Competition for Managers, Corporate Governance and Incentive Compensation

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Abstract

We propose a model in which firms use corporate governance as part of an optimal compensation scheme: better governance incentivizes managers to perform better and thus saves on the cost of providing pay for performance. However, when managerial talent is scarce, firms compete to attract better managers. This reduces an individual firm's incentives to invest in corporate governance because managerial rents are determined by the manager's reservation value when employed elsewhere and thus by other firms' governance. In equilibrium, better managers end up at firms with weaker governance, and conversely, better-governed firms have lower-quality managers. Consistent with these implications, we show empirically that a firm's executive compensation is not chosen in isolation but also depends on other firms' governance and that better managers are matched to firms with weaker corporate governance.

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1 Introduction

The public outcry against the pay of investment bankers following the crisis of 2007-08 is just the latest manifestation of the ongoing debate on executive pay that has kept academics busy for the last twenty years. Executives receive large pay for performance when their firm does well and they are also paid well when their firm does poorly (for instance, in the form of severance payments and golden parachutes). The critical question is: Why are executives (and other professional individuals) paid so much and, apparently, independently of performance?

The literature has evolved into two conflicting camps. The first one directly starting with Jensen and Murphy (1990) argues that entrenchment, or poor corporate governance, allows managers to skim profits away from the firm in the form of high pay (see Bertrand and Mullainathan, 2001, Bebchuk and Fried, 2004, among others). The second camp suggests an efficient explanation: competition for managerial talent forces large firms to pay managers a lot (see Rosen, 1981, and Gabaix and Landier, 2008). In this paper, we show that these views are not in conflict and there is in fact a natural link between them.

We develop a model of the managerial labor market in which poor corporate governance and entrenchment arise *because* of competition in the market for managerial talent. Firms may on purpose choose lower governance and higher pay to attract and retain better managers. The key insight is that corporate governance affects the matching between managers and firms. Better governance may incentivize managers to perform better for a lower pay. However, it also reduces firms' ability to attract the best managers.

In our model, firms can incentivize managers to choose the right action via (i) *pay for performance*, that is, by rewarding them when things go well, and (ii) *corporate governance*, that is, by punishing them when things go badly. When firms do not have to compete with each other to attract top quality managers, they choose an efficient combination of pay for performance and corporate governance that just meets the manager's incentive compatibility condition.

However, when managerial talent is scarce and firms have to compete to attract the few top quality managers, firms depart from the optimal level of corporate gov-

ernance. This result follows from the inability of a firm to affect the rents of the top quality managers as these managers can always find another firm to employ them. In other words, the compensation of top-quality managers is exogenous for a given firm. Therefore, it becomes inefficient for a firm that wants to employ a top quality manager to set high levels of corporate governance as it would in any case have to match the manager's reservation wage by increasing pay for performance. Thus, shareholders would end up bearing the costs of implementing corporate governance without enjoying its benefits in the form of lower executive pay.

With ex-ante identical firms, the better-quality managers extract all the rents, which are exactly equal to the difference in profitability between better and worse managers. Then, in equilibrium firms are indifferent between hiring a better- or worse-quality manager. Those firms that hire better-quality managers optimally choose to underinvest in corporate governance and pay managers more. Those that instead hire worse-quality managers, optimally choose to invest more in corporate governance and pay managers less. In short, the scarcity of managerial talent leads to managers accruing all the surplus generated by their superior talent as rents.

Our model delivers two main empirical predictions that are tested in the second part of the paper. First, a firm's executive compensation should be negatively correlated with both its own and its competitors' governance standards. Because governance is chosen as part of an optimal incentive contract, it must satisfy the manager's incentive compatibility and participation constraints. The manager's incentive compatibility condition implies that the firm can save on executive compensation by increasing its investment in corporate governance. The managers' participation constraint generates instead a spillover effect in the choice of corporate governance. Specifically, firms with poor corporate governance offer higher pay for performance than other firms to managers in order to incentivize them. When managerial talent is scarce, the option to work for these firms with weaker governance raises the participation constraint for managers and forces all firms to pay managers more. Hence, executive compensation (and, in particular, pay for performance) in a firm is decreasing in the quality of its own and its competitors' governance.

Second, the main result of the model is that, in equilibrium some firms attract better managers by paying them more and choosing more lax governance standards;

others attract weaker managers by paying them less and choosing stricter governance standards. If we can measure managerial talent, our main empirical prediction is that better quality managers are matched to firms that have weaker governance and receive higher pay. Moreover, changes in corporate governance should be associated with CEO turnover and should depend on the quality of the new CEO relative to the old one: governance standards should improve when the new CEO is of worse quality than the old one and should worsen when on the contrary the new CEO is of better quality than the old one.

