition (2b): Using the proof of Proposition 1, it suffices to show that under the conditions in (2), $\delta^*=0$ and $\varepsilon^*>0$.

(21) together with (2) yield the following relationships:

$$\frac{V(u^l)}{V(u^h)}\geq\frac{p^h\cdot(1-p^l)\cdot(q_l^h-q_l^l)}{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)};$$

$$\frac{V(l)}{V(h)}>\frac{p^h\cdot(1-p^l)\cdot(q_l^h-q_l^l)}{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)}. \tag{26}$$

(20) and (2) yield the following relationship:

$$\frac{V(u^l)}{V(u^h)}\geq\frac{p^l\cdot(1-p^h)\cdot(1-q_h^l)-p^h\cdot(1-p^l)\cdot(1-q_h^h)}{(1-p^h)\cdot p^l\cdot(q_h^h-q_h^l)}>\frac{V(l)}{V(h)},$$

which implies

$$\frac{V(u^l)}{V(u^h)}>\frac{V(l)}{V(h)}. \tag{27}$$

Combining (24) and (25), the following has to hold:

$$\frac{V(u^l)}{V(u^h)}>\frac{p^h\cdot(1-p^l)\cdot(q_l^h-q_l^l)}{p^h\cdot(1-p^l)\cdot(1-q_l^l)-p^l\cdot(1-p^h)\cdot(1-q_l^h)}, \tag{28}$$

which implies the following:

$$\frac{\partial Z(\delta,\varepsilon)}{\partial \delta} = p^h \cdot V(u^h)\cdot(-1)\cdot\left[\frac{(1-p^h)\cdot(1-p^l)\cdot(q_l^h - q_l^l)}{(p^h-p^l)}\right] + (1-p^h)\cdot V(u^l)\cdot \left[\frac{p^h\cdot(1-p^l)\cdot(1-q_l^l) - p^l\cdot(1-p^h)\cdot(1-q_l^h)}{(p^h-p^l)}\right] > 0.$$

In other words, $\frac{\partial Z(\delta,\varepsilon)}{\partial \varepsilon} \geq 0$ holds as a strict inequality, which implies $\beta_1 > 0$ (from (17)), which, in turn, implies $\delta^* = 0$ (by complementary slackness). To show that $\varepsilon^* > 0$, suppose that $\varepsilon^* = 0$. Then $\frac{V(u^l)}{V(u^h)} = \frac{V(l)}{V(h)}$, violating (27). Therefore, $\varepsilon^* \neq 0$.

It follows that $\beta_2 = 0$ and therefore, $\left.\frac{\partial Z(\delta,\varepsilon)}{\partial \varepsilon}\right|_{\delta=0} = 0$:

$$\left.\frac{\partial Z(\delta,\varepsilon)}{\partial \varepsilon}\right|_{\delta=0} = p^h \cdot V(H')\cdot(-1)\cdot\left[\frac{p^l\cdot(1-p^h)\cdot(1-q_h^l) - p^h\cdot(1-p^l)\cdot(1-q_h^h)}{(p^h-p^l)}\right] + (1-p^h)\cdot V(L')\cdot\left[\frac{p^h\cdot p^l\cdot(q_h^h - q_h^l)}{(p^h-p^l)}\right] = 0$$

or, equivalently:

$$\frac{V(L')}{V(H')} = \frac{p^l\cdot(1-p^h)\cdot(1-q_h^l) - p^h\cdot(1-p^l)\cdot(1-q_h^h)}{(1-p^h)\cdot p^l\cdot(q_h^h - q_h^l)}$$

where

$$V(L') = V\left(\overline{U} + \frac{e(a^l)\cdot p^h - e(a^h)\cdot p^l}{(p^h-p^l)} + \varepsilon\cdot\frac{p^l\cdot p^h\cdot(q_h^h - q_h^l)}{(p^h-p^l)}\right), \text{ and}$$

$$V(H') = V\left(\overline{U} + \frac{e(a^h)\cdot(1-p^l) - e(a^l)\cdot(1-p^h)}{(p^h-p^l)} - \varepsilon\cdot\frac{p^l\cdot(1-p^h)\cdot(1-q_h^l) - p^h\cdot(1-p^l)\cdot(1-q_h^h)}{(p^h-p^l)}\right).$$

In order to show that there exists a $\varepsilon^* > 0$, it suffices to show that (i) $R(\varepsilon) = \frac{V(L')}{V(H')}$ is increasing in ε and that (ii) there exists a $\hat{\varepsilon} > 0$ such that

$$R(\hat{\varepsilon}) \geq \frac{p^l \cdot (1-p^h)\cdot(1-q_h^l) - p^h \cdot (1-p^l)\cdot(1-q_h^h)}{(1-p^h)\cdot p^l \cdot (q_h^h - q_h^l)}.$$

Part (i):

