

# Serial CEOs' Incentives and the Shape of Managerial Contracts\*

Preliminary Version

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## **Abstract**

This paper analyzes the optimal contracting consequences of a recent phenomenon in the managerial labor market, CEO job hopping. I show that when the managerial labor market is thin and growth opportunities are relatively low, the optimal contract rewards the CEO for past performance through a bonus. Nevertheless, the CEO takes a long horizon in selecting corporate strategies. If growth opportunities improve, but opportunities for job hopping remain limited, the optimal contract must include restricted-equity-like claims, but overall compensation does not increase. When the managerial labor market provides more opportunities for job hopping, large differences in the structure of executive contracts emerge. It is still optimal to offer a bonus contract, even though the manager selects inefficient short-term strategies, if growth opportunities are expected to be weak. If, instead, growth opportunities are perceived to be relatively strong, an increase in long-term equity compensation drives a surge in the overall CEO compensation. I show that, under these conditions, the optimal contract may include non-restricted equity even though the main problem is managerial retention in the intermediate period. Finally, I argue that the mechanisms highlighted in the model can explain both the surge in U.S. CEO compensation and the large differences in the level and structure of managerial compensation across countries and across firms within a country.

**JEL Codes:** G32; J33; L14

**Keywords:** Executive compensation, managerial labor market, short-termism

# I Introduction

Chief executive officers' (CEOs) compensation is at the center of the academic and policy debate, which so far has focused on and often criticized the high level of U.S. CEOs' compensation (Bebchuk and Fried, 2004). Not only CEO compensation has soared in the last two decades, but also the structure of executive pay has dramatically changed, as stock options and long-term incentive payments have become a larger share of compensation over time (Murphy, 1999; Frydman and Saks, 2005).

These changes have coincided with profound modifications of the CEO labor market. Companies have increasingly started to look outside for replacing their CEOs and, in particular, hire experienced chief executives of other companies. As a consequence, executives do not consider to be arrived when they obtain the top job in a company, but are aware that the first appointment to lead a company can be followed by a series of new and potentially more prestigious ones. Career paths like the one of Richard C. Notebaert are a good example of the *serial CEOs* phenomenon<sup>1</sup>: Notebaert led the regional phone company Ameritech Corporation before its 1999 acquisition by SBC Communication Inc.; after he held the top job at Tellabs Inc., a telecom -equipment maker; finally in 2002, he became CEO of Qwest Communications International Inc.

While these career paths have become increasingly common, the effects of more attractive job opportunities on CEO incentives has been somewhat neglected. However, it is well-know that career concerns may lead CEOs to undertake inefficient strategies (Holmström, 1999). The structure of CEO compensation may thus represent an attempt to reduce inefficiencies, caused by more attractive job opportunities.

The objective of this paper is to analyze optimal contracts for *serial CEOs*. I recognize that a CEO's strategy choice may be affected by considerations affecting the CEO's future career. For instance, the CEO may want to acquire marketable skills and quickly become well-known for being good at carrying out a particular business strategy (e.g., a CEO is hired because of his reputation as a cost cutter). The CEO thus faces a trade off between spending effort in developing such a reputation at the cost of pursuing an inefficient short-term strategy at the firm where she is currently employed and choosing the efficient long-term strategy, which makes less likely to acquire a reputation for being good at pursuing a specific business strategy.

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<sup>1</sup>An article on the Wall Street Journal (2005) provides a vivid characterization of this phenomenon.

I show that the CEO labor market and the expectations on growth opportunities have large effects on the structure of the optimal contract. When the CEO labor market is thin, the probability of receiving an outside offer is low. The CEO may thus have an incentive to undertake the efficient long-term strategy even when she is offered a short-term contract that compensates her for past performance. Such a contract resembles the traditional bonus contracts.

A short-term contract maximizes shareholders' returns if growth opportunities (i.e., the probability that a long-term efficient strategy is available) are expected to be low. In this case, in order to minimize the costs of managerial turnover, firm shareholders have an incentive to share the surplus from the efficient strategy with the manager even if she does not receive outside offers.

If growth opportunities increase, it becomes necessary for the firm to offer long-term compensation. The optimal contract makes compensation conditional to long-term performance and it is similar to offering restricted stocks or stock options. The change in the shape of the optimal contract is due to the fact that as growth opportunities increase, firm shareholders' incentives to share the surplus from the long-term strategy with the CEO decrease. If offered a short-term contract, the CEO would expect this and would never choose the optimal long-term strategy. The long-term contract provides to the firm a way to commit to share the surplus from the long-term strategy with the manager. Interestingly, if the CEO labor market is thin, the structure but not the level of CEO compensation change.

When the managerial labor market provides more opportunities for job hopping, large differences in the structure of executive contracts emerge. In this case, the manager's expected payoff from the inefficient short-term strategy increases dramatically because with high probability the CEO receives attractive outside offers if she develops a reputation for being good at pursuing a particular business strategy. The incentive compatibility constraint becomes binding. The CEO has an incentive to choose the efficient long-term strategy only if she is offered a sufficiently high level of long term compensation. Firm shareholders find still optimal to offer a bonus contract, even though the manager selects an inefficient short-term strategy, if growth opportunities are expected to be weak. Only if the increment in firm value due to the choice of the efficient strategy is sufficiently high, firm shareholders find it optimal to dramatically increase the long-term compensation. Hence, if growth opportunities are perceived to be strong and the managerial labor market is deep, not only the structure of CEO compensation changes, but also the level of

compensation optimally soars.

Interestingly, awarding non-restricted rights to second period output, which resemble non-restricted stocks and stock options may be optimal. This is at first counter-intuitive because the main problem faced by the firm is to retain the CEO in the intermediate period. Common sense would suggest that non-restricted rights to the second period output may merely increase the CEO's payoff from quitting and can never be optimal. The model shows that this is not necessarily true. The intuition is the following. The CEO has private information on whether a long-term strategy is available and she has undertaken it. The market may interpret the CEO's sale of stocks as bad news on the availability of growth opportunities and incorporate this information in prices. If the manager does not find it optimal to sell non-restricted rights to second period output at a discount when she has positive private information, non-restricted stocks do not increase incentives to choose the short-term strategy in order to receive outside offers. They may be preferable to award only restricted rights to second period output because they increase the bargaining power of the manager when she has chosen a long-term strategy and receive an outside offer. Differently, from restricted rights to second period output, non-restricted rights allow for higher compensation when the manager has undertaken the long-term strategy and receive an outside offer (i.e., in the state of the world in which there is a stronger need for high compensation). Hence, it may be optimal to confer non-restricted rights to second period output (together with restricted rights) if this allows to reduce the manager expected payoff from the short-term strategy.