We test these predictions using a dataset that combines balance-sheet data from Compustat on unregulated firms in the United States over the period 1993 to 2007, data from ExecuComp on the compensation they award their CEOs and on their turnover, and using firm-level corporate governance indices from Riskmetrics. We focus on two measures of corporate governance: the *G-Index* developed by Gompers et al. (2003), which is a proxy for the quality of outside corporate governance, and *CEO Duality*, which is a dummy variable that takes value one when the CEO is also the Chairman of the Board (and zero otherwise) and is a proxy for the quality of internal corporate governance. Using both indicators, we find evidence in favor of our predictions.

To start with, we show that the choice of corporate governance in one firm has a spillover effect on other firms: the executive compensation in one firm is decreasing in the quality of corporate governance in the firm itself *and* of its size-matched competitors. The result that governance of competitors affects a firm's executive compensation holds even after controlling for other determinants of executive compensation, such as market capitalization (as suggested by Gabaix and Landier, 2008). We also control for CEO age, tenure, external/internal CEO and board composition to alleviate the concern that CEO "power" is the omitted variable that is behind the association between higher compensation and weak governance, as argued by Hermalin and Weisbach (1998).

In particular, we find that the use of pay-for-performance compensation (bonuses and stock options) is greater in firm with weaker governance. This is consistent with the finding in Fahlenbrach (2009) that pay for performance and corporate governance are substitute mechanisms. We also show that the governance quality of competitors

is also negatively correlated with the use of flexible pay.

Most importantly, we show that the allocation of CEOs and firms is consistent with the matching equilibrium predicted by the model. Our empirical strategy follows a two-stage approach. In the first stage, managerial talent is measured as the CEO fixed effect in a regression of firm's operating performance on several control variables. That is, we extract a CEO's talent relative to other CEOs in the industry. In the second stage, we correlate these predicted measures of managerial talent with corporate governance, executive compensation, firm size and turnover rate. We find that better managers are employed by larger firms, face *weaker* governance regimes and are paid more, and are less likely to be replaced, results that are consistent with the model's predictions. Once again, we find these associations even after controlling for proxies of CEO power (his tenure, age and whether he is externally hired).

Furthermore, we show that the changes in governance primarily happen around CEO turnovers. As predicted by the model, when the new CEO is of better quality than the old one, the quality of corporate governance decreases; while governance increases if the new CEO is of worse quality than the old one.

The evidence from these tests taken together provides strong support for our theoretical starting point that competition amongst firms for scarce managerial talent is an important determinant of observed executive compensation *and* governance practices. The rest of the paper is structured as follows. Section 2 discusses related literature. Section 3 presents the model. Section 4 presents the empirical evidence for our testable hypotheses. Section 5 presents robustness checks and alternative explanations. Section 6 concludes.

2 Related Literature

Our paper is related to a large literature on executive compensation and corporate governance. The neoclassical view is that executive compensation is the solution of the principal-agent problem between a set of risk-neutral investors and a risk-averse manager (Holmström, 1979). In this setting, pay for performance solves the trade-off between the need to incentivize the manager and the desire to insure him against idiosyncratic risk. According to this view, a firm chooses low- or high-powered

compensation packages depending on the relative importance of managerial risk-aversion and incentives. Starting with Jensen and Murphy (1990), skepticism grew among academics on whether this view provides a satisfactory explanation for the recent trends in executive compensation. Two alternative economic views have been suggested to explain executive compensation trends: one, managerial rent extraction, and second, efficient matching between managerial skills and firm characteristics.

The first explanation links executive compensation to managers' ability to extract rents (see Bertrand and Mullainathan 2001, Bebchuk and Fried 2004, Kuhnen and Zwiebel 2009). According to this view, weaker corporate governance allows managers to skim profits from the firm, thereby leading to higher executive compensation. Even though this is currently the most popular explanation for the high executive pay, it begs several questions: If better corporate governance is the solution to excessive executive compensation, why don't all shareholders demand better corporate governance? Moreover, why are CEOs of well-governed firms also paid a lot? In our model, we treat corporate governance as a choice of the firm. We show that better corporate governance could indeed reduce managerial pay. However, when there is an active market for scarce managerial talent, firms are forced to choose weaker corporate governance and to leave rents for managers. In this respect, our contribution is to clarify the link between corporate governance, pay for performance and scarcity of managerial talent.

