Incentives for CEOs to Exit*

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Abstract

An important question for firms in dynamic industries is how to induce a CEO to reveal information that the firm should change its strategy, in particular when a strategy change might cause his own dismissal. We show that the uniquely optimal incentive scheme from this perspective consists of options, a base wage, and severance pay. Option compensation *minimizes* the CEO's expected on-the-job pay from continuing with a poor strategy. Hence, a smaller severance payment is needed to induce the CEO to reveal information causing a strategy change than, e.g., under stock compensation or other forms of variable pay. The model suggests how deregulation and massive technological changes in the 1980s and 1990s may have contributed to the dramatic rise in CEO pay and turnover over the same period.

1 Introduction

Phil Trubey, the founder and CEO of Netpartners Internet Solutions, bootstrapped his company into a $6 million dollar business.[1] In 1998, the company's venture capitalist and main shareholder informed Trubey that she lost confidence in his ability to take the company to the next level. "I was worried about losing control of the company," Trubey said. "I pushed back and said, No, no. I want to be the CEO. I can learn." Shortly after, Trubey was dismissed. Today, the company—who meanwhile went public under a different name—has over $81 million in revenues and $27 million in pre-tax income.

In some sense, the story of Phil Trubey is typical. Every firm, small or large, reaches a point where it faces challenges that it cannot tackle under its current strategy and CEO. In another sense, the story may not be so typical. Unlike Trubey's company, not every firm has a main shareholder who knows, or seems to know, when the right time has come for a change in strategy and leadership. In fact, as the CEO is the one who implements the firm's strategy, it seems plausible that he knows before anyone else if this strategy is still the right strategy for the firm going forward. The question is then how can shareholders get the CEO to reveal this information given that negative information might lead to the CEO's own dismissal?[2]

We believe this is an important question. Around the world, corporate governance scandals have underscored the need for more transparency, while CEOs have gone to great lengths to hide and manipulate information to safeguard their own positions, or at least have tried to do so. This paper is concerned with finding the optimal mechanism inducing CEOs to reveal information that the firm should change its strategy when a strategy change may involve his own dismissal. We define "strategy" broadly as any choice variable that may affect the firm's future performance, including "soft" factors such as corporate culture and leadership style. The management literature provides broad evidence suggesting that fundamental changes in strategy are frequently accomplished by hiring a new CEO (e.g., Hambrick, Geletkanycz, and Fredrickson (1993), Barker and Duhaime (1997), Gordon et al. (2000)), while Bertrand and Schoar (2003)

[1] Taken from an article by Inc., 2002, http://www.qwest.net/nav4/articles/w-f10.html.

[2] Monitoring may mitigate the problem, but is unlikely to solve it. For instance, Jensen (1993) cautions that "limitation on information severely hinders the ability of even highly talented board members to contribute effectively to the monitoring and evaluation of the CEO and the company's strategy."

document that CEOs are hired for their specific managerial skills and style.[3]

A special, but important, example of a fundamental strategy change is the firm's decision to shut down. For instance, in a declining industry there may not be enough time to radically alter the firm's industry focus and product portfolio. The only realistic alternative may be to shut the firm down and reallocate its assets to other, growing industries.[4] Jensen (1993) views the reluctance of CEOs to shut down their firms as one of the major problems in what he calls "Modern (or Third) Industrial Revolution": "Even when managers do acknowledge the requirement for exit, it is often difficult for them to accept and initiate the shutdown decision."[5] Observe that in this shutdown example the firm exits as a whole, which naturally also involves the CEO's own exit. By contrast, in other examples a strategy change may involve the CEO's personal exit while the firm as a whole remains intact.

We address the problem of providing the CEO with incentives to reveal information using an optimal contracting approach. In our model, the firm faces a choice between "continuation"—i.e., continuing under its current strategy and CEO—and "change". As illustrated above, "change" can mean anything from replacing the CEO and implementing a new strategy to shutting the firm down. Whether "continuation" or "change" is optimal depends on the "state of nature", which is informative about whether the firm's current strategy is still the best strategy for the firm going forward, and thus about the firm's likely future value under the "continuation" alternative. Precisely, in low states of nature the firm's expected future value under "continuation" is low, implying that "change" is optimal. In contrast, in high states of nature "continuation" is optimal.

As the CEO implements the firm's strategy, he is likely to know before anyone else whether the current strategy continues to be the best strategy for the firm's future. What makes it tricky to get the CEO to reveal this information is that he is biased towards "continuation", a feature

[3] For further evidence, see, e.g., Weisbach (1995) and Denis and Denis (1995). Relatedly, Rotemberg and Saloner (1993, 2000) argue that hiring a new CEO with a particular vision and style is a credible signal to the firm's employees that the firm will pursue a different strategy. By contrast, merely changing the firm's strategy while keeping the old CEO may not be credible.

[4] Holmström and Kaplan (2001) argue that it may be difficult to ask firms to migrate across industries. To reallocate assets from declining to growing industries, it may thus be necessary to shut the old firm down.

[5] Similarly, Murphy (1997) argues that CEOs "too easily dismiss exit as an appropriate long-run strategy" for fear of "managing themselves out of a job".

that arises endogenously in our model. The question is therefore what is the optimal mechanism to get the CEO to reveal this information? The answer, and our first result, is that the CEO's unique optimal compensation scheme consists of severance pay, options, and a base wage.

The role of severance pay is similar to that in other models.[6] Naturally, without any offsetting benefits the CEO will never reveal information that may cost him his job. But granting the CEO severance pay is only one side of the coin. The other side is the CEO's expected on-the-job pay under the "continuation" alternative. When choosing between "continuation" and "change", the CEO trades off his expected on-the-job pay against his severance pay.

Intuitively, the CEO's *optimal* on-the-job pay scheme is that which minimizes the amount of severance pay needed to get him to choose "change" in (low) states of nature when "change" is optimal. The reason why this is an option is as follows. An option minimizes the CEO's on-the-job pay when the firm value is low. Precisely, it pays him less than, e.g., stock or other forms of variable compensation. Accordingly, an option minimizes the CEO's *expected* on-the-job pay in low states of nature, thus minimizing the amount of severance pay needed to induce him to choose "change" in precisely those states where "change" is optimal.

This does not mean that option compensation trivially resolves all inefficiencies arising from the CEO having private information. Mitigating these inefficiencies is costly as it implies that shareholders must leave the CEO substantial (informational) rents. Rather, it means that option compensation implements the "most efficient" decision rule ("continuation" versus "change") with a *given* amount of CEO rents, or alternatively, that it implements a *given* decision rule with the minimum amount of CEO rents.