R(ε) = $\frac{V(L')}{V(H')}$ is increasing in ε:

$$\frac{\partial R(\varepsilon)}{\partial \varepsilon} = \frac{V'(L')\cdot\left(\frac{p^l \cdot p^h \cdot (q_h^h - q_h^l)}{(p^h - p^l)}\right)\cdot V(H') +}{V(H')^2}$$

$$\frac{V(L')\cdot V'(H')\cdot\left(\frac{p^l \cdot (1-p^h)\cdot(1-q_h^l) - p^h \cdot (1-p^l)\cdot(1-q_h^h)}{(p^h - p^l)}\right)}{V(H')^2} \geq 0.$$

(We know that $(p^l \cdot (1-p^h)\cdot(1-q_h^l) - p^h \cdot (1-p^l)\cdot(1-q_h^h))$ is positive by (2)).

Part (ii):
Note that

$$\frac{p^l \cdot (1-p^h)\cdot(1-q_h^l) - p^h \cdot (1-p^l)\cdot(1-q_h^h)}{(1-p^h)\cdot p^l \cdot (q_h^h - q_h^l)} < 1.$$

Moreover, there exists a $\hat{\varepsilon} > 0$ such that $L' = H'$ and therefore $\frac{V(L')}{V(H')} = 1$:

$$\hat{\varepsilon} = \frac{e(a^h) - e(a^l)}{p^l \cdot p^h \cdot (q_h^h - q_h^l) + p^l \cdot (1-p^h)\cdot(1-q_h^l) - p^h \cdot (1-p^l)\cdot(1-q_h^h)}.$$

(L', H' are > 0 when $\varepsilon = \hat{\varepsilon}$).

Therefore, there exist a (unique) ε* > 0 such that $\left.\frac{\partial Z(\delta, \varepsilon^*)}{\partial \varepsilon}\right|_{\delta=0} = 0$. ■

Proof of Proposition (3): It suffices to show that the solution to program P2 is such that $w^m = s^{mh} = s^{ml}$. Let λ and μ denote the Lagrange-multipliers for constraints (i) and (ii), respectively. Denote by β^{jk} the Lagrange-multiplier for the constraint $w^j - s^{jk} \geq 0$ (there are 6 such inequalities embedded in constraint (iii)). The first-order conditions for the optimal solution with regard to w^h, w^m, and w^l are:

$$-p_h^h + \beta^{hh} + \beta^{hl} = 0 \tag{29}$$

$$-p_m^h + \beta^{mh} + \beta^{ml} = 0 \tag{30}$$

$$-(1 - p_h^h - p_m^h) + \beta^{lh} + \beta^{ll} = 0 \tag{31}$$

Similarly, the first-order conditions for the optimal solution with regard to s^{hh}, s^{hl}, s^{mh}, s^{ml}, s^{lh}, and s^{ll} are:

$$\lambda \cdot p_h^h \cdot q_h^h \cdot U'(s^{hh}) + \mu \cdot \left[p_h^h \cdot q_h^h - p_h^l \cdot q_h^l \right] \cdot U'(s^{hh}) - \beta^{hh} = 0 \tag{32}$$

$$\lambda \cdot p_h^h \cdot (1 - q_h^h) \cdot U'(s^{hl}) + \mu \cdot \left[p_h^h \cdot (1 - q_h^h) - p_h^l \cdot (1 - q_h^l) \right] \cdot U'(s^{hl}) - \beta^{hl} = 0 \tag{33}$$

$$\lambda \cdot p_m^h \cdot q_m^h \cdot U'(s^{mh}) + \mu \cdot \left[p_m^h \cdot q_m^h - p_m^l \cdot q_m^l \right] \cdot U'(s^{mh}) - \beta^{mh} = 0 \tag{34}$$

$$\lambda \cdot p_m^h \cdot (1 - q_m^h) \cdot U'(s^{ml}) + \mu \cdot \left[p_m^h \cdot (1 - q_m^h) - p_m^l \cdot (1 - q_m^l) \right] \cdot U'(s^{ml}) - \beta^{ml} = 0 \tag{35}$$

$$\begin{aligned} &\lambda \cdot (1 - p_h^h - p_m^h) \cdot q_l^h \cdot U'(s^{lh}) + \mu \cdot \left[(1 - p_h^h - p_m^h) \cdot q_l^h - (1 - p_h^l - p_m^l) \cdot q_l^l \right] \\ &\cdot U'(s^{lh}) - \beta^{lh} = 0 \end{aligned} \tag{36}$$

$$\begin{aligned} &\lambda \cdot (1 - p_h^h - p_m^h) \cdot (1 - q_l^h) \cdot U'(s^{ll}) + \mu \cdot \left[(1 - p_h^h - p_m^h) \cdot (1 - q_l^h) - (1 - p_h^l - p_m^l) \cdot (1 - q_l^l) \right] \\ &\cdot U'(s^{ll}) - \beta^{ll} = 0 \end{aligned} \tag{37}$$