Besides explaining the increase and the change in the structure of executive compensation, the model generates a number of novel empirical implications for the structure of compensation of firms and CEOs with different characteristics. The most important implications regard the often neglected and still unexplained cross-country differences in CEO compensation. This paper suggests that liquid managerial labor markets may provoke problems of short-termism similar to the ones caused by liquid equity markets and pointed out, for instance, by Porter (1992). In this context, the changes in the structure and the level of managerial compensation, observed during the nineties, may be seen as an optimal response to short-termism problems. This is consistent with the fact managerial compensation in Japan and Continental Europe, which are generally believed to be less affected by short-termism problems, did not change to the same large extent. The model can also explain (1) why firms in economies affected by short-termism may appear in a state of malaise

in comparison to firms in other countries when growth opportunities are weak, as the long-term contracts may be too expensive to implement and the optimal contract may just let the manager undertake inefficient projects (2) why these firms prospects dramatically improve in comparison to firms in countries where short-termism is less accentuated, when growth opportunities pick up, as it happened during the nineties, and it becomes optimal to give managers incentives to undertake the efficient strategy.

The main contribution of this paper is the focus on how the managerial labor market affects CEO incentives and how this in turn affects the structure of executive compensation. While the most of the literature on CEO compensation has focused on partial equilibrium analysis, a few other papers have proposed that the puzzles in CEO compensation may be better understood in the context of labor market equilibrium. Murphy and Zbojnik (2004) and Frydman (2005) suggest that the increasing prevalence of appointing CEOs through external hires and the increase in pay for top level executives reflect an increase in the importance of managerial ability. Like me, these papers focus on the effect of outside options on CEO compensation. However, they do not analyze how the changes in the labor market affect CEO incentives and therefore have implications only on the level of CEO compensation but not on its structure. Himmelberg and Hubbard (2000), Oyer (2004) and Rajgopal, Shevlin and Zamora (2006) explain the lack of relative performance evaluation in managerial contracts with the fact that companies wish to offer their executives higher compensation exactly when their outside option are more attractive.

This paper is also related to the career concerns literature, initiated by Holmström (1999). Like Narayanan (1985) and Stein (1988 and 1989), I study a model in which the incentives given by the labor market induce the manager to choose a short-term strategy, even if a long-term strategy with higher expected return is available. Differently from most of the papers in this strand of literature, which take contracts as given, I derive the optimal contract and the conditions under which the efficient strategy is undertaken. Holmström and Ricart-i-Costa (1986) and Narayanan (1996) are two notable exceptions and study how the form of compensation can improve managerial incentives. While their models also imply that the managerial horizon problem can be mitigated with long-term compensation, they study the optimal contract in a context that it is not directly applicable to the current debate on CEO compensation. In particular, they cannot explain the great variety of managerial contracts, the surge in executive compensation and how the structure

of compensation depends on growth opportunities and the managerial labor market.

The remainder of the paper is organized as follows. Section II describes the model. Section III and Section IV derive short and long-term optimal contracts, respectively. Section V presents empirical evidence consistent with the empirical implications of the model. Section VI concludes. All proofs of formal results are in the Appendix.

## II The model

### A Timing

The timing of events is as follows:

#### *First Period*

- Firm shareholders (henceforth, the firm) hire a manager and sign a contract, which can be either long-term or short-term;
- The manager observes whether a long-term strategy is available and chooses the strategy's horizon;
- The output is realized. The manager may also acquire skills (or become well-known) for developing a particular strategy. The manager receives her first-period compensation;
- With some probability, the manager receives an outside offer;

#### *Second Period*

- If the contract signed at  $t = 0$  is short-term, the manager is offered a new short-term contract. If the contract offered at  $t = 0$  is long-term, depending on her outside options, the manager may unilaterally renegotiate the contract. The manager has the possibility to sell non-restricted rights to the second period output if she owns any. If the manager has received an outside offer, she also decides whether to switch firm;
- The output is realized and the manager receives her second period compensation.

## B Managers, strategies and outside offers

The manager maximizes her expected utility. She is risk neutral but discounts her future income at rate  $\delta < 1$ . The manager expected utility at  $t = 0$  is:

$$(1) \quad E_0(U_0) = E_0(w_1^c - \gamma e) + \delta E_0(w_2^c - \gamma e),$$

where  $w_t^c$  is the compensation received in period  $t$ , under contract  $c$ . Contracts can be either long-term ( $l$ ) or short-term ( $s$ ). The manager can choose whether to provide effort:  $e \in \{0, 1\}$ . Effort involves a non-monetary cost:  $\gamma$ .

The manager income profile depends on the strategy's choice in the firm where she is employed at  $t = 0$  and on whether the manager receives an outside offer. While the manager implements the selected strategy at the current employer, she can acquire marketable skills that increase the probability of receiving an outside offer. The probability that the manager actually acquires marketable skills depends on the strategy horizon. A manager choosing a short horizon strategy is more likely to acquire skills (or become well-known) for implementing a particular business strategy (e.g., being a cost-cutter) than a manager working for the long horizon. If the manager is well-known for implementing a particular strategy, she is more likely to receive outside offers to implement the same strategy in another firm.

For simplicity's sake, I assume that a manager developing a short-term strategy develops marketable skills with probability 1. Conditionally on having developed marketable skills, the manager receives an outside offer with probability  $\xi$ . The parameter  $\xi$  captures the depth of the CEO labor market. If the manager chooses to develop a long-term strategy, however, the probability of acquiring marketable skills is only  $0 \leq \kappa \leq 1$ . Hence, the ex ante probability of receiving an outside offer is only:  $\kappa\xi$ . If the manager receives an outside offer, she is offered a wage:  $w$ .

## C Managerial strategies and firm value

Firm shareholders are risk neutral and have zero discount rate. Hence, the value of the firm is equal to the sum of first and second period cash flows. The value of the firm depends on the horizon of the strategy ( $h$ ) chosen by the manager. The horizon of the strategy may be either long ( $l$ ) or short

( $s$ ):  $h \in \{l, s\}$ . A long-term strategy is implementable only with probability  $\phi$  strictly less than 1. The parameter  $\phi$  captures firm growth opportunities. If a long-term strategy can be implemented, it is expected to be more profitable than the short-term strategy in the long-run.