This argument for granting CEOs options is both novel and, we believe, intuitive. Existing arguments for giving CEOs incentive pay are based on different rationales, e.g., effort provision (e.g., Holmström (1979), Innes (1990)), risk-taking (Lambert (1986)), or self-selection of high-ability CEOs (Lazear (1999)).[7] Also, there is a growing literature on employee stock-option compensation arguing why individual employees should receive stock options even though—

[6] E.g., Knoeber (1986), Harris (1990), Almazan and Suarez (2003), Eisfeldt and Rampini (2004). The role of the base wage is to provide the CEO with a minimum consumption level

[7] These are all arguments for incentive pay, not necessarily for options. As for moral hazard, Jenter (2002) illustrates that options may be *suboptimal* incentive schemes. As for risk-taking, Carpenter (2000) and Ross (2004) show that options may, in fact, *decrease* risk-taking incentives. Finally, in Lazear's model compensation schemes are assumed to be of the form $w = a + bx$, which does not include options.

unlike the firm's CEO—they have no significant impact on the firm's output.[8]

The second part of this paper presents a comparative statics analysis. In the 1980s and 1990s, the deregulation of major U.S. industries and massive technological innovations put substantial pressure on U.S. firms to reconsider their existing business strategies and industry focus (see, e.g., Jensen (1993), Holmström and Kaplan (2001)).[9] In our model, we link these developments to two other developments taking place during the same time period. One is the increase in forced CEO turnover during the past decades (Huson, Parrino, and Starks (2001)). The other is the dramatic rise in both the overall level of CEO compensation and the use of option pay (e.g., Hall and Liebman (1998)).

Arguably, deregulation and technological innovations made it more likely that changes in firms' strategy and industry focus became optimal. In our model, this corresponds to an increase in the likelihood that "change" becomes optimal. As this likelihood increases, both the value of the CEO's severance pay and the value of his on-the-job option grant increases. Furthermore, the actual likelihood that "change" will be implemented also increases, implying that it becomes more likely that the CEO will be replaced.

Only few papers draw a link between CEO option pay and the likelihood of firm exit or the regulatory and technological changes during the 1980s and 1990s. A notable exception is Mehran, Nogler, and Schwartz (1997), who document empirically that CEO stock option grants have a positive effect on the likelihood of voluntary firm liquidation.[10]

Hermalin (2003) and Murphy and Zábojník (2004) offer interesting alternative explanations for the rise in CEO pay by linking it (like this paper) to the increase in CEO turnover.[11]

[8] See, e.g., Oyer (2004), Bergman and Jenter (2003), Inderst and Müller (2004). With few exceptions, these arguments do not easily extend to the firm's CEO. In Inderst and Müller, for instance, all relevant information and decision-making power rests with the firm's owner(s), while those who receive options—namely, individual employees—have no private information or ability to affect the firm's output in any significant way.

[9] The result was a massive reallocation of assets from declining to growing industries, large-scale firm exits, and changes in firms' strategic orientation and organizational focus (see, e.g., Jensen (1993)). Many view the takeover, merger, and restructuring waves of the 1980s and 1990s as consequences of these developments (e.g., Holmström and Kaplan (2001), Andrade, Mitchell, and Stafford (2001), Harford (2004)).

[10] See also Dial and Murphy's (1995) discussion of General Dynamic's partial liquidation, where it is argued that executives' incentive plans were sufficiently large to motivate them to sell off assets, thereby sacrificing even their own positions.

[11] See also Bebchuk, Fried, and Walker (2002), who argue that the increase in CEO pay is an indication of

Hermalin argues that both trends can be explained by greater board diligence in monitoring CEOs. Murphy and Zábojník argue that they reflect a shift in the relative importance of general versus firm-specific managerial human capital. Neither of these papers considers the optimal design of the CEO's compensation. (Both models assume that the CEO obtains a fixed wage.) Also, neither paper links the increase in CEO pay to the fundamental changes in the industrial and competitive landscape in the U.S. during the 1980s and 1990s.

As argued above, one specific application of our setting is the firm's decision to shut down so that its assets can be reallocated to other, growing industries. Eisfeldt and Rampini (2004) consider a similar problem, also assuming that managers have private information. Their focus is different from ours, however. In particular, Eisfeldt and Rampini do not consider the optimal design of the CEO's on-the-job compensation scheme, which is the focus of our paper. Like our paper, Dow and Raposo (2003) also consider the link between CEO compensation and strategy choice. In their paper, a CEO has discretion over the choice of a firm's strategy, while different strategies require different levels of CEO effort. In order to extract a higher surplus from the firm's shareholders, CEOs may choose overtly ambitious strategies whose success depends strongly on their own performance.

The rest of this paper is organized as follows. Section 2 presents the model. Section 3 derives the CEO's optimal compensation scheme in an optimal contracting framework. Section 4 links the level of CEO compensation to the likelihood that "change" becomes optimal, thereby tying together various developments occuring during the 1980s and 1990s. It also discusses the policy implications of restricting either the level or form of CEO compensation, requests that have become popular in recent debates. Section 5 concludes. All proofs are in the Appendix.

2 The Model

The model is conceivably simple. There are three dates: $t = 0, 1$, and 2. At $t = 0$, the firm's shareholders hire a CEO to implement the firm's strategy. The choice of CEO is not accidental: he is chosen because his skills, style, and expertise make him the best available candidate to implement this strategy.[12]

CEOs extracting wealth from shareholders.

[12] See Betrand and Schoar (2003), Rotemberg and Saloner (1993, 2000) and related references cited in the Introduction. For instance, the CEO may be particularly qualified because he successfully implemented a similar

As the CEO implements the firm's strategy, he is likely to know before anyone else whether this strategy continues to be the best strategy for the firm going forward. We capture this by assuming that at an interim date $t = 1$ the CEO privately observes the "state of nature", which is informative about the firm's future value if the current strategy is continued. The alternative to "continuation" is "change". In the most likely case, "change" means implementing a new strategy with a new CEO. But as we illustrated in the Introduction, "change" can also mean that the firm is shut down or sold. In either case, the firm's assets will be operated under a different strategy by a different management team.