By (34), (35), and MLRP,

$$\begin{aligned} \frac{\beta^{mh}}{p_m^h \cdot q_l^h \cdot U'(s^{mh})} &= \lambda + \mu \cdot \left[1 - \frac{p_m^l \cdot q_m^l}{p_m^h \cdot q_m^h} \right] > \\ &\lambda + \mu \cdot \left[1 - \frac{p_m^l \cdot (1 - q_m^l)}{p_m^h \cdot (1 - q_m^h)} \right] = \frac{\beta^{ml}}{p_m^h \cdot (1 - q_l^h) \cdot U'(s^{ml})} \end{aligned} \tag{38}$$

By (35), (37), MLRP, and assuming that $q_l^h \geq q_m^h$ and $q_m^l \geq q_l^l$,

$$\begin{aligned} \frac{\beta^{ml}}{p_m^h \cdot (1 - q_m^h) \cdot U'(s^{ml})} &= \lambda + \mu \cdot \left[1 - \frac{p_m^l \cdot (1 - q_m^l)}{p_m^h \cdot (1 - q_m^h)} \right] > \\ &\lambda + \mu \cdot \left[1 - \frac{p_l^l \cdot (1 - q_l^l)}{p_l^h \cdot (1 - q_l^h)} \right] = \frac{\beta^{ll}}{p_l^h \cdot (1 - q_l^h) \cdot U'(s^{ll})} \end{aligned} \tag{39}$$

It is clear that $w^m = \max\{s^{mh}, s^{ml}\}$. To show that $s^{mh} \geq s^{ml}$, suppose that the opposite were true. Then, $s^{mh} < s^{ml} = w^m \Rightarrow \beta^{mh} = 0$ (by complementary slackness), which in turn would imply $\beta^{ml} = p_m^h$ (from (30)). But from (38), $\beta^{mh} = 0 \Rightarrow \beta^{ml} < 0$, which is a contradiction.

To show that $w^m = s^{mh} = s^{ml}$, suppose not, so that $w^m = s^{mh} > s^{ml}$. This implies $\beta^{ml} = 0$ (by complementary slackness). But from (39), $\beta^{ml} = 0 \Rightarrow \beta^{ll} < 0$, which is impossible. ■

Table 1: Sample Collection

I. Companies that paid discretionary bonuses ("discretionary sample")

I. a) Forms 8-K	
Documents identified by Lexis/Nexis	1164
Dollar amount not available	854
Employment agreement, separation agreement, promotion agreement	83
Not clear whether bonus is discretionary	88
Manager is in charge of a business unit	14
Proxy statement not available	32
Not a named officer	6
Final Firm-Years	87

I. b) Proxy Statements	
Documents identified by Lexis/Nexis	854
Dollar amount not available	472
Employment agreement, separation agreement, promotion agreement	56
Not clear whether bonus is discretionary	137
Manager is in charge of a business unit	5
Already in 8-K Sample	55
Final Firm-Years	129

I. c) Final discretionary sample	
Final Firm-Years	216
Final Firms	190

II. Companies that did not pay any discretionary bonuses ("non-discretionary sample")	
Documents identified by Lexis/Nexis	955
Amount of target/ maximum bonus not available	470
Manager is in charge of a business unit	2
Manager had a different position in the prior year	131
Final Firm-Years	352
Final Firms	283

III. Total Sample

III. a) Firm-Years	
Companies that paid discretionary bonuses	216
Companies that did not pay any discretionary bonuses	352
Final Firm-Years	568

III. b) Firms	
Companies that paid discretionary bonuses	190
Companies that did not pay any discretionary bonuses	283
Final Firms	473

Table 2: Measures

Measures of discretionary bonus payment

DISC1	Indicator variable that is equal to 1 if a discretionary bonus was paid; 0 otherwise
DISC2	(Discretionary bonus/ salary)

Measures of objective performance

PERF1	(Formula bonus/ target bonus); for companies that only provide information on the maximum bonus: (Discretionary bonus/ 0.5* maximum bonus).
PERF2	((Actual EPS_t – Mean analyst $forecast_{t-1}$)/ Share $Price_{t-1}$)*100; Actual EPS and mean analyst forecast are obtained from the I/B/E/S Summary tape: Actual EPS is the "ACTUAL" data item; mean analyst forecast is the "MEANEST" data item, calculated at the beginning of the year. Share price is obtained from the CRSP Monthly Stocks tape: data item "PRC".