In the first period, the manager produces cash-flows  $x_1 = X$  with probability  $p$  whatever the strategy horizon is. A manager who has chosen horizon  $h$  produces high output,  $x_2 = X$ , at date 2 with probability  $p_2^h = h$ , if she remains with the current employer. The output is equal to zero otherwise. I assume that  $l > s$  and that  $l \leq 1$ . The expected cash flows in the first and the second period are sufficient to cover the manager's effort cost:  $sX - \gamma \geq 0$  and  $pX - \gamma \geq 0$ .

Only the manager observes whether a long-term strategy is implementable. Hence, under my assumptions on cash flows, the horizon of the strategy is neither observable nor contractible.

Although the long-term strategy is efficient, it has a drawback from the point of view of the manager. In the first period, the manager can acquire skills and become well-known for performing a given task. This is more likely to happen if the manager has selected a short-term strategy. A manager pursuing a long-term strategy may not acquire any particular skill in the short-term. The reputation of being good at implementing a particular business strategy increases the probability of receiving an outside offer. For simplicity sake, I assume that this reputation is not related to (past and future) productivity at the current employer.

I assume that the outside offer is always more desirable than continuing the short-term strategy at the current employer. Even if the manager was offered the whole project surplus, she would prefer the outside offer:  $sX \leq w$ . I also assume that implementing the long-term strategy at the current employer is more profitable than the outside offer:  $lX - \gamma > w - \gamma$ .<sup>2</sup>

## D Contracts

Since the horizon of implementable strategies and the strategy that the manager is actually pursuing are not observable, managerial remuneration can only be made contingent on output and to the arrival of an outside offer.

I assume that the firm can commit to a long-term contract, but the manager cannot. By offering the manager stocks or stock options at  $t = 0$ , for instance, the firm can credibly commit to make the compensation dependent on long-run performance as the manager would not agree to

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<sup>2</sup>This assumption is made only to focus on a particular case and is not essential for the results to hold.

renegotiate if this lowers her utility. Like in the existing literature on career concerns, however, the manager cannot commit not to withdraw her human capital if she gets a better outside offer. This is equivalent to say that human capital is inalienable.<sup>3</sup> This assumption is critical because it contributes to make the horizon of the project non-contractible.

At the end of the first period, when the first period output is realized, the manager can unilaterally renegotiate the contract if she receives a better outside offer. In this case, she does not necessarily leave the firm where she is employed, but can obtain a remuneration that matches her outside offer in expected value (if this is optimal for the current employer).

For simplicity, I focus on compensation contracts that yield to the manager a fraction of the output if the project succeeds:  $w_t^c = \beta_t^c x_t$ , where  $c$  is the horizon of the contract, and  $t$  the date at which compensation actually accrues to the manager. Since the manager is risk neutral, the fixed wage can be set to zero without loss of generality.

The horizon of the contract may be either long-term ( $l$ ) or short-term ( $s$ ). A long-term contract between the manager and the firm is signed at  $t = 0$  and specifies compensation at  $t = 1$  and  $t = 2$ . A short-term contract can be signed at  $t = 0$  ( $t = 1$ ), and specifies compensation at the end of the first (second) period.

Finally, I assume that there are more potentially first-time CEOs than firms. Hence, the optimal contract maximizes firm shareholders' return subject to the CEOs' incentive and participation constraints.

### III Short-term optimal contracts

A short-term contract is signed at date  $t = 0$  ( $t = 1$ ), and compensates the manager for the output realized at date  $t = 1$  ( $t = 2$ ). Under a short-term contract, the manager receives a fraction of the output at the end of the period. This may be thought as a bonus that depends on past performance. Managerial compensation does not depend on future output or expectations of future output. In other words, the manager is not awarded stocks in the firm. Nonetheless, the manager internalizes that the choice of investment horizon affects her second period remuneration because it influences the probability of receiving an outside offer and, for given share of the output offered by the firm,

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<sup>3</sup>This assumption requiring that the manager cannot commit to slavery is a realistic representation of the labor market, similar to Hart and Moore (1994).

the expected payoff at the current employer. Therefore, I solve the model backward.

In the second period, the manager may receive or not an outside offer. Consider the case in which the manager does not receive an outside offer. In this case, the firm may choose between offering a contract that is equivalent to retaining the manager only when she is implementing a long-term strategy and retaining the manager also when she is implementing a short-term strategy. The participation constraint of the manager that is implementing a short-term strategy is satisfied if  $\beta_2^s \geq \frac{\gamma}{sX}$ . If the participation constraint of the manager implementing a short-term strategy is satisfied, the participation constraint of the manager implementing a long-term strategy is clearly non-binding. If the firm aims to retain the manager in all states of the world, it offers  $\beta_2^s = \frac{\gamma}{sX}$  in order to maximize its payoff. In this case, the expected payoff of the firm is:  $(1 - \phi) \left[ \left(1 - \frac{\gamma}{sX}\right) sX \right] + \phi \left[ \left(1 - \frac{\gamma}{sX}\right) lX \right]$ . If the firm aims to retain the manager only if she is implementing a long-term strategy, it offers  $\beta_2^s = \frac{\gamma}{lX}$ . In this case, the manager pursuing a short-term strategy quits and no output is produced in the second period. The expected payoff of the firm is:  $\phi \left[ \left(1 - \frac{\gamma}{lX}\right) lX \right]$ . The firm offers  $\beta_2^s = \frac{\gamma}{sX}$  if:

$$(1 - \phi) \left[ \left(1 - \frac{\gamma}{sX}\right) sX \right] + \phi \left[ \left(1 - \frac{\gamma}{sX}\right) lX \right] \geq \phi \left[ \left(1 - \frac{\gamma}{lX}\right) lX \right], \text{ which implies:}$$

$$(2) \quad \phi \left( (sX - \gamma) \left(1 - \frac{lX}{sX}\right) + lX - \gamma \right) \leq sX - \gamma.$$

Inequality (2) is satisfied if growth opportunities,  $\phi$ , are sufficiently low.

Note that if the manager receives an outside offer at  $t = 1$ , the current firm can retain the manager only if she is pursuing the long-term strategy by offering:  $\beta_2^s = \frac{w}{lX}$ .