The second explanation relates the level of executive pay to exogenous heterogeneity in firm size. Gabaix and Landier (2008), Terviö (2008), and Edmans, Gabaix and Landier (2009) present matching models à la Rosen (1981) in which the differences in size across firms predict some of the well-documented empirical facts on executive compensation. Gabaix and Landier (2008) and Terviö (2008) show that the empirically documented positive cross-sectional correlation between firm size and compensation may optimally arise in a setup where managerial talent has a multiplicative effect on firm performance and managers are compensated according to their increase in productivity as better managers will be matched to larger firms. Similarly, Edmans, Gabaix and Landier (2009) present a model in which both the low ownership and its negative correlation with firm size arise as part of an optimal

contract.[1]

Our model builds upon this part of the literature because we treat firm size as an endogenous variable. In particular, we explore the impact of the extent of real investment on the market for managerial talent and corporate governance. We show that investment size may be a viable way to attract better managers and thereby determine the equilibrium choice of size by ex-ante identical firms. We find that indeed firms that invest more will attract better managers but will choose worse corporate governance. Conversely, firms that invest less will attract worse managers and will choose better corporate governance.

Also, managers in our model can be incentivized to behave in the interest of their shareholders through a combination of incentive contracts and corporate governance, where governance acts as a substitute for compensation, as shown by Core et al. (1999) and Fahlenbrach (2009). Fahlenbrach (2009), in particular, finds that there is more pay for performance in firms with weaker corporate governance, as measured by less board independence, more CEO-Chairman duality, longer CEO tenure, and less ownership by institutions. Similarly, Chung (2008) studies the adoption of the Sarbanes-Oxley Act of 2002 and shows that firms required to have more than 50% of outside directors (interpreted as an improvement in shareholder governance) decreased significantly their CEO pay-performance sensitivity relative to the control group.

Finally, our paper is also related to a growing literature on spillover and externality effects in corporate governance initiated by Hermalin and Weisbach (2006), who provide a framework for assessing corporate governance reforms from a contracting standpoint and justify the need for regulation in the presence of negative externalities arising from governance failures. Acharya and Volpin (2010) and Dicks (2009) formalize this argument in a model where the choice of corporate governance

[1]Within this framework, the recent rise in compensation can be related to changes in the types of managerial skills required by firms. For example, Murphy and Zábojník (2007) argue that CEO pay has risen because of the increasing importance of general managerial skills relative to firm-specific abilities. Supportive evidence is provided by Frydman and Saks (2008). Cremers and Grinstein (2009) study CEOs movements for the period between 1993 and 2005 and find that the characteristics of the market for CEOs differs across industries. Specifically, the proportion of CEOs coming from firms in other sectors significantly varies across industries, indicating that there is not a unique pool of managers that all firms compete for, but instead many pools specific to individual industries.

in one firm is a strategic substitute for corporate governance in another firm. As in this paper, the externality therein is due to competition for managerial talent among firms. In a somewhat different context, Nielsen (2006) and Cheng (2009) model the negative externalities caused by earnings manipulation across firms. Nielsen (2006) considers a setting where governance improves publicly disclosed information about a firm and facilitate managerial assessment in competing firms. Cheng (2009) shows that earnings management in one firm may induce earnings management in other firms in the presence of relative performance compensation.

3 Theoretical Analysis

The basic idea of our model is that firms compete for managers by choosing governance as part of an optimal incentive contract. We show below that in the presence of competition for scarce managerial talent, in equilibrium firms are indifferent between hiring a better manager, investing more and choosing weaker governance regime, and hiring a worse manager, investing less and setting a stronger governance regime.

3.1 Setup of the Model

Consider an economy with n firms and m managers. There are two types of managers, m_H are high-quality, well-established managers with a strong track-record (H-type), and m_L are low-quality, possibly less-experienced managers (L-type): type H have high productivity $e_H = 1$, while type L have low productivity $e_L = e < 1$. We assume that the mass of L-type managers is greater than the mass of firms: $m_L > n$. However, the H-type managers may or may not be enough to be hired by all firms: in what follows, we will consider the case when $m_H < n$ so that there is competition for managerial talent. In the extension, we discuss what happens when $m_H \geq n$ and thus there is no effective competition for managerial talent.

All firms are ex-ante identical and have to make the following decisions (the timeline is as in Figure 1):

At $t = 1$, each firm's founder chooses a manager from a pool of candidates of observable quality $\widetilde{e} \in \{e, 1\}$. Managers are risk averse and have the following utility

function:

$$U = E(w) - \frac{1}{2} A \, Var(w) \tag{1}$$

where $A \geq 0$ is the coefficient of absolute risk aversion, $w \geq 0$ is the (random) total pay received by the manager. Given that types are observable, each firm advertises two jobs, one for L-type managers and one for H-type managers, each with its own compensation contract. Managers apply for one of the jobs. After the managers' choices, each firm chooses a manager from those who have applied for a job. If a manager is not employed at the end of this stage, he receives a reservation utility equal to 0. Similarly, a firm that does not employ any managers receives an output equal to 0.