Measures of executive power

APPO	The percentage of outside directors that were appointed by existing inside directors
OLDO	The percentage of outside directors that are older than 70
BUSYO	The percentage of outside directors that serve on four or more other boards
BDSIZE	Number of directors
STAGGER	Indicator variable that is equal to 1 if the company has a staggered board, 0 otherwise
LEAD	Indicator variable that is equal to 1 if there is a lead director, 0 otherwise
NBHOLD	Number of blockholders
NACTIVE	Number of activists
UNEQUAL	Indicator variable that is equal to 1 if the company has unequal voting rights across shareholders or dual classes of stock
IMONITOR	Captures the amount of internal monitoring. *BUSYO*, *BDSIZE*, and *NACTIVE* load.
BCHARTER	Captures a board's charter. *STAGGER* loads positively and *UNEQUAL* loads negatively.
EMONITOR	Captures the amount of external monitoring. *APPO* loads positively; *LEAD* and *NBHOLD* load negatively.

Control measure

SIC	One-digit SIC code; based on DNUM in Compustat

Table 3: Industry Composition

Two-digit SIC	Industry	Discretionary Sample (Percent of sample)	Non-discretionary Sample (Percent of sample)	Compustat Composition
01	Crops	0.0	0.6	0.2
10	Ores	0.0	0.3	1.3
12	Coal	1.0	0.6	0.2
13	Oil & Gas	2.4	2.9	3.8
14	Quarry	0.5	0.0	0.2
15	Building – Light	1.4	0.0	0.5
16	Building – Heavy	0.5	0.6	0.2
17	Construction	1.0	0.0	0.3
20	Food	1.9	1.2	1.7
22	Textile Mill	0.0	0.3	0.5
23	Apparel	1.0	0.3	0.7
24	Lumber	0.5	0.0	0.4
25	Furniture	0.0	0.9	0.4
26	Paper	1.4	1.7	0.7
27	Printing	0.0	0.6	1.1
28	Chemicals	4.8	11.9	5.7
30	Rubber	0.0	0.3	1.0
31	Leather	0.0	0.6	0.2
32	Stone	1.0	0.6	0.6
33	Metal Work – Basic	2.4	0.3	1.0
34	Metal Work – Fabrication	0.5	0.3	1.2
35	Industrial	4.8	5.8	4.9
36	Electrical	8.1	6.7	5.6
37	Transport – Equipment	2.4	0.6	1.5
38	Instruments	5.7	6.1	4.8
39	Misc. Manufacturing	1.0	1.2	1.0
41	Local transit	0.5	0.3	0.1
42	Motor freight	1.4	0.6	0.6
44	Water Transport	2.4	0.0	0.4
45	Air Transport	0.5	1.5	0.6
47	Transport – Services	0.0	0.3	0.3
48	Communications	2.9	5.2	4.0
49	Utilities	2.4	1.5	3.0
50	Durables – Wholesale	3.3	0.9	2.2
51	NonDurables - Wholesale	0.5	0.6	1.4
53	General Stores	1.4	0.3	0.5
54	Food Stores	0.5	0.3	0.6
55	Auto Dealers	0.5	0.3	0.3
56	Apparel – Retail	2.9	2.0	0.5
57	Home Equipment	1.9	0.0	0.5
58	Eating	1.4	1.2	1.4
59	Misc. Retail	2.9	0.9	1.7
60	Depositories	4.8	5.5	8.5
61	Non-depositories	1.0	0.3	1.4
62	Brokers	1.9	0.3	1.0
63	Insurance	3.3	5.5	7.8
64	Ins Agents	0.0	1.2	0.0
67	Trusts	1.9	3.2	0.5
72	Personal Services	1.0	0.3	0.0

Table 3: Continued

Two-digit SIC	Industry	Discretionary Sample (Percent of sample)	Non-discretionary Sample (Percent of sample)	Compustat Composition
73	Business Services	11.5	17.4	2.9
75	Auto Repair	0.5	0.6	0.0
78	Movies	1.0	0.0	0.0
79	Amusements	0.5	0.6	0.0
80	Health	3.3	1.7	0.0
82	Educational	0.0	0.6	0.0
87	Engineering – Retail	1.9	2.9	0.0

Table 4: Descriptive Statistics

Panel A: Discretionary subsample

Variable[a]	N	Mean	Std	Q1	Median	Q3
Measures of discretionary bonus payment						
DISC2	216	0.36	0.68	0.10	0.19	0.34
Measures of objective performance						
PERF1	156	0.83	0.73	0.00	0.80	1.30
PERF2	133	-0.90	12.62	-1.45	0.00	1.00
Measures of executive power						
APPO	139	66.65	35.37	40.00	77.78	100.00
OLDO	139	9.71	14.20	0.00	0.00	20.00
BUSYO	139	9.37	15.14	0.00	0.00	20.00
BDSIZE	139	8.68	2.19	7.00	9.00	10.00
STAGGER	139	0.60	0.49	0.00	1.00	1.00
LEAD	139	0.11	0.31	0.00	0.00	0.00
NBHOLD	139	1.88	1.51	1.00	2.00	3.00
NACTIVE	139	6.28	4.10	3.00	6.00	10.00
UNEQUAL	139	0.09	0.29	0.00	0.00	0.00