Let us introduce some notation. The state of nature is denoted by θ. From an ex-ante perspective, the state of nature is uncertain with distribution function $F(\theta)$ and support $\Theta := [\underline{\theta}, \overline{\theta}]$. All distribution functions in our model are assumed to be atomless. The corresponding density function is $f(\theta) > 0$. After observing the state of nature, the CEO updates his beliefs about the firm's future value at $t = 2$ if the current strategy is continued. The firm's future value is denoted by s, while the CEO's updated beliefs are given by the distribution function $G_\theta(s)$ with support $S := [\underline{s}, \overline{s}]$. The corresponding density function $g_\theta(s)$ is assumed to be continuous in both θ and s. We assume that high states of nature are "good news" for the firm's future value under the current strategy in the sense of the Monotone Likelihood Ratio Property (MLRP).[13] That is, we assume that $g_{\theta'}(s)/g_\theta(s)$ is strictly increasing in s for all $\theta' > \theta$ in Θ.

The assumption that the state of nature is uncertain reflects the notion that the likely success of the firm's current strategy depends on the firm's uncertain business environment. If the state of nature is high, the firm's current strategy is likely to remain a good strategy for the firm going forward. On the other hand, if the state of nature is low, a strategy change may be optimal to adapt to the firm's changing business environment.

Realistically, the long-run success of the firm's strategy will also depend on the CEO's effort to implement this strategy. We assume that the above distributional assumptions hold only for the "good" case where the CEO is fully dedicated to implementing the firm's strategy. Being fully dedicated is costly, however: it implies that the CEO must forgo private benefits of $B > 0$. If the CEO is not dedicated this results in a ("bad") state of nature in which implementing "change" is optimal.[14] Whether or not the CEO is fully dedicated is unobservable.

strategy for a similar firm in the past.

[13] MLRP is satisfied by many standard probability distributions (see Milgrom (1981)).

[14] Precisely, and anticipating part of our subsequent analysis, we assume that poor implementation of the firm's

Let $E[s \mid \theta] := \int_S s g_\theta(s) ds$ denote the firm's expected future value under the current strategy conditional on the state of nature, and let $V > 0$ denote the expected payoff under the "change" alternative. For example, if "change" involves pursuing a new strategy with a new CEO, then V is the expected firm value under this new strategy.[15] On the other hand, if "change" means that the firm will be shut down, then V is the firm's liquidation value. Accordingly, it is first-best optimal to continue under the firm's current strategy if $E[s \mid \theta] \geq V$, while "change" is optimal if $E[s \mid \theta] < V$. Ruling out trivial cases where either "continuation" or "change" is optimal for all $\theta \in \Theta$, this implies there exists a unique interior cutoff $\theta_{FB} \in (\underline{\theta}, \overline{\theta})$ such that "continuation" is optimal if and only if $\theta \geq \theta_{FB}$.[16]

The crux with implementing the first best is that only the CEO observes θ. Whether or not the CEO will truthfully reveal θ depends on his incentives, and thus on his compensation scheme in place. Finding the optimal CEO compensation scheme is thus tantamount to finding the optimal truthtelling mechanism. By the revelation principle, we can restrict ourselves to direct mechanisms in which the CEO truthfully announces θ. Given the CEO's announcement, a mechanism stipulates a decision ("continuation" or "change") and a CEO compensation scheme. As the decision is binary, the underlying state space Θ can be partitioned into two subsets Θ_+ and $\Theta_- := \Theta \backslash \Theta_+$. If the CEO announces that the state of nature is $\theta \in \Theta_+$, "continuation" will be implemented and the CEO receives his "on-the-job pay" $w(s, \theta)$ in $t = 2$. Note that, in principle, the CEO's on-the-job pay may depend on both θ and the firm's value at $t = 2$, s. Conversely, if the CEO announces that the state of nature is $\theta \in \Theta_-$, "change" will be implemented. In this case, the CEO loses his job but receives a severance payment $W \geq 0$.[17,18]

strategy results in a sufficiently *low* state of nature.

[15] There is no need to make distributional assumptions about the firm's value under alternative strategies. Intuitively, this is because the firm's future performance under a new strategy is not informative about θ.

[16] As $G_\theta(s)$ satisfies MLRP, it also satisfies First-Order Stochastic Dominance (FOSD), which implies the firm's expected future value under "continuation", $E[s \mid \theta]$, is strictly increasing in the state of nature θ. In conjunction with continuity of $g_\theta(s)$, this implies the existence of a unique cutoff θ_{FB} given by $E[s \mid \theta_{FB}] = V$.

[17] It is not possible to implement different levels of severance pay for different states of nature $\theta \in \Theta_-$. If W were to vary with θ, the CEO would always announce the state of nature that yields him the highest possible severance pay, i.e., he would always announce $\theta \in \arg\max_{\theta' \in \Theta_-} W(\theta')$. Also, there is no point in conditioning W on V as everybody shares common beliefs about V. Consequently, W will optimally be a constant.

[18] See Hartzell, Ofek, and Yermack (2004) and Yermack (2004) for empirical studies of severance pay. Unless the CEO remains affiliated with the firm, accelerating vesting provisions typically allow CEOs to recoup some of

3 The Optimal CEO Compensation Scheme

3.1 The Shareholders' General Problem

When designing the optimal mechanism, the firm's shareholders maximize their expected utility

$$\int_{\Theta_-} [V - W] f(\theta) d\theta + \int_{\Theta_+} E[s - w(s, \theta) \mid \theta] f(\theta) d\theta \tag{1}$$

subject to a set of constraints to be described below. Recall that Θ_- denotes the set of states in which "change" is implemented while Θ_+ denotes the set of states in which "continuation" is implemented. Also, note that the set Θ_- (and therefore Θ_+) is endogenous and part of the optimal solution. To rule out trivial cases where either Θ_+ or Θ_- is empty, we assume that both "continuation" and "change" will be implemented for *some* states of nature $\theta \in \Theta$.[19]

We first consider the CEO's truthtelling constraint(s). For all states of nature $\theta \in \Theta_-$, the CEO will truthfully announce θ if

$$W \geq \max_{\theta' \in \Theta_+} E[w(s, \theta') \mid \theta]. \tag{2}$$

Likewise, for all states of nature $\theta \in \Theta_+$, truthtelling requires that

$$E[w(s, \theta) \mid \theta] \geq \max \left\{ W, \max_{\theta' \in \Theta_+} E[w(s, \theta') \mid \theta] \right\}. \tag{3}$$

That is, the CEO must prefer the scheme $w(s, \theta)$ intended for him when the true state of nature is θ to both his severance pay and any other scheme $w(s, \theta')$ from the menu.

The next constraint ensures that the CEO is fully dedicated to implementing the firm's strategy. Given the truthtelling constraints, the CEO's expected payoff if he works hard to implement the firm's strategy is

$$\int_{\Theta_+} E[w(s, \theta) \mid \theta] f(\theta) d\theta + \int_{\Theta-} W f(\theta) d\theta. \tag{4}$$

If the CEO is not fully dedicated to implementing the firm's strategy, his payoff is $B + W$: while he consumes private benefits of B, poor implementation of the firm's strategy results in "change"

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the value from previously awarded stock or option grants, while all other rights are typically forfeited.