Compensation contracts have the following general form: they include a fixed payment $b \geq 0$, which is paid independently of performance (the signing bonus); a performance-related bonus $p \geq 0$, which is contingent on the verifiable output X and paid at $t = 4$; and a severance payment $s \geq 0$, which is conditional on the manager leaving the firm voluntarily at $t = 3$.[2] Moreover, as part of the incentive package, at $t = 1$ the firm also chooses the investment size $I \geq 0$ at a cost rI (with $r \geq 1$ being the cost of capital) and the level of corporate governance $g \in [0, 1]$, which comes at a cost $kIg^2/2$ (where k is a constant).[3] The benefit of corporate governance is that it reduces the cost of firing the manager in the future, if shareholders desire to do so, and thus it reduces managerial entrenchment. For instance, governance increases coordination among shareholders and makes board of directors more effective and independent. Specifically, we assume that shareholders receive a fraction g of the surplus from renegotiation (when the replacement decision is taken at $t = 3$) and the manager a fraction $1 - g$.

At $t = 2$, managers choose action $Z \in \{M, S\}$, where choice M generates a payoff $X = 0$ for the firm and a private benefit B for the manager; while action S generates a payoff $X = Y(I)$ with probability $\widetilde{e}$ and $X = 0$ otherwise, and no private benefits

[2]In this we follow Almazan and Suarez (2003), who show that severance payments are part of an optimal incentive scheme for managers.

[3]This cost reflects the costs of investing in auditing and information technology to make sure that the board of directors can detect and replace poorly performing managers. It also captures the indirect costs of hiring truly independent directors rather than directors who are better at advising the CEO on strategic decisions.

for the manager. The choice of action is not observable by shareholders.[4]

At $t = 3$, shareholders and managers observe a signal $\widetilde{x} \in \{Y(I), 0\}$ on the expected output X. After observing this signal, the manager can choose to leave voluntarily, in which case he is paid the severance pay s. Otherwise, he can bargain with the firm, in which case the firm and the manager receive a fraction g and $1-g$ of the surplus, respectively, as explained earlier. If there is a turnover, a replacement manager produces at $t = 4$ an output $y_T(I) = \delta I$ net of his compensation, where $\delta \in (0, 1)$.

At $t = 4$, output is realized and distributed; and performance-related bonus p is paid.

We make the following technical assumptions:

(i) Types are observable: in an extension, we consider the case in which types are not known by anyone (symmetric information).

(ii) $k > \delta$: to ensure an internal solution for the choice of governance.

(iii) $e \geq 1 - \frac{1}{2AB}$: to ensure that there is a solution to the incentive problem of the manager.

(iv) $Y(I) > I$, $Y' > 0$, $Y'' < 0$, $\lim_{I \to 0} Y'(I) = \infty$, $\lim_{I \to \infty} Y'(I) < 1$: to ensure an internal solution for the choice of investment.

(v) The signal $\widetilde{x}$ at $t = 3$ is perfectly informative: this assumption can be relaxed without changing the substance of the paper.

(vi) Tie-breaking assumption: when firms are indifferent about which manager to hire, they choose to employ the H-type manager.

3.2 Competition for Managers

To derive the equilibrium, we proceed by backwards induction, starting from the replacement of incumbent CEO at $t = 3$.

[4] An alternative interpretation of the L-type managers is that they are managers with uncertain productivity. With probability e, they are as good as H-type managers. Otherwise, they produce 0.

3.2.1 Severance Payment and Turnover

Firing the CEO generates an output $\delta I < Y(I)$ (from the replacement manager). Hence, the manager will not be fired if $\widetilde{x} = Y(I)$. Now, consider the case in which $\widetilde{x} = 0$. In this case, since $\delta I > 0$ there is a case for managerial turnover (as without it both the firm and the manager receive a payoff of 0).

If $s \geq (1-g)\delta I$, there is a voluntary turnover and the manager leaves with the severance pay s. If $s < (1-g)\delta I$, there is a forced turnover but the manager extracts a compensation equal to $(1-g)\delta I$. We focus on renegotiation-proof contracts. Hence, we restrict the choice of contracts such that $s = (1-g)\delta I$ must hold in equilibrium. The firm's payoff if $\widetilde{x} = 0$ is therefore $g\delta I$.