Panel B: Non-discretionary subsample

Variable	N	Mean	Std	Q1	Median	Q3
Measures of objective performance						
PERF1	350	1.06	0.69	0.65	1.00	1.41
PERF2	261	-0.18	4.48	-0.61	0.16	0.72
Measures of executive power						
APPO	255	65.53	36.86	33.33	75.00	100.00
OLDO	255	8.34	13.82	0.00	0.00	16.67
BUSYO	255	7.90	14.02	0.00	0.00	14.29
BDSIZE	255	8.56	2.54	7.00	8.00	10.00
STAGGER	255	0.69	0.46	0.00	1.00	1.00
LEAD	255	0.07	0.25	0.00	0.00	0.00
NBHOLD	255	2.04	1.48	1.00	2.00	3.00
NACTIVE	255	6.27	4.09	3.00	6.00	10.00
UNEQUAL	255	0.11	0.31	0.00	0.00	0.00

[a] See Table 2 for variable definitions.

Table 5: Logit Analysis[a]

Variable[b]		Ia	Ib	Ic	Id	IIa	IIb	IIc	IId
LOW	+	1.88*** (6.57)	1.75*** (5.09)	1.85*** (5.16)	1.80*** (5.30)	0.87*** (2.87)	0.77** (2.28)	0.97*** (2.82)	0.93*** (2.71)
HIGH	+	0.59 (1.59)	0.75* (1.80)	0.74* (1.79)	0.68* (1.68)	0.48 (1.55)	0.53 (1.55)	0.52 (1.45)	0.56 (1.61)
APPO	+			0.00 (0.25)				0.00 (0.06)	
OLDO	+			0.01 (1.16)				0.01 (0.85)	
BUSYO	+			0.01 (1.34)				0.01 (1.39)	
BDSIZE	+			0.01 (0.18)				-0.02 (-0.42)	
STAGGER	+			-0.61** (-2.28)				-0.43 (-1.62)	
LEAD	-			0.17 (0.36)				0.46 (0.96)	
NBHOLD	-			-0.20** (-2.00)				-0.11 (-1.13)	
NACTIVE	-			0.01 (0.19)				0.03 (0.89)	
UNEQUAL	+			0.06 (0.13)				-0.54 (-1.24)	
IMONITOR	+				0.23 (1.25)				0.26 (1.40)
BCHARTER	+				-0.31 (-1.52)				-0.39** (-2.00)
EMONITOR	+				0.21 (1.03)				0.03 (0.14)
Number of observations		497	357	357	357	394	327	327	327
DISC1 > 0		153	104	104	104	133	111	111	111
Adj. R^2		11.07%	10.37%	13.22%	11.50%	4.44%	4.58%	6.82%	6.04%

[a] The dependent variable for all models is *DISC1*, which is equal to 1 if a discretionary bonus was paid and 0 otherwise. Reported are the coefficients from the models with Z-statistics in parentheses. The models are estimated using Huber-White robust standard errors. Significance levels are indicated by stars: *** significant at 1%, ** significant at 5%, * significant at 10%, all based on two-tailed tests.
[b] *LOW* and *HIGH* are indicator variables capturing the objective performance. Models Ia, Ib, Ic, and Id are estimated using *PERF*1 (= (formula bonus/ target bonus)) as the measure of objective performance. In these models, *LOW* is equal to 1 if *PERF1* = 0 and *HIGH* is equal to 1 if *PERF1* is between 1.9 and 2.1 Models IIa, IIb, IIc, and IId are estimated using *PERF2* (= ((Actual EPS – mean analyst forecast)/ Price)*100) as the measure of objective performance. In those models, *LOW* is equal to 1 if *PERF2* is in the bottom 15% of the distribution and *HIGH* is equal to 1 if *PERF2* is in the top 15% of the distribution. The remaining variables are defined in Table 2. In addition to the variables listed, I include industry fixed effects using 1-digit SIC codes.

Table 6: Tobit Analysis[a]

Variable[b]		Ia	Ib	Ic	Id	IIa	IIb	IIc	IId
LOW	+	0.70*** (4.76)	0.62*** (3.85)	0.59*** (3.72)	0.61*** (3.78)	0.28** (2.16)	0.26* (1.76)	0.29** (2.00)	0.29* (1.94)
HIGH	+	0.39* (1.90)	0.53*** (2.63)	0.53*** (2.70)	0.51** (2.54)	0.33** (2.53)	0.43*** (2.78)	0.44*** (2.99)	0.44*** (2.86)
APPO	+			0.00 (1.10)				0.00 (1.03)	
OLDO	+			0.00 (1.14)				0.00 (0.61)	
BUSYO	+			0.00 (0.80)				0.01 (1.51)	
BDSIZE	+			-0.01 (-0.27)				-0.02 (-0.71)	
STAGGER	+			-0.23* (-1.92)				-0.11 (-0.99)	
LEAD	-			0.53*** (2.67)				0.67*** (3.45)	
NBHOLD	-			-0.05 (-1.15)				-0.03 (-0.75)	
NACTIVE	-			0.01 (0.95)				0.03* (1.72)	
UNEQUAL	+			0.18 (1.00)				0.01 (0.06)	
IMONITOR	+				0.10 (1.08)				0.15* (1.76)
BCHARTER	+				-0.06 (-0.68)				-0.07 (-0.81)
EMONITOR	+				-0.02 (-0.18)				-0.09 (-0.97)
Number of observations		497	357	357	357	394	327	327	327
DISC2 > 0		152	104	104	104	133	111	111	111
Adj. R^2		6.52%	7.61%	10.80%	7.97%	4.05%	4.89%	8.71%	5.96%