At  $t = 0$ , the manager would never find it optimal to pursue the long-term strategy if the firm is expected to offer:  $\beta_2^s = \frac{\gamma}{lX}$ . In this case, the manager does not obtain a benefit from pursuing the long-term strategy and, doing so, would decrease the probability of receiving an outside offer, which increases her lifetime income. Hence, the manager may have an incentive to choose the long-term strategy only if inequality (2) is satisfied and the firm is expected to offer  $\beta_2^s = \frac{\gamma}{sX}$  at  $t = 1$ . The manager actually finds it optimal to pursue the long-term strategy when available if:

$$(3) \quad (1 - \kappa\xi) \left[ \frac{\gamma}{sX} lX - \gamma \right] + \kappa\xi \max \left\{ w - \gamma, \frac{\gamma}{sX} lX - \gamma \right\} \geq \xi [w - \gamma].$$

The previous condition compares the expected payoff from pursuing the long-term and the short-term strategies. It is always satisfied if  $w - \gamma < \frac{\gamma}{sX}lX - \gamma$  or if  $\xi$  is sufficiently low.

**Proposition 1** *If growth opportunities are relatively low ( $\phi$  low), the managerial labor market relatively thin ( $\xi$  low) or outside options not very attractive ( $w$  low), the manager pursues the efficient long-term strategy with a short-term contract.*

Proposition 1 summarizes the conditions under which short-term contracts can lead to the implementation of the efficient long-term strategy. Condition (2) requires that the long-term strategy is expected to be available only with low probability. Only under this condition, the firm has an incentive to share the surplus with the manager. Otherwise, in equilibrium, the manager is never compensated for having undertaken a long-term project. Hence, she does not undertake the long-term strategy to increase the chances of getting an outside offer.

If condition (2) is satisfied, the manager actually undertakes a long-term strategy when outside job opportunities are not expected to be too good. Inequality (3) is always satisfied if the wage offered by a potential new employer is sufficiently low ( $w - \gamma < \frac{\gamma}{sX}lX - \gamma$ ). More in general, the condition poses a lower bound on the probability of an outside offer  $\xi$ .

Whether or not short-term contracts, which consist of a bonus based on past performance, succeed in implementing the efficient strategy and are therefore optimal may depend on the business cycles. The availability of the long-term strategy may be thought as long-term growth opportunities. Offering a short-term contract to the manager maximizes the value of the firm only if in periods (or sectors) when (in which) growth opportunities are perceived to be low.

Note that an important assumption for obtaining the result in Proposition 1 is that the firm cannot continue the project with a new manager. This guarantees that, under certain conditions, in the interim period, the firm finds it optimal to share the expected surplus from growth opportunities with the manager. While this is an extreme hypothesis, done for sake of simplicity, the result can be generalized if there are some costs of managerial turnover, which affect the firm's payoff (but not the manager's).

## IV Long-term optimal contracts

The previous Section shows that short-term contracts may not provide the manager sufficiently strong incentives to undertake a long-term project. This is more likely if growth opportunities are perceived to be high or if the manager expects to receive an outside offer with high probability. This Section studies under what conditions a long-term contract can give the manager incentives to undertake the long-term project.

If the firm finds it optimal to stimulate effort from a manager pursuing a short-term strategy, a long-term contract solves the following program:<sup>4</sup>

$$\max_{\beta_1^l, \beta_2^l} (1 - \beta_1^l) pX + \phi \left[ (1 - \beta_2^l) lX - R\xi\kappa \right] + (1 - \phi) (1 - \xi) \left[ (1 - \beta_2^l) sX \right]$$

subject to the following participation constraints:

$$(4) \quad \beta_1^l pX - \gamma \geq 0$$

$$(5) \quad \beta_2^l sX - \gamma \geq 0,$$

which implies

$$(6) \quad \beta_2^l lX - \gamma \geq 0;$$

and the interim participation constraint:

$$(7) \quad \beta_2^l lX + R - w \geq 0,$$

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<sup>4</sup>I show in the Appendix that the qualitative results are similar if the firm does not find it optimal to stimulate effort if the manager is pursuing a short-term strategy.

where  $R = \max \{w - \beta_2^l LX, 0\}$  is the renegotiation payoff of the manager; and the incentive-compatibility constraint to be satisfied at  $t = 0$ :

$$(8) \quad \beta_2^l LX + \xi \kappa \max \{w - \beta_2^l LX, 0\} \geq \xi w + (1 - \xi) \beta_2^l sX.$$

Note that in the short-term contract described in Section II, the three participation constraints (4), (5) and (7) are always satisfied with the equality. In the long-term contract, however, an additional constraint needs to be satisfied. This implies that it may become optimal to increase managerial compensation in order to induce the choice of the efficient strategy and leave the manager a rent when she can only pursue a short-term strategy.

**Lemma 1** *An optimal long-term contract is renegotiated in some states of the world.*

It follows from Lemma 1 that (if the firm finds it optimal to stimulate effort from a manager pursuing a short-term strategy) we can write the incentive-compatibility constraint as follows:

$$\xi \kappa w + (1 - \xi \kappa) \beta_2^l LX \geq \xi w + (1 - \xi) \beta_2^l sX.$$

**Corollary 1** *The incentive-compatibility constraint is not binding if the manager finds it optimal to pursue a long-term strategy with a short-term contract when the firm is expected to offer  $\beta_2^s = \frac{\gamma}{sX}$  in the second period.*

If the incentive-compatibility constraint is not binding the long-term contract does not affect the level of managerial compensation. In this case, the long-term contract can be regarded as a pure commitment device for the firm when  $\phi$  is large. In this case, the firm would have an incentive to retain the manager only if she is pursuing a long-term strategy by offering a compensation that does not fully compensate for effort when the manager is pursuing a short-term strategy. It is optimal for the firm to commit not to pursue this strategy ex post because this induces the manager to undertake the efficient strategy. This case is relevant if the managerial labor market is such that it is relatively unlikely for the manager to receive an outside offer ( $\xi$  low) or if outside offers are not very rich ( $w$  low).

**Proposition 2** *Managerial compensation is increasing in the probability of receiving an outside offer and the value of outside offer  $w$ , if  $(1-\xi\kappa) \left(\frac{\gamma}{sX}lX - \gamma\right) < \xi(1-\kappa)(w - \gamma)$  or if the participation constraint of the manager is not satisfied when she is working on the short-term project.*

Managerial compensation is higher with a long-term contract than with a short-term contract if the probability of outside offers is sufficiently high or if outside offers are expected to be relatively rich.