[19] This is optimal, for instance, if i) $E[s \mid \theta]$ is sufficiently greater than V for high θ and sufficiently smaller than V for low θ, and ii) $F(\theta)$ puts sufficient probability mass on both high and low θ.

being implemented and thus in the CEO receiving his severance pay W.[20] Consequently, the CEO will be dedicated to implementing the firm's strategy if and only if his expected payoff (4) equals or exceeds $B + W$. Rearranging this inequality, we obtain

$$\int_{\Theta_+} E[w(s,\theta) - W \mid \theta] f(\theta) d\theta \geq B. \tag{5}$$

Hence, for the CEO to be dedicated to implementing the firm's strategy and forgo his private benefits B, there must be a sufficiently large wedge between his expected on-the-job pay if the firm's strategy is continued and his severance pay.[21]

Let us briefly comment on what (5) implies and what it does not imply. The existence of a wedge between the CEO's expected on-the-job pay under "continuation" and his severance pay creates an *endogenous* bias on the part of the CEO towards continuation. This is what makes the CEO's truthtelling problem tricky. On the other hand, (5) has no immediate implications for the optimal design of the CEO's on-the-job pay scheme $w(s,\theta)$. It merely requires that on average, i.e., across "continuation" states $\theta \in \Theta_+$, the CEO's expected on-the-job pay be greater than his severance pay, but it says nothing about whether or how his on-the-job pay $w(s,\theta)$ ought to vary with the firm's future value s, or how his expected on-the-job pay $E[w(s,\theta) \mid \theta]$ ought to vary with the state of nature θ. This is important, as it implies that our subsequent results concerning the optimal design of $w(s,\theta)$ are solely driven by concerns of how to get the CEO to truthfully reveal the state of nature, not by concerns of how to get him to work towards implementing the firm's strategy.[22]

[20] Precisely, we assumed previously that poor implementation of the firm's strategy results in a state of nature in which implementing "change" is optimal. If the truthtelling constraints hold, "change" will indeed be implemented in this state, which implies the CEO receives his severance pay W. Note that—for the same reason why it is not possible to let W vary across states of nature $\theta \in \Theta_-$ (see footnote 17)—it is not possible to explicitly penalize the CEO for not being fully dedicated to implementing the firm's strategy. For instance, suppose poor implementation of the firm's strategy resulted in some particular state $\theta' \in \Theta_-$. If the CEO's payoff in this state was less than W, he would rather announce a different state $\theta \neq \theta'$ in Θ_- that also triggers "change" but where he receives his severance pay W.

[21] Fee and Hadlock (2004) and Hartzell, Ofek, and Yermack (2004) document that CEOs who lose their jobs forgo substantial pecuniary benefits.

[22] Another way of showing this is as follows: it is easy to show that if the state of nature θ is publicly observable, there exists an infinite number of optimal mechanisms implementing the first best, including some where $w(s,\theta)$ takes the form of a "flat" wage. An example is the mechanism where "continuation" is implemented if and only if $\theta \geq \theta_{FB}$, while the CEO receives a fixed wage $w = B/[1 - F(\theta_{FB})]$ if and only if "continuation" is implemented.

We finally impose two additional constraints on the CEO's compensation scheme. The first is a minimum consumption requirement stating that the CEO's pay must equal or exceed some exogenously specified minimum level $C \geq 0$. While we believe that a minimum consumption requirement is realistic, none of our qualitative results is driven by this requirement, which is why we allow C to be zero. The second constraint is a monotonicity constraint, which is a standard constraint in models of this sort. Precisely, we assume that both $w(s,\theta)$ and $s - w(s,\theta)$ must be nondecreasing in s for all θ.[23]

We now proceed as follows. To derive the intuition for our results in the simplest possible way, we first consider a restricted problem in which the firm's shareholders are limited to offering a single on-the-job pay scheme $w(s)$ (Section 3.2). That is, we assume that $w(s,\theta) = w(s)$ for all $\theta \in \Theta_+$. Naturally, this simplifies our analysis. Subsequently, we show that offering a single on-the-job pay scheme is indeed uniquely optimal (Section 3.3). Precisely, we show that the solution to the shareholders' restricted problem also constitues the unique solution to their general problem in which the CEO's on-the-job pay $w(s,\theta)$ may depend on θ.

3.2 The Shareholders' Restricted Problem

The shareholders' restricted problem assumes that $w(s,\theta) = w(s)$ for all $\theta \in \Theta_+$. We proceed in several steps. We first argue that the CEO's on-the-job pay scheme cannot be a "flat" wage $w(s) = w$ for all $s \in S$. The intuition is simple. If $w(s) = w$, the only way to satisfy the CEO's truthtelling constraints (2)-(3) is by setting $w = W$. (In this case, the CEO is just indifferent between "continuation" and "change".) Otherwise, the CEO would either always (i.e., for all $\theta \in \Theta$) favor "continuation" (if $w > W$) or "change" (if $w < W$), violating the requirement that both Θ_+ and Θ_- be non-empty. But if $w = W$, the CEO has no incentives to work hard towards implementing the firm's strategy, which requires a sufficiently large wedge between his expected on-the job pay and his severance pay.

Lemma 1. *It is not feasible to set $w(s) = w$ for all $s \in S$.*

(The optimal severance pay in this case is zero.)

[23] The usual rationale for this constraint is that if either w or $s - w$ were decreasing over some range, the CEO or the firm's shareholders, respectively, could make an arbitrage gain by borrowing one dollar and adding this dollar to the firm's value at $t = 2$. (Alternatively, one could appeal to the opposite logic that otherwise either the CEO or the firm's shareholders would have an incentive to destroy firm value.)