[a] The dependent variable for all models is *DISC2,* which is computed by (discretionary bonus/ salary). Reported are the coefficients from the models with t-statistics in parentheses. Significance levels are indicated by stars: *** significant at 1%, ** significant at 5%, * significant at 10%, all based on two-tailed tests.

[b] *LOW* and *HIGH* are indicator variables capturing the objective performance. Models Ia, Ib, Ic, and Id are estimated using *PERF*1 (= (formula bonus/ target bonus)) as the measure of objective performance. In these models, *LOW* is equal to 1 if *PERF1* = 0 and *HIGH* is equal to 1 if *PERF1* is between 1.9 and 2.1 Models IIa, IIb, IIc, and IId are estimated using *PERF2* (= ((Actual EPS – mean analyst forecast)/ Price)*100) as the measure of objective performance. In those models, *LOW* is equal to 1 if *PERF2* is in the bottom 15% of the distribution and *HIGH* is equal to 1 if *PERF2* is in the top 15% of the distribution. The remaining variables are defined in Table 2. In addition to the variables listed, I include industry fixed effects using 1-digit SIC codes.

Table 7: Logit and tobit analyses for the subsample of companies that did not pay the discretionary bonuses in connection with a milestone

Panel A: Logit analysis[a]

Variable[b]		Ia	Ib	Ic	Id	IIa	IIb	IIc	IId
LOW	+	2.12*** (6.92)	2.03*** (5.49)	2.19*** (5.43)	2.09*** (5.66)	0.93*** (2.93)	0.94*** (2.68)	1.08*** (2.95)	1.08*** (3.03)
HIGH	+	0.87** (2.21)	0.95** (2.15)	1.05** (2.29)	0.89** (2.08)	0.46 (1.40)	0.47 (1.28)	0.42 (1.10)	0.51 (1.36)
APPO	+			-0.00 (-0.15)				-0.00 (-0.17)	
OLDO	+			0.02** (2.09)				0.01 (1.44)	
BUSYO	+			0.01 (0.96)				0.01 (1.09)	
BDSIZE	+			0.07 (1.10)				0.02 (0.40)	
STAGGER	+			-0.52* (-1.74)				-0.32 (-1.12)	
LEAD	-			0.34 (0.65)				0.63 (1.29)	
NBHOLD	-			-0.24** (-2.35)				-0.11 (-1.11)	
NACTIVE	-			-0.03 (-0.76)				0.00 (0.05)	
UNEQUAL	+			-0.02 (-0.03)				-0.60 (-1.27)	
IMONITOR	+				0.22 (1.09)				0.24 (1.17)
BCHARTER	+				-0.31 (-1.34)				-0.35* (-1.75)
EMONITOR	+				0.13 (0.57)				-0.04 (-0.17)
Number of observations		462	334	334	334	371	307	307	307
DISC1 > 0		118	81	81	81	110	91	91	91
Adj. R^2		14.21%	14.01%	18.25%	14.89%	5.32%	5.91%	8.41%	7.10%

[a] The dependent variable for all models is *DISC1*, which is equal to 1 if a discretionary bonus was paid and 0 otherwise. Reported are the coefficients from the models with Z-statistics in parentheses. The models are estimated using Huber-White robust standard errors. Significance levels are indicated by stars: *** significant at 1%, ** significant at 5%, * significant at 10%, all based on two-tailed tests.
[b] *LOW* and *HIGH* are indicator variables capturing the objective performance. Models Ia, Ib, Ic, and Id are estimated using *PERF*1 (= (formula bonus/ target bonus)) as the measure of objective performance. In these models, *LOW* is equal to 1 if *PERF1* = 0 and *HIGH* is equal to 1 if *PERF1* is between 1.9 and 2.1
Models IIa, IIb, IIc, and IId are estimated using *PERF2* (= ((Actual EPS – mean analyst forecast)/ Price)*100) as the measure of objective performance. In those models, *LOW* is equal to 1 if *PERF2* is in the bottom 15% of the distribution and *HIGH* is equal to 1 if *PERF2* is in the top 15% of the distribution. The remaining variables are defined in Table 2. In addition to the variables listed, I include industry fixed effects using 1-digit SIC codes.