Note also that, if  $sX\xi w(1-\kappa) > lX\gamma(1-\xi\kappa)$ ,  $\beta_2^l \geq \beta_2^s$ . This derives from deriving  $\beta_2^l = \frac{\xi w(1-\kappa)}{(1-\xi\kappa)lX}$  from the binding incentive-compatibility constraint under the assumption that the manager exerts no effort under the optimal contract if she is pursuing a short-term strategy, and setting  $\frac{\xi w(1-\kappa)}{(1-\xi\kappa)lX} > \frac{\gamma}{sX}$ . This implies that the firm may find it optimal to offer a long-term contract only if the manager would never choose a long-term strategy under a short-term contract.

Assume that the firm finds it optimal to stimulate effort from a manager pursuing a short-term strategy. Proposition 3 gives conditions under which a long-term contract is actually optimal.

**Proposition 3** *The firm always finds it optimal to offer a long-term contract if the incentive-compatibility constraint is not binding. If the incentive-compatibility constraint is binding, the long-term contract is preferable to the short-term contract if growth opportunities are expected to be relatively high ( $\phi$  large) or the managerial labor market is relatively deep ( $\xi$  large).*

## A Unrestricted stocks

So far, I have assumed that the share of second period output the manager is awarded cannot be traded at  $t = 1$ . In this respect, the interpretation is that the manager is awarded restricted stocks or options on future output that cannot be transferred.

It is interesting to analyze whether and to what extent it may be convenient to award the manager a right to enjoy a share of the second period cash flow which allows selling the right in the intermediate period. To put it differently, I want to ask whether it can ever be optimal to award shares or options that the manager has the possibility to sell or exercise at  $t = 1$ .

I indicate with  $\beta_2^{tl}$  the right to enjoy the corresponding share of second-period cash-flows with the possibility of selling the stocks at time  $t$ . Hence,  $\beta_2^{tl} > 0$  implies that the manager is awarded non-restricted stocks;  $\beta_2^{2l}$  must be interpreted like the restricted stocks in the previous Subsection.

**Lemma 2** *A necessary condition for the optimality of  $\beta_2^{1l} > 0$  is that  $\frac{lX}{1+\delta} < (1 - \xi) sX$ .*

**Corollary 2** *Unrestricted rights to second-period output must have positive value if they are sold in the intermediate period. This implies  $\beta_2^{2l} \geq \frac{\gamma}{sX}$  in the optimal contract.*

**Proposition 4** *If the condition on parameter in Lemma 2 is satisfied, in the optimal contract, the manager is granted non-restricted rights to second period output if  $(1 + \delta)(1 - \xi\kappa) < 1$  and  $\phi$  is relatively small.*

Proposition 4 shows that there are situations in which it may be optimal to let the manager unwind equity incentives. This is the case because non-restricted rights to second period output increase the CEO's bargaining power when she receives an outside offer and has undertaken a long-term strategy. They thus allow to increase managerial compensation in the state of the world in which there is more need for it. In turn, this permit to decrease the CEO's rent from pursuing the short-term strategy.

Hence granting non-restricted stocks or options is not necessarily evidence that compensation reflects managerial power. The model gives an explanation alternative to Bolton, Scheinkman and Xiong (2006) of the reasons why it may be optimal to let the manager cash out at least some of the vested stocks or options. In Bolton, Scheinkman and Xiong (2006), some shareholders profit from the temporary overvaluation of stocks because there are other market participants with overoptimistic expectations on the prospect of the company. Hence, they give the manager an incentive to build "castles in the air", leading to a higher stock price in the short-term. I show that shareholders may find it optimal to award non-restricted stocks also when they want to give an incentive to undertake a long-term project.

## V Empirical implications

**Implication 1.** *In countries with deeper CEO labor market, executive compensation is expected to be higher and to consist mostly of long-term incentives.*

Contract features vary enormously both across countries and across firms within the same country. Murphy (1999) shows that U.S. CEOs not only are paid more than CEOs elsewhere, but

also that they are paid differently. A large part of their compensation is in the form of long-term incentives (i.e., non-vested stock options with vesting periods longer than three years, out-of-the-money stock options, restricted stocks, and other long-term incentive plans), which comprise only a small part of compensation in other countries. Even if stock options and other forms of long-term compensation are rapidly being adopted outside the U.S., Towers Perrin's 2002 report suggests that differences are persistent: CEO compensation in the U.S. is still four times larger than in Europe, *and* the value of long-term incentives U.S. CEOs receive is almost tenfold the long-term incentives of their European colleagues.<sup>5</sup> International differences in CEO compensation remain large after controlling for taxes, price level, firm size and sector (Abowd and Bognanno, 1995; Abowd and Kaplan, 1999; Conyon and Murphy, 2000).

The model suggests that these differences may depend on the managerial labor market. In the United States, company founders generally hire managers early on. In Western Europe, instead, after the founder retires, his children often run the firm themselves and only sometimes they hire a manager even though they retain control. In emerging markets, the manager tend to belong to the controlling family even when the founder retires. Occasionally, a manager even marries into the family as happened at Bombardier in Canada, Matsushita in Japan and Worldwide Shipping in Hong Kong. This suggests that in countries other than the U.S., the legal system induces controlling shareholders to entrust the firm management to family members or their cronies (see Burkart, Panunzi and Shleifer, 2003 and Bhattacharya and Ravikumar, 2004 for models). In all these cases, the market for the professional managers remains thin. Consistently with the empirical evidence, the model predicts that, depending on growth opportunities, performance-based compensation will consist either of a bonus or of a small amount of long-term incentives.

This explanation is consistent with the fact that within Europe long-term compensation and CEO pay levels are highest in the U.K., the country in which family firm are less dominant (Conyon and Schwalbach, 1999).

The interpretation of the empirical evidence provided by the model is corroborated not only by the cross-country empirical evidence, but also by the fact that participation in corporate management by a founding family significantly reduces the likelihood of establishing most types of equity awarding plans in the U.S. (Kole, 1997). This may clearly depend on the fact that high levels of

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<sup>5</sup>Abowd and Bognanno (1995) notice the same patterns using surveys of other major human resource consulting firms, but are unable to suggest an explanation why only U.S. CEOs receive such large long-term compensation plans.

stock ownership in family firms decrease the need to rely on equity compensation. However, it is also indicative of the fact that there is less formal or explicit contracting in these firms. This is consistent with the prediction that family members, having no incentive to job hopping, create less complex contracting problems.