Together with the requirement that $w(s)$ be nondecreasing, Lemma 1 implies that $w(s)$ must be strictly increasing for some $s \in S$ on a set of positive measure. As $G_\theta(s)$ satisfies FOSD, it therefore follows that $E[w(s) \mid \theta]$ must be strictly increasing in θ. In conjunction with the truthtelling constraints (2)-(3), this yields the following result.[24]

Lemma 2. *There exists a critical cutoff* $\theta^* \in (\underline{\theta}, \overline{\theta})$ *such that* $\Theta_- = [\underline{\theta}, \theta^*)$ *and* $\Theta_+ = [\theta^*, \overline{\theta}]$, *where* θ^* *is given by*

$$E[w(s) \mid \theta^*] = W. \tag{6}$$

Lemma 2 implies that under any *feasible*—and hence also under the optimal—mechanism, there exists a critical cutoff θ^* such that "continuation" will be implemented if $\theta \geq \theta^*$ and "change" will be implemented if $\theta < \theta^*$.[25] This clear-cut division of the state space into two intervals further simplifies the shareholders' problem. Accordingly, the firm's shareholders choose $w(s)$ and W to maximize their expected utility

$$F(\theta^*)(V - W) + \int_{\theta^*}^{\overline{\theta}} E[s - w(s) \mid \theta] f(\theta) d\theta \tag{7}$$

subject to the requirement that the CEO is sufficiently dedicated towards implementing the firm's strategy,

$$\int_{\theta^*}^{\overline{\theta}} E[w(s) - W \mid \theta] f(\theta) d\theta \geq B, \tag{8}$$

and the requirement that θ^* satisfies (6), which replaces the truthtelling constraints (2)-(3).

By standard arguments, (8) must bind at the optimal solution. Inserting the binding constraint into (7), the shareholders' objective function becomes

$$[1 - F(\theta^*)]\, V + \int_{\theta^*}^{\overline{\theta}} E[s \mid \theta] g_\theta(s) ds - B - W, \tag{9}$$

while the CEO's expected utility *net* of his compensation for forgone private benefits equals W.[26] In standard terminology, the CEO extracts a *rent* of W on top of being compensated for

[24] To guarantee the existence of a cutoff value θ^* solving (6), we also need that $E[w(s) \mid \theta]$ is continuous in θ. This follows immediately from our continuity assumption regarding $g_\theta(s)$.

[25] We have included θ^* in Θ_+. As $\theta = \theta^*$ is a zero-probability event, this is without loss of generality.

[26] Rearranging (5) (with equality), we obtain

$$\int_{\theta^*}^{\overline{\theta}} E[w(s) \mid \theta] f(\theta) d\theta + F(\theta^*) W - B = W.$$

The LHS depicts the CEO's expected compensation over and above his compensation for forgoing his private benefits B.

forgoing private benefits of B.

To see why the CEO's rent increases one-for-one with his severance pay, recall that there must be a positive wedge between his expected on-the-job pay and his severance pay. Consequently, when granting the CEO severance pay the firm's shareholders must contemporaneously also increase his on-the-job pay. Formally, rearranging (8) yields

$$\int_{\theta^*}^{\overline{\theta}} E[w(s) \mid \theta] \frac{f(\theta)}{1 - F(\theta^*)} d\theta = W + \frac{B}{1 - F(\theta^*)}. \tag{10}$$

The left-hand side represents the CEO's expected on-the-job pay. (Note that $f(\theta)/[1 - F(\theta^*)]$ is the density of θ conditional on $\theta \geq \theta^*$.) By (10), the CEO's expected on-the-job pay must increase one-for-one with his severance pay W. Consequently, if the firm's shareholders want to raise the CEO's severance pay by \$1 million, they must also raise his expected on-the-job pay by \$1 million. Regardless of whether the CEO continues to run the firm or whether he is dismissed, he is thus better off by \$1 million.[27]

Lemma 3. *The firm's shareholders' expected utility is given by* (9)*, while the CEO extracts a rent that increases one-for-one with his severance pay.*

The fact that severance pay constitutes a source of rent for the CEO strikes us as a realistic implication of our model. It derives from the fact that the firm's shareholders cannot disentagle the possible causes of a low state of nature. The state of nature may be low because—despite the CEO's genuine efforts to implement the firm's strategy—changes in the firm's business environment warrant a change in the firm's strategy. On the other hand, the state of nature may be low simply because the CEO was not fully dedicated to implementing the firm's strategy. In the first case, severance pay constitutes a reward for the CEO's "honesty" to reveal information allowing the firm to adapt to its changing environment. In the second case, severance pay constitutes a reward for the CEO's failure to perform on his job.

Equally plausible, we think, is the implication that an increase in the CEO's severance pay must be matched by a contemporaneous increase in his on-the-job pay: any undue increase in his severance pay makes the CEO focus too much on his exit options and mutes his incentives to forgo short-run private benefits in the interest of the firm's long-run performance.

[27] Yermack (2004) finds that the size of the CEO's separation pay is indeed strongly positively correlated with his expected on-the-job pay. Likewise, Lefanowicz, Robinson, and Smith (2000) find that managers whose contracts stipulate generous golden parachutes tend to be more highly compensated on their jobs.

According to Lemma 3, granting the CEO severance pay is costly as it leaves him rents. However, granting the CEO severance pay is *necessary* to induce truthtelling. Observe that the CEO's expected on-the-job pay under "continuation" will always be positive—even if $W = 0$—simply because the CEO must be compensated for his forgone private benefits of B.[28] Hence, when the CEO is asked to reveal the state of nature, the prospect of receiving this promised compensation inherently biases him towards "continuation". Without any offsetting severance pay, the CEO would thus always choose "continuation" over "change"—even in the lowest states of nature.

The firm's shareholders thus face a tradeoff between implementing a "more efficient" decision rule—i.e., a higher cutoff θ^* that is closer to the first-best cutoff θ_{FB}—and limiting the CEO's severance pay and thus his (informational) rents. Consequently, the CEO's *optimal* compensation scheme must have the feature that it implements a given decision rule—i.e., a given cutoff θ^*—with the smallest possible amount of severance pay. We have the following result.

Proposition 1. *The CEO's unique optimal compensation scheme consists of severance pay, options, and a base wage.*

Proof. See Appendix.

The reason for why the CEO's severance pay must be positive has already been explained. The role of the base wage is to satisfy the CEO's binding minimum consumption requirement, which implies that the base wage will be exactly equal to $C \geq 0$. Let us now illustrate why giving the CEO options allows the firm's shareholders to implement a given decision rule θ^* at minimum cost—i.e., with the smallest possible rent for the CEO.

An option shifts as much as possible of the CEO's on-the-job pay into states where the firm's value s is high while minimizing his on-the-job pay in those states where s is low. As low values of s are relatively more likely after low states of nature (due to our assumption that $G_\theta(s)$ satisfies MLRP), an option therefore *minimizes* the CEO's *expected* on-the-job pay $E[w(s) \mid \theta]$ in low states of nature. This makes "continuation" as unattractive as possible for the CEO in low states, which implies that only a relatively small amount of severance pay (precisely: less severance pay than under any non-option pay scheme) is needed to induce the CEO to choose "change" in precisely those states where "change" is optimal.

[28] This can be formally seen by setting $W = 0$ in (10).