Panel B: Tobit Analysis[a]

Variable[b]		Ia	Ib	Ic	Id	IIa	IIb	IIc	IId
LOW	+	0.92*** (5.21)	0.83*** (4.29)	0.79*** (4.17)	0.82*** (4.24)	0.32** (2.22)	0.36** (2.14)	0.37** (2.23)	0.39** (2.30)
HIGH	+	0.57** (2.42)	0.67*** (2.89)	0.69*** (3.04)	0.65*** (2.78)	0.34** (2.28)	0.42** (2.36)	0.43** (2.54)	0.45** (2.53)
APPO	+			0.00 (0.62)				0.00 (0.75)	
OLDO	+			0.01** (2.17)				0.00 (1.18)	
BUSYO	+			0.00 (0.44)				0.01 (1.31)	
BDSIZE	+			0.03 (0.81)				0.00 (0.11)	
STAGGER	+			-0.21 (-1.41)				-0.10 (-0.79)	
LEAD	-			0.63*** (2.83)				0.75*** (3.57)	
NBHOLD	-			-0.07 (-1.39)				-0.03 (-0.67)	
NACTIVE	-			-0.00 (-0.19)				0.02 (0.91)	
UNEQUAL	+			0.09 (0.38)				-0.11 (-0.50)	
IMONITOR	+				0.10 (0.89)				0.15 (1.60)
BCHARTER	+				-0.10 (-0.91)				-0.11 (-1.05)
EMONITOR	+				-0.07 (-0.62)				-0.14 (-1.31)
Number of observations		462	334	334	334	371	307	307	307
DISC2 > 0		117	81	81	81	110	91	91	91
Adj. R^2		8.59%	10.08%	14.29%	10.58%	4.75%	5.56%	9.70%	6.94%

[a] The dependent variable for all models is *DISC2,* which is computed by (discretionary bonus/ salary). Reported are the coefficients from the models with t-statistics in parentheses. Significance levels are indicated by stars: *** significant at 1%, ** significant at 5%, * significant at 10%, all based on two-tailed tests.

[b] *LOW* and *HIGH* are indicator variables capturing the objective performance. Models Ia, Ib, and Ic are estimated using *PERF*1 (= (formula bonus/ target bonus)) as the measure of objective performance. In these models, *LOW* is equal to 1 if *PERF1* = 0 and *HIGH* is equal to 1 if *PERF1* is between 1.9 and 2.1 Models IIa, IIb, and IIc are estimated using *PERF2* (= ((Actual EPS – mean analyst forecast)/ Price)*100) as the measure of objective performance. In those models, *LOW* is equal to 1 if *PERF2* is in the bottom 15% of the distribution and *HIGH* is equal to 1 if *PERF2* is in the top 15% of the distribution. The remaining variables are defined in Table 2. In addition to the variables listed, I include industry fixed effects using 1-digit SIC codes.

Table 8: Logit analysis including additional measures[a]

Variable[b]		Ia	Ib	Ic	IIa	IIb	IIc
LOW	+	1.66*** (4.84)	1.72*** (4.91)	1.80*** (5.12)	0.77** (2.28)	0.83** (2.45)	1.00*** (2.88)
HIGH	+	0.75* (1.82)	0.67 (1.60)	0.60 (1.45)	0.53 (1.55)	0.59* (1.70)	0.62* (1.76)
NROA	+		-10.03** (-2.26)	-10.63** (-2.31)		-7.32 (-1.59)	-7.44 (-1.53)
M/B	+		-0.01 (-0.30)	-0.00 (-0.18)		0.05* (1.84)	0.06* (1.70)
IMONITOR	+			0.20 (1.02)			0.25 (1.27)
BCHARTER	+			-0.41** (-1.96)			-0.41** (-2.07)
EMONITOR	+			0.21 (1.01)			0.07 (0.31)
Number of observations		351	351	351	327	327	327
DISC1 > 0		101	101	101	111	111	111
Adj. R^2		9.95%	11.12%	12.57%	4.58%	6.04%	7.53%

[a] The dependent variable for all models is *DISC1*, which is equal to 1 if a discretionary bonus was paid and 0 otherwise. Reported are the coefficients from the models with Z-statistics in parentheses. The models are estimated using Huber-White robust standard errors. Significance levels are indicated by stars: *** significant at 1%, ** significant at 5%, * significant at 10%, all based on two-tailed tests.