**Implication 2.** *Firms with higher growth opportunities are more likely to provide long-term compensation and less likely to offer non-restricted stocks or options.*

There is plenty of empirical evidence consistent with this implication of the model. Bryan, Hwang and Lilien (2000) find that firms with high research and development expenditures, which are more likely to have long-run growth opportunities, are more likely to grant stock options. Similarly, Murphy (2003) finds that, during the high-tech boom, new economy firms were more likely to use stock-based compensation than old economy firms. The empirical implications of the model are also consistent with the findings of Kole (1997). Managers in research-intensive firms, which are more likely to have long-term investment opportunities, receive equity-based awards that are more restrictive (e.g., stocks have longer time to full vesting) than in less innovative firms. Put differently, long-term incentives are stronger in sectors with high growth opportunities, such as the high-tech, than in more traditional sectors, such as utilities.

Finally, Smith and Watts (1992) find that not only managers of firms with growth options receive more stock options, but also that the absolute value of their compensation package is larger. This is again consistent with the implications of the model under the assumption the incentive-compatibility constraint is binding.

**Implication 3.** *The use of long-term compensation is expected to decrease during recessions.*

The model implies that during recessions, when growth opportunities weaken, the long-term contract may no longer be optimal. Consistently, Benerjee, Gatchev and Noe (2004) show that while in 2000, at the height of the high-tech bubble, 83 percent of firms were granting options, this percentage has decreased to 76 since 2003, when corporate scandals contributed to the downward revision of growth opportunities. Bebchuk and Grinstein (2005) also find that equity-based compensation has decrease in the U.S. since 2001, after having increased in the period 1993-2001.

**Implication 4.** *Larger firms are less likely to grant long-term compensation than smaller firms. Additionally, larger firms are more likely to switch from long-term to short-term contracts during recessions, when growth opportunities weaken.*

In countries with active managerial labor market, managerial incentives to select the short-term strategy depend not only on the probability of receiving an outside offer but also on the expectations on the quality of the outside offer. Since larger firms provide more attractive compensation packages and are more prestigious, the kind of distortion highlighted in the model is relevant especially for small firms. In other words, the incentive compatibility constraint is less likely to be binding for large companies. This in turn implies that as growth opportunities become weaker, large firms should be the first to abandon option compensation and other forms of long-term compensation.

**Implication 5.** *Older CEOs, who are at the end of their careers, need less long-term incentives.*

Brian, Hwang and Lilien (2000) find that older managers receive less long-term incentives than average, especially if they are employed in smaller companies. This empirical finding is puzzling if one does not take into account the horizon problem created by outside job opportunities, as I do. For instance, Gibbons and Murphy (1992) argue that younger CEOs may optimally be awarded contracts with lower pay-performance sensitivity because they have incentives to exert high effort deriving from the desire to establish a reputation for high ability.

**Implication 6.** *Managers receive a larger share of firm output.*

The model suggests that not only the long-term contract increases shareholder value, but this may happen even if the CEO with a long-term contract receives a larger share of firm output. This is the case if the incentive-compatibility constraint is binding.

This implication of the model is consistent with the findings of Bebchuk and Grinstein (2005), who show that in the U.S., on average, CEO compensation has increased from 5 percent of the earnings in the early nineties to 12.8 percent in the period 2000-2002. Since then, it has decreased by 3 percentage points.

## VI Conclusion

This paper shows that changes in the managerial labor market can help explaining not only the increase in CEO compensation, but also the structure of managerial contracts and differences in executive compensation across countries with different labor markets. I argue that the large variety of managerial contracts observed in the U.S. is the effect of a deep managerial labor market, in which CEOs have repeated job-hopping opportunities. In these situations, firms with low growth

opportunities renounce to prevent the CEO from pursuing short-term inefficient strategies. In contrast, firms with high growth opportunities find it optimal to leave the CEO a larger share of a bigger pie in order to give incentives to pursue efficient strategies. In countries with thinner managerial labor market, CEOs have stronger incentives to pursue efficient long-term strategy. Firms may find it optimal to offer long-term contracts in order to share some of the surplus of the efficient strategy with the manager. The long-term contracts however does not grant the manager a larger share of the output than the short-term contract. Hence, the two types of contracts appear very close substitutes.

The insights of the model go beyond the specific context of the managerial labor market. The implications of the model are valid all times that workers face a trade-off between the acquisition of firm-specific skills, which can improve productivity at the current job, and marketable skills, which increase the chances of receiving outside offers. The model implies that employees are more likely to receive long-term compensation if they face a highly liquid market and are employed in sectors in which the benefits from the acquisition of specific skills are perceived to be large. If, on the other hand, these benefits are smaller, there is underinvestment in firm-specific skills in equilibrium. We would expect productivity and firm value to be lower in these sectors in countries with deep labor markets.

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## A Appendix

### A Proof of Lemma 1

By contradiction assume that an optimal long-term contract is never renegotiated, which implies  $R = 0$ . Then, it must be true that  $\beta_2^l lX - w > 0$ . This may be optimal if the incentive compatibility constraint is binding. If the firm finds it optimal to stimulate effort when the manager is pursuing a short-term project, the incentive-compatibility constraint can be written as:  $\beta_2^l lX = \xi w + (1 - \xi) \beta_2^l sX$ . This implies:  $\beta_2^l = \frac{\xi w}{lX - (1 - \xi) sX}$ . Using the expression for  $\beta_2^l$ ,  $\beta_2^l lX - w > 0$  can be written as:  $\frac{\xi w lX}{lX - (1 - \xi) sX} - w > 0$ . It is straightforward to show that this implies:  $-(1 - \xi) lX + (1 - \xi) sX > 0$ , which is a contradiction.