The flip side of this is that, by shifting the bulk of the CEO's on-the-job pay into states where the firm's value s is high, an option provides the CEO with a relatively high expected on-the-job pay in high states of nature. This is inconsequential, however, as in high states of nature the CEO should choose "continuation" anyway.

The only choice variable left is now the CEO's severance pay. Given some value of W, both the CEO's on-the-job pay and the cutoff θ^* are jointly and fully determined by (6) and (10). It is worthwhile to bring out clearly the tradeoff governing the optimal choice of W. We have argued above that setting $W = 0$ will prevent the CEO from choosing "change" in *any* state of nature $\theta \in \Theta$. But this does not necessarily mean that setting $W > 0$ can implement a cutoff $\theta^* > \underline{\theta}$—i.e., that it can induce the CEO to choose "change" in low states of nature. Indeed, this is not obvious given that an increase in W must be matched by an increase in the CEO's expected on-the-job pay to preserve his incentives. While not obvious in general, it is, however, true under the *optimal* CEO on-the-job pay scheme given in Proposition 1. That is, it is true if $w(s)$ is an option.

The intuition is as follows. If $w(s)$ is an option, the required increase in the CEO's on-the-job pay (to match the initial increase in W) occurs primarily at high values of s, implying that the CEO's expected on-the-job pay $E[w(s) \mid \theta]$ increases primarily in high states of nature θ. Conversely, in low states of nature the CEO's expected on-the-job pay increases only by very little. Accordingly, while "on average" the CEO's expected on-the-job pay must, and will, increase indeed one-for-one with his severance pay, under the *optimal* (i.e., option) on-the-job pay scheme it increases by (much) more than W in high states of nature and by (much) less than W in low states of nature. As a consequence, the difference $E[w(s) \mid \theta] - W$ *decreases* in low states of nature, which implies that—following an initial increase in W—choosing "change" becomes indeed more attractive for the CEO in low states of nature.

Proposition 2. *Under the CEO's optimal compensation scheme in Proposition 1, the firm's shareholders can increase the cutoff θ^*—thereby increasing the likelihood that "change" will be implemented—by increasing the CEO's severance pay. This is despite the fact that an increase in the CEO's severance pay must be matched by a contemporaneous increase in his on-the-job option grant.*

Proof. See Appendix.

To summarize, if $w(s)$ is an option the firm's shareholders can push up the cutoff θ^* by increasing the CEO's severance pay W, thereby implementing a more efficient decision rule. On the other hand, increasing W leaves the CEO more rents, which reduces shareholders' expected utility (see (9)). The optimal value of W trading off these costs and benefits depends on the parameter choices and distributional assumptions of the model. In Section 4.1, we conduct a comparative statics analysis along these lines by varying the ex-ante likelihood that implementing "change" is optimal.

3.3 The General Problem Revisited

It remains to show that a richer menu $w(s, \theta)$ in which the CEO's on-the-job pay depends on the state of nature θ is *strictly* suboptimal in our model. Consequently, the unique optimal solution to the shareholders' general problem is to give the CEO the unique optimal "single" on-the-job pay scheme $w(s)$ from Proposition 1.

The intuition is as follows. The CEO's optimal on-the-job pay scheme from Proposition 1 shifts more of his pay into states where the firm's value s is high—thus shifting more of his expected on-the-job pay $E[w \mid \theta]$ into high states of nature—than any other feasible on-the-job pay scheme. By construction, any richer menu of on-the-job pay schemes $w(\theta, s)$—regardless of whether this menu includes the optimal scheme from Proposition 1—must therefore shift some of the CEO's expected on-the-job pay $E[w \mid \theta]$ "back" into low states of nature. Hence, a richer menu consisting of on-the-job pay schemes other than the single optimal scheme from Proposition 1 will *not* minimize $E[w \mid \theta]$ in low states of nature. But this property of minimizing the CEO's expected on-the-job pay in low states of nature is precisely what drives optimality in our model as it allows the firm's shareholders to implement a given cutoff θ^* with the minimum necessary CEO rent. Accordingly, any richer menu $w(\theta, s)$ will therefore either require more CEO rents to implement the same cutoff θ^* or implement a lower cutoff with the same amount of CEO rents.

Proposition 3. *The unique optimal menu of CEO on-the-job pay schemes in the shareholders' general problem consists of a single on-the-job pay scheme $w(s, \theta) = w(s)$, namely, the unique optimal on-the-job pay scheme from Proposition 1.*

Proof. See Appendix.

4 Discussion

4.1 Varying the Likelihood of "Change" Being Optimal

Beginning with the 1980s, the "pace of economic change has accelerated" (Holmström and Kaplan (2001)). The deregulation of major U.S. industries as well as massive technological innovations—key forces behind Jensen's (1993) "Modern Industrial Revolution"—put substantial pressure on U.S. firms to reconsider their existing business strategies and industry focus.[29] Many view these forces as main causes behind the takeover, restructuring, and merger waves of the 1980s and 1990s (e.g., Holmström and Kaplan (2001), Andrade, Mitchell, and Stafford (2001), Harford (2004)).

Arguably, industry shocks, deregulation, and technological innovations made it more likely that a change in firms' existing strategies and industry focus became optimal. In our model, this corrsponds to an increase in the likelihood that "change" is optimal, $F(\theta_{FB})$, and therefore to an increase in the first-best cutoff θ_{FB}. The following result summarizes the implications.[30]

Proposition 4. *As the likelihood that "change" is optimal increases, i) the size of the CEO's severance pay and thus his rent increases, ii) the value of the CEO's on-the-job option grant increases, and iii) the likelihood that "change" will be implemented increases.*

Proof. See Appendix.

The intuition for Proposition 4 is straightforward. The optimal response by the firm's shareholders to an increase in the likelihood that "change" is optimal is to increase the likelihood that "change" will be indeed implemented. That is, the optimal response to an increase in θ_{FB} is to increase θ^*. As our previous results suggest, increasing θ^* is costly, however: to increase θ^*, the firm's shareholders must increase both the CEO's severance pay W and the value of his on-the-job option grant (see Proposition 2). Hence, an increase in the likelihood that "change" is optimal implies that the CEO will be able to appropriate more rents.

[29] The following industries experienced massive deregulations between 1978 and 1996: airlines, broadcasting, entertainment, natural gas, trucking, banks and thrifts, utilities, and telecommunications (Andrade, Mitchell, and Stafford (2001)). Jensen (1993) cites several examples of technological innovations that fundamentally altered the industrial landscape in the 1980s.