[b] *LOW* and *HIGH* are indicator variables capturing the objective performance. Models Ia, Ib, and Ic are estimated using *PERF*1 (= (formula bonus/ target bonus)) as the measure of objective performance. In these models, *LOW* is equal to 1 if *PERF1* = 0 and *HIGH* is equal to 1 if *PERF1* is between 1.9 and 2.1 Models IIa, IIb, and IIc are estimated using *PERF2* (= ((Actual EPS – mean analyst forecast)/ Price)*100) as the measure of objective performance. In those models, *LOW* is equal to 1 if *PERF2* is in the bottom 15% of the distribution and *HIGH* is equal to 1 if *PERF2* is in the top 15% of the cdistribution. The remaining variables are defined in Table 2. In addition to the variables listed, I include industry fixed effects using 1-digit SIC codes.

NROA is measured by the time series variation in the median industry return on assets. *M/B* is measured by the market-to-book ratio at the beginning of the period.

Table 9: Logit analysis for the sample based on the proprietary dataset[a]

Variable[b]		Ia	Ib	Ic	Id
LOW	+	0.11 (0.23)	0.23 (0.43)	0.14 (0.25)	0.22 (0.41)
HIGH	+	-0.25 (-0.49)	-0.26 (-0.45)	-0.16 (-0.26)	-0.27 (-0.48)
APPO	+			0.01 (1.08)	
OLDO	+			-0.01 (-0.47)	
BUSYO	+			-0.02 (-1.43)	
BDSIZE	+			0.12 (1.57)	
STAGGER	+			-0.11 (-0.25)	
LEAD	-			0.48 (0.76)	
NBHOLD	-			0.13 (0.78)	
NACTIVE	-			0.05 (0.80)	
UNEQUAL	+			-0.55 (-0.74)	
IMONITOR	+				0.15 (0.46)
BCHARTER	+				-0.15 (-0.52)
EMONITOR	+				-0.07 (-0.22)
Number of observations		148	133	133	133
DISC1 > 0		66	56	56	56
Adj. R^2		3.55%	5.57%	9.42%	5.89%

[a] The dependent variable for all models is *DISCPROP*, which is equal to 1 if it is likely that the company paid discretionary bonuses and 0 otherwise. Reported are the coefficients from the models with Z-statistics in parentheses. The models are estimated using Huber-White robust standard errors. Significance levels are indicated by stars: *** significant at 1%, ** significant at 5%, * significant at 10%, all based on two-tailed tests.

[b] *LOW* and *HIGH* are indicator variables capturing the objective performance. All models are estimated using *PERF2* (= ((Actual EPS – mean analyst forecast)/ Price)*100) as the measure of objective performance. *LOW* is equal to 1 if *PERF2* is in the bottom 15% of the proprietary distribution and *HIGH* is equal to 1 if *PERF2* is in the top 15% of the proprietary distribution. The remaining variables are defined in Table 2. In addition to the variables listed, I include industry fixed effects using 1-digit SIC codes.

Figure 1: Distributions of the discretionary and non-discretionary subsamples across different levels of the objective outcome.

Figure 1a: Distributions across *PERF1*

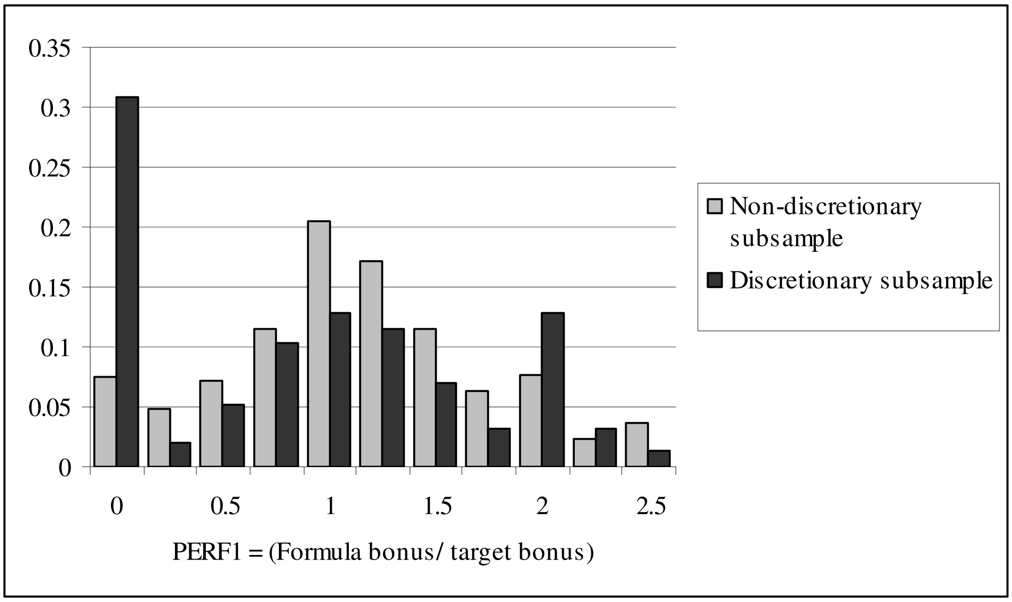

Figure 1b: Distributions across *PERF2*