Analogously, it can be demonstrated that the optimal long-term contract must be renegotiated if the firm does not find it optimal to stimulate effort when the manager is pursuing a short-term project. In this case, the incentive-compatibility constraint can be written as:  $\beta_2^l lX - \gamma \geq \xi (w - \gamma)$ . Assume that the incentive-compatibility constraint is binding. This implies that  $\beta_2^l = \frac{\xi w + (1 - \xi) \gamma}{lX}$ . In turn, this implies that  $\frac{\xi w + (1 - \xi) \gamma}{lX} lX < w$  and therefore the contract would actually be renegotiated. If the incentive-compatibility constraint is not binding, then also the participation constraint for a manager pursuing a long-term project is not binding. Hence, the contract cannot be optimal as firm shareholders could increase their payoff by decreasing  $\beta_2^l$ .

### B Proof of Corollary 1

If the incentive-compatibility constraint is not binding, the participation constraint must be binding. Hence,  $\beta_2^s = \frac{\gamma}{sX}$  and the incentive-compatibility constraint can be re-written as:  $(1 - \xi \kappa) \left( \frac{\gamma}{sX} lX - \gamma \right) \geq \xi (1 - \kappa) (w - \gamma)$ , which implies the condition guaranteeing that the manager would find it optimal to pursue the long term-strategy even if offered a series of two short-term contracts:  $(1 - \kappa \xi) \left[ \frac{\gamma}{sX} lX - \gamma \right] + \kappa \xi \max \{ w - \gamma, \frac{\gamma}{sX} lX - \gamma \} \geq \xi [w - \gamma]$ .

The firm finds it optimal to offer a long-term contract if this guarantees a larger payoff than the short-term contract (under which the manager always undertakes the short-term strategy):

$$(1 - \phi) \left[ (1 - \xi) \left( 1 - \frac{\gamma}{sX} \right) sX \right] + \phi \left[ \left( 1 - \frac{\gamma}{sX} \right) lX \right] \geq (1 - \xi) \left( 1 - \frac{\gamma}{sX} \right) sX.$$

This condition is clearly always satisfied.

It is actually optimal for the firm to offer  $\beta_2^s = \frac{\gamma}{sX}$  and retain the manager when she is pursuing

a short-term strategy if:

$$(1 - \phi) \left[ (1 - \xi) \left( 1 - \frac{\gamma}{sX} \right) sX \right] + \phi \left[ \left( 1 - \frac{\gamma}{sX} \right) lX \right] \geq \phi \left( 1 - \frac{\xi(1-\kappa)}{1-\xi\kappa} \frac{w-\gamma}{lX} - \frac{\gamma}{lX} \right) lX,$$

where  $\frac{\xi(1-\kappa)}{1-\xi\kappa} \frac{w-\gamma}{lX} + \frac{\gamma}{lX}$  is derived from the incentive-compatibility constraint, which is necessarily binding if it is not optimal to stimulate effort when the manager pursues a short-term strategy ( $\beta_2^l sX < \gamma$ ). This is always satisfied if (2) holds, but is less restrictive. Hence, a long-term contract, allowing the firm to commit, implements the efficient strategy for a larger range of parameter values.

### C Proof of Proposition 2

It follows from Corollary 1 that if  $(1 - \xi\kappa) \left( \frac{\gamma}{sX} lX - \gamma \right) < \xi(1 - \kappa) (w - \gamma)$ ,  $\beta_2^l = \frac{\xi w(1-\kappa)}{(1-\xi\kappa)lX - (1-\xi)sX}$ . It is straightforward to establish that  $\beta_2^l$  is increasing in  $\xi$  and  $w$ .

### D Proof of Proposition 3

To prove Proposition 3, we need to compare the firm payoffs under long-term and short-term contract.

First, consider the case in which the firm finds it optimal to stimulate effort if the manager is pursuing a short-term strategy (i.e.,  $(1 - \phi) \left[ (1 - \xi) \left( 1 - \frac{\gamma}{sX} \right) sX \right] + \phi \left[ \left( 1 - \frac{\gamma}{sX} \right) lX \right] \geq \phi \left( 1 - \frac{\xi(1-\kappa)}{1-\xi\kappa} \frac{w-\gamma}{lX} - \frac{\gamma}{lX} \right) lX$ ).

The firm payoff under a short-term contract is:

$$\left( 1 - \frac{\gamma}{pX} \right) (pX - I) + \left( 1 - \frac{\gamma}{sX} \right) (sX - I) (1 - \xi)$$

while with a long-term contract:

$$(1 - \beta_1^l) (pX - I) + \left[ (1 - \beta_2^l) lX - (w - \beta_2^l lX) \xi\kappa - I \right] \phi + (1 - \beta_2^l) (sX - I) (1 - \phi) (1 - \xi).$$

Here  $\beta_1^s = \beta_1^l$  as first period compensation does not affect the incentive-compatibility constraint.

The long-term contract dominates the short-term contract if the incentive-compatibility constraint is not binding.

If the incentive-compatibility constraint is binding, the optimal long-term contract actually increases shareholder value if:

$$\left[ \left( 1 - \frac{\xi w(1-\kappa)}{(1-\xi\kappa)lX - (1-\xi)sX} \right) lX - \left( w - \frac{\xi w(1-\kappa)}{(1-\xi\kappa)lX - (1-\xi)sX} lX \right) \xi\kappa - I \right] \phi + \left( 1 - \frac{\xi w(1-\kappa)}{(1-\xi\kappa)lX - (1-\xi)sX} \right) (sX - I) (1 - \phi) (1 - \xi) - \left( 1 - \frac{\gamma}{sX} \right) (sX - I) (1 - \xi) \geq 0.$$

The second part of Proposition 3 derives from inspection of the previous inequality.

Now, consider the case in which the firm does not find it optimal to stimulate effort if the manager is pursuing a short-term strategy (i.e.,  $(1 - \phi) [(1 - \xi) (1 - \frac{\gamma}{sX}) sX] + \phi [(1 - \frac{\gamma}{sX}) lX] \leq \phi \left(1 - \frac{\xi(1-\kappa)w-\gamma}{1-\xi\kappa} \frac{w-\gamma}{lX} - \frac{\gamma}{lX}\right) lX$ ).