[30] We assume that the optimal choice of W is unique, implying that $w(s)$ and θ^* are also uniquely pinned down. If we drop this assumption, all our results hold qualitatively for the respective sets of optimal values.

Proposition 4 ties together three developments taking place during the 1980s and 1990s. The first development is the one mentioned above, namely, the deregulation of major U.S. industries and massive technological changes, which put substantial pressure on U.S. firms to change their existing strategies and industry focus. As we argued above, this corresponds to an increase in θ_{FB} in our model.

The second development is the increase in forced CEO turnover during the past decades (Huson, Parrino, and Starks (2001)). By Proposition 4, an increase in θ_{FB} causes an increase in θ^*. In words: an increase in the likelihood that "change" is optimal causes an increase in the likelihood that "change" will be implemented. In the Introduction, we cited evidence documenting that strategy changes tend to go hand in hand with a replacement of the firm's existing CEO.

The third and final development concerns the dramatic increase in the value of CEO option grants. Between 1980 and 1994, the mean value of CEO option grants increased almost sevenfold from roughly \$155,000 to over \$1,210,000—a trend that continued throughout the second half of the 1990s (Hall and Liebman (1998)). By Proposition 4, to effect an increase in θ^* the firm's shareholders must increase both the CEO's severance pay and the value of his option grant.

4.2 Caps and Restrictions on the CEO's Compensation Package

Generous CEO compensation packages have recently come under increased scrutiny. In response to public pressure, institutional investors in many countries have turned against large CEO compensation packages, including golden parachutes.[31]

The previous subsection illustrates that large golden parachutes and option grants may be warranted in times when flexibility is key and extant strategies are likely to become quickly obsolete. In fact, the greater the likelihood that "change" is optimal, the larger ought to be the

[31] A recent example is the lawsuit by Walt Disney shareholders against the company for awarding its former CEO Michael Ovitz severance pay worth \$140 million after being only 14 months with Disney. The dismissal of Dick Grasso as chairman of the NYSE for excessive pay (despite stellar performance) is another example. Listing rules in the UK were amended in 2002 to require the publication of a directors' remuneration report, which must be annually approved by shareholders. While this approval is only advisory, the vote helped shareholder activists to gain publicity in their fight against "fat-cat pay", e.g., in the case of the advertising company WPP, the retailing chain Sainsbury's, and—perhaps most prominently—in the rejection of the £20 million severance package for the head of GlaxoSmithKline, Britain's biggest drug manufacturer.

CEO's option grant and severance pay. Imposing a cap on the value of the CEO's compensation package may thus hurt everybody. It may hurt the CEO, whose rents are being reduced. But it may also hurt the firm's shareholders, who—despite paying the CEO less—are worse off as new business opportunities are less likely to be pursued.

The following statement follows from our previous results.

Proposition 5. *Imposing a cap on the value of the CEO's compensation package makes both the CEO and the firm's shareholders worse off. In particular, it makes it more likely that the firm will stick to its existing strategy even when there are better alternative strategies.*

Another possible restriction concerns not so much the size, but the *form* of the CEO's compensation package. Both policymakers and academics have cautioned against the use of options to compensate CEOs. Paul Volcker, the current chairman of the International Accounting Standards Committee and former chairman of the Board of the Federal Reserve System, explicitly advocates to discourage public companies from using options for compensation (The Conference Board (2002)). Similarly, Becht, Bolton, and Roell (2002) argue that "it is widely recognized that these options are at best an inefficient financial incentive and at worst create new incentive or conflict-of-interest problems of their own." At least in our model, such a conclusion is not warranted. On the contrary, excluding options from the CEO's compensation package implies that shareholders must leave the CEO *more* rents to implement the same level of flexibility and turnover (i.e., to implement the same cutoff θ^*). Or, holding the CEO's rents fixed, it implies that the firm loses flexibility and the CEO becomes *more* entrenched in the sense that it becomes less likely that he will reveal information that may lead to his dismissal.

To summarize, our analysis suggests that imposing restrictions on the CEO's compensation may easily backfire: they may increase managerial entrenchment, make both the CEO and shareholders worse off, and reduce the firm's flexibility to adapt to changes in its environment.

5 Conclusion

This paper examines how CEOs should be incentivized to reduce their resistance against fundamental strategy changes that may involve their own dismissal. We show that the uniquely optimal compensation package consists of options, a base wage, and severance pay. Severance pay naturally reduces the CEO's resistance to changes that may lead to his dismissal, while

option compensation reduces his incentives to cling to his job in precisely those states of nature where his dismissal is desirable.

In our model, the primary reason for awarding option grants is to induce better decision-making. As it becomes more likely that a change in the firm's strategy is optimal, shareholders are willing to scale up the CEO's compensation by increasing both his severance pay and his option grant. This can leave the CEO with substantial rents. As we have argued in the paper, understanding this link might help understand some of the observed trends in CEO pay and turnover during the past decades.

In summary, the paper has two main messages. First, putting CEOs on a steep incentive scheme can make it easier (i.e., less costly) to break their resistance against necessary changes that may involve their own dismissal. Second, promoting flexibility and voluntary exit may require leaving CEOs with substantial rents. On a broader scale, our results suggest that formal or informal restrictions on either the level or composition of CEO pay—especially with regard to option grants—may stifle economic change. Countries in which such restrictions exist may be less able to exploit new opportunities and experience less industrial change.

6 Appendix

Proof of Proposition 1. The fact that $W > 0$ follows from the argument in the main text. It remains to prove that it is uniquely optimal to compensate the CEO with an option and a fixed pay just equal to C.

We argue to a contradiction. Suppose thus that shareholders want to implement some decision rule θ^* with an on-the-job pay scheme $\widetilde{w}(s)$ satisfying $\widetilde{w}(s) \neq C + \max\{0, s - \widehat{s}\}$. We denote the corresponding severance pay by $\widetilde{W}$. We show that there exists some $w(s)$ such that (i) the constraint (8) remains binding and that (ii) θ^* is still implemented—though now with a lower severance pay W. That is, with a slight abuse of notation the new compensation scheme satisfies $\theta^*(w, W) = \theta^*(\widetilde{w}, \widetilde{W}) = \theta^*$ and $W < \widetilde{W}$, which by inspection of the shareholders' objective function (7) contradicts optimality of the original contract $\widetilde{w}(s)$.