In this case, the long-term contract is preferred if:

$$\phi \left(1 - \frac{\xi(1-\kappa)w-\gamma}{1-\xi\kappa} \frac{w-\gamma}{lX} - \frac{\gamma}{lX}\right) lX \geq (1 - \xi) \left(1 - \frac{\gamma}{sX}\right) sX.$$

An increase in  $\xi$  has a larger negative impact on the right hand side than on the left hand side if:

$$\xi \geq \frac{1}{\kappa} \left( \frac{(1-\kappa)(w-\gamma)}{sX-\gamma} \right)^{\frac{1}{2}}, \text{ which is also consistent with the statement in Proposition 3.}$$

## E Proof of Lemma 2

Consider an equilibrium in which the manager finds it optimal to sell non-restricted rights to second period output only if she has undertaken the short-term strategy. In this case, the manager's sale of the rights to second period output reveals that the manager has undertaken a short-term strategy and will leave the firm with probability  $\xi$ . Risk-neutral investors will be willing to pay the expected value of future cash flows:  $(1 - \xi) sX$ . If the condition in Lemma 2 were not satisfied, the manager would sell the right to enjoy the second period output in the intermediate period even if she had undertaken a long-term project and the sale of stocks revealed to market participants that the horizon of the project is short (and therefore the expected value of the second period output relatively low). This would be the case if the manager were very impatient. Hence, setting  $\beta_2^{1l} > 0$  would have no impact on the incentive-compatibility constraint and the participation constraints. This implies that  $\beta_2^{1l} = 0$  is optimal.

## F Proof of Proposition 4

If the manager owns non-restricted rights to the second period output  $\beta_2^{1l}$  and receives an outside offer in the intermediate period, her reservation wage is  $w + \beta_2^{1l} (1 - \xi) sX (1 + \delta)$ , where  $(1 - \xi) sX$  is the price that can be obtained selling the unrestricted stocks at  $t = 1$  and  $(1 + \delta)$  takes into account that the manager is impatient.

The firm shareholder choose the optimal contract maximizing the following utility function:

$$\begin{aligned} & (1 - \beta_1^l) pX + \phi [(1 - \beta_2^{1l} - \beta_2^{2l}) lX - (w + \beta_2^{1l} (1 - \xi) sX - (\beta_2^{1l} + \beta_2^{2l}) lX) \xi \kappa] + \\ & + (1 - \phi) (1 - \xi) [(1 - \beta_2^{1l} - \beta_2^{2l}) sX] \end{aligned}$$

subject to the following constraints:

$$\begin{aligned} & (\beta_2^{1l} + \beta_2^{2l}) lX - \gamma + \xi\kappa [w + \beta_2^{1l} (1 - \xi) sX (1 + \delta) - (\beta_2^{1l} + \beta_2^{2l}) lX] \geq \\ & \geq \beta_2^{1l} (1 - \xi) sX (1 + \delta) + \xi w - \gamma + (1 - \xi) \beta_2^{2l} sX \end{aligned}$$

$$\beta_1^l pX - \gamma \geq 0$$

$$\beta_2^{2l} sX - \gamma \geq 0$$

$$(\beta_2^{1l} + \beta_2^{2l}) lX - \gamma \geq 0$$

Note that the last constraint is implied by the previous one.

The Lagrangian associated to this problem is:

$$\begin{aligned} L = & (1 - \beta_1^l) pX - I + \phi [(1 - \beta_2^{1l} - \beta_2^{2l}) lX - I - (w + \beta_2^{1l} (1 - \xi) sX - (\beta_2^{1l} + \beta_2^{2l}) lX) \xi\kappa] + \\ & + (1 - \phi) (1 - \xi) [(1 - \beta_2^{1l} - \beta_2^{2l}) sX - I] + \\ & + \lambda^{IC} \left[ \begin{array}{c} (\beta_2^{1l} + \beta_2^{2l}) lX + \xi\kappa [w + \beta_2^{1l} (1 - \xi) sX (1 + \delta) - (\beta_2^{1l} + \beta_2^{2l}) lX] \\ -\beta_2^{1l} (1 - \xi) sX (1 + \delta) - \xi w - (1 - \xi) \beta_2^{2l} sX \end{array} \right] + \\ & + \lambda^{PC_1} (\beta_1^l pX - \gamma) + \lambda^{PC_2} (\beta_2^{2l} sX - \gamma) \end{aligned}$$

The first order condition are:

$$\beta_1^l :$$

$$-pX + \lambda^{PC_1} = 0$$

Note that this condition can be satisfied with the equality only if  $\lambda^{PC_1} = 0$ . This implies that  $\beta_1^l pX - \gamma = 0$ . Therefore:  $\beta_1^l = \frac{\gamma}{pX}$ .

$$\beta_2^{1l} :$$

$$\begin{aligned} & -\phi [lX + ((1 - \xi) sX - lX) \xi\kappa] - (1 - \phi) (1 - \xi) sX + \\ & + \lambda^{IC} [lX + \xi\kappa ((1 - \xi) sX (1 + \delta) - lX) - (1 - \xi) sX (1 + \delta)] = 0 \end{aligned}$$

$$\beta_2^{2l} :$$

$$-\phi [lX (1 - \xi\kappa)] - (1 - \phi) (1 - \xi) sX +$$

$$+\lambda^{IC} [lX (1 - \xi\kappa) - (1 - \xi) sX] + \lambda^{PC_2} sX = 0.$$

It is optimal to have  $\beta_2^{1l} > 0$  if all first order conditions are satisfied with the equality.

If this is true:

$$\lambda^{IC} = \frac{\phi[lX + ((1-\xi)sX - lX)\xi\kappa] + (1-\phi)(1-\xi)sX}{lX + \xi\kappa((1-\xi)sX(1+\delta) - lX) - (1-\xi)sX(1+\delta)}$$
 from the first order condition with respect to  $\beta_2^{1l}$ .

From the first order condition with respect to  $\beta_2^{2l}$ , I can derive:

$$\lambda^{PC_2} = \frac{1}{sX} \left[ \begin{aligned} &\phi [lX (1 - \xi\kappa)] + (1 - \phi) (1 - \xi) sX - [lX (1 - \xi\kappa) - (1 - \xi) sX] \times \\ &\quad \times \frac{\phi[lX(1-\xi\kappa) + (1-\xi)sX\xi\kappa] + (1-\phi)(1-\xi)sX}{lX(1-\xi\kappa) - (1-\xi)sX(1+\delta)(1-\xi\kappa)} \end{aligned} \right] \geq 0$$

if:  $(1 + \delta)(1 - \xi\kappa) < 1$  and  $\phi$  small.

If  $(1 + \delta)(1 - \xi\kappa) > 1$ ,  $\lambda^{PC_2} \geq 0$  cannot be satisfied. Hence, unrestricted stocks cannot be optimal as the first order conditions cannot be jointly satisfied with the equality.