We proceed in two steps. We first choose $\overline{W} = \widetilde{W}$ and $\overline{w}(s) = C + \max\{0, s - \widehat{s}'\}$ such that $\theta^*(\overline{w}, \overline{W}) = \theta^*$, i.e., with $d(s) := \widetilde{w}(s) - \overline{w}(s)$ we have that

$$\int_S d(s) g_{\theta^*}(s) ds = 0. \tag{11}$$

As $\widetilde{w}(s)$ and $s-\widetilde{w}(s)$ are both nondecreasing, there exists a value $\widetilde{s}\in(\underline{s},\overline{s})$ such that $d(s)\geq 0$ for all $s<\widetilde{s}$ and $d(s)\leq 0$ for all $s>\widetilde{s}$, where both inequalities are strict over sets of positive measure. Take now any $\widehat{\theta}>\theta^*$. By MLRP of $G_\theta(s)$ and (11), it then holds that

$$\begin{aligned}\int_S d(s)g_{\widehat{\theta}}(s)ds &= \int_{\underline{s}}^{\widetilde{s}} d(s)g_{\theta^*}(s)\frac{g_{\widehat{\theta}}(s)}{g_{\theta^*}(s)}ds+\int_{\widetilde{s}}^{\overline{s}} d(s)g_{\theta^*}(s)\frac{g_{\widehat{\theta}}(s)}{g_{\theta^*}(s)}ds \\ &< \frac{g_{\widehat{\theta}}(\widetilde{s})}{g_{\theta^*}(\widetilde{s})}\int_S d(s)g_{\theta^*}(s)ds=0,\end{aligned} \tag{12}$$

which implies that the constraint (8) is slack if we choose $\overline{w}(x)$ and $\overline{W}$. In a second step, we can now construct the asserted compensation scheme with $w(s)=C+\max\{0,s-\widehat{s}\}$ and $W<\overline{W}=\widetilde{W}$. For this we (continually) increase $\widehat{s}'$ in $\overline{w}(s)=C+\max\{0,s-\widehat{s}'\}$ and decrease $\overline{W}$, while still satisfying $\theta^*(\overline{w},\overline{W})=\theta^*$, until (8) becomes again binding. That this is possible follows as, while we keep $E[\overline{w}(s)\mid\theta^*]=\overline{W}$ satisfied, the difference $E[\overline{w}(s)\mid\theta]-\overline{W}$ continuously decreases for all $\theta>\theta^*$. To see this, note that after partial integration we have $dE[\overline{w}(s)\mid\theta]/d\widehat{s}'=-[1-G_\theta(\widehat{s}')]$, which by FOSD of $G_\theta(s)$ (implied by MLRP) is strictly decreasing in θ. This completes the proof of Proposition 1. **Q.E.D.**

Proof of Proposition 2. We know from Proposition 1 that in order to implement a given decision rule θ^* it is uniquely optimal to do so with $w(s)=C+\max\{0,s-\widehat{s}\}$. Substituting $w(s)$ and using partial differentiation, (6) transforms to

$$C+(\overline{s}-\widehat{s})-\int_{\widehat{s}}^{\overline{s}}G_{\theta^*}(s)ds=W \tag{13}$$

and (10) transforms to

$$\int_{\theta^*}^{\overline{\theta}}\left[C+(\overline{s}-\widehat{s})-\int_{\widehat{s}}^{\overline{s}}G\theta(s)ds-W\right]f(\theta)d\theta=B. \tag{14}$$

From (13) and (14) we then have by total differentiation (and the assumed differentiability of $G_\theta(s)$) that

$$\frac{d\theta^*}{dW}=\frac{\int_{\theta^*}^{\overline{\theta}}\left[G_\theta(\widehat{s})-G_{\theta^*}(\widehat{s})\right]f(\theta)d\theta}{\left[\int_{\theta^*}^{\overline{\theta}}\left[1-G_\theta(\widehat{s})\right]f(\theta)d\theta\right]\left[\int_{\widehat{s}}^{\overline{s}}\frac{G_\theta(s)}{d\theta}_{\theta=\theta^*}ds\right]}>0, \tag{15}$$

where we used that $G_\theta(s)$ satisfies FOSD (implied by MLRP). That is, in order to implement a higher cutoff θ^* it is necessary to increase W. By (13) this also requires to increase the value of the on-the-job pay by decreasing $\widehat{s}$. **Q.E.D.**

Proof of Proposition 3. We can again restrict consideration to on-the-job pay schemes $w(s,\theta)$ that are strictly increasing at some s. Given that all $w(s,\theta)$ are thus strictly increasing somewhere and that $G_\theta(s)$ satisfies MLRP, the truthtelling constraint implies again that $\Theta_- = [\underline{\theta}, \theta^*)$ and $\Theta_+ = [\theta^*, \overline{\theta}]$ with $E[w(s,\theta^*) \mid \theta^*] = W$. The following auxiliary result follows now immediately from the proof of Proposition 1.

Claim 1. *Take two different feasible pay schemes $\widetilde{w}(s)$ and $\widehat{w}(s) = C + \max\{0, s - \widehat{s}\}$. Then if $E[\widehat{w}(s) \mid \theta'] \geq E[\widetilde{w}(s) \mid \theta']$ holds for some $\theta' < \overline{\theta}$, it holds strictly for all $\theta > \theta'$.*

To complete the proof, we distinguish between two cases. If $w(s,\theta^*) = C + \max\{0, s - \widehat{s}\}$, Claim 1 and truthtelling imply that $w(s,\theta) = C + \max\{0, s - \widehat{s}\}$ holds for all θ, i.e., the menu is degenerate. Suppose next that $w(s,\theta^*) \neq C + \max\{0, s - \widehat{s}\}$. As in the proof of Proposition 1, we can then construct a single offer $\widehat{w}(s) = C + \max\{0, s - \widehat{s}\}$ that leads to the same decision rule θ^* and relaxes the constraint (8). This follows as for all $\theta > \theta^*$ we have that $E[\widehat{w}(s) \mid \theta] > E[w(s,\theta) \mid \theta]$, which in turn follows immediately from Claim 1 and the truthtelling requirement for the original menu. As in Proposition 1, we can then adjust the new (single) on-the-job pay scheme $\widehat{w}(s)$ so as to implement θ^* with a lower severance pay. **Q.E.D.**

Proof of Proposition 4. We denote the cutoff that shareholders want to implement by θ^{**}. Given $\theta^{**} \in (\underline{\theta}, \overline{\theta})$ we have from (7) the first-order condition

$$E[s \mid \theta^{**}] - V = \frac{F(\theta^{**})}{-(d\theta^{**}/dW)}, \tag{16}$$

where we can substitute $d\theta^{**}/dW$ from (15). Implicit differentiation of (16) gives $d\theta^{**}/dV > 0$. The implications for W and for the value of the option grant follow then directly from Proposition 2. **Q.E.D.**

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