3.2.2 Compensation Contract and Corporate Governance

Now consider the firm's choice of incentive contract and corporate governance at $t = 1$. Given that types are observable, firms offer a menu of contracts (b_i, g_i, p_i, I_i) for each type $i = \{H, L\}$.

To solve for the optimal contracts, first we need to derive the manager's incentive compatibility and participation constraint. Starting with the incentive compatibility condition, if the manager chooses action $Z = M$, output always equals 0 and manager's utility equals

$$U(M) = b_i + (1-g_i)\delta I_i + B \tag{2}$$

If he chooses action $Z = S$, then his utility equals

$$U(S) = b_i + (1-g_i)\delta I_i + e_i\left[p_i - (1-g_i)\delta I_i\right] - \frac{1}{2}Ae_i(1-e_i)\left[p_i - (1-g_i)\delta I_i\right]^2 \tag{3}$$

Hence, we can derive the incentive compatibility (IC) condition $U(S) \geq U(M)$ as follows

$$\left[p_i - (1-g_i)\delta I_i\right] - \frac{1}{2}A(1-e_i)\left[p_i - (1-g_i)\delta I_i\right]^2 \geq \frac{B}{e_i} \tag{4}$$

Provided that the (IC) constraint is satisfied, the corresponding participation constraint (PC) becomes

$$b_i + (1-g_i)\delta I_i + e_i[p_i - (1-g_i)\delta I_i] - \frac{1}{2}Ae_i(1-e_i)\left[p_i - (1-g_i)\delta I_i\right]^2 \geq \overline{u}_i \tag{5}$$

where $\overline{u}_i$ is manager's i reservation utility and will be endogenously determined so as to clear the market for managers.

It is useful to rewrite (IC) and (PC) in terms of the *net* incentive contract $\xi_i \equiv [p_i - (1-g_i)\delta I_i]$: the IC condition becomes

$$\xi_i - \frac{1}{2}A(1-e_i)\xi_i^2 \geq \frac{B}{e_i} \tag{6}$$

while the PC condition takes the form

$$b_i + (1-g_i)\delta I_i + e_i\xi_i - \frac{1}{2}Ae_i(1-e_i)\xi_i^2 \geq \overline{u}_i \tag{7}$$

Then, we can solve the second order equation in ξ_i to find the incentive-compatible contract

$$\xi_i = \begin{cases} \frac{1-\sqrt{1-2AB\frac{1-e}{e}}}{A(1-e)} \equiv \xi(e) & \text{if } i = L \\ B & \text{if } i = H \end{cases} \tag{8}$$

Because of the definition of ξ_i, the IC condition becomes:

$$p_i \geq (1-g_i)\delta I_i + \xi_i. \tag{9}$$

In a competitive equilibrium, each firm must solve for the optimal contracts for each type of managers, taking as given the behavior of other firms, that is, taking as given $\overline{u}_L$ and $\overline{u}_H$. Then, $\overline{u}_L$ and $\overline{u}_H$ are determined so as to clear the market for managers. Since there are more L managers than firms, there is no effective competition for them, so we already know that $\overline{u}_L = 0$.

Analyzing the optimal incentive contracts conditional on the manager's type, we can derive the following result:

Lemma 1: *The optimal contract for a $L-$type manager is:*

$$(b_L, p_L, s_L, g_L, I_L) = \left(0, (1-\frac{\delta}{k})\delta I_L + \xi(e), (1-\frac{\delta}{k})\delta I_L, \frac{\delta}{k}, Y'^{-1}\left(\delta + \frac{r}{e} - \frac{\delta^2}{2ke}\right)\right)$$

with associated profit for the firm equal to $e\left[Y(I_L) - \delta I_L - \xi(e)\right] + \frac{\delta^2}{2k}I_L - rI_L$.

The optimal contract for a $H-$type manager depends on $\overline{u}_H$:

(i) If $\overline{u}_H \leq (1-\frac{\delta}{k})\delta Y'^{-1}\left(\delta + r - \frac{\delta^2}{2k}\right) + B$, the optimal incentive contract is

$$(b_H, p_H, s_H, g_H, I_H) = \left(0, (1-\frac{\delta}{k})\delta I_H + B, (1-\frac{\delta}{k})\delta I_H, \frac{\delta}{k}, Y'^{-1}\left(\delta + r - \frac{\delta^2}{2k}\right)\right)$$

with associated profit equal to $Y(I_H) - \delta I_H - B + \frac{\delta^2}{2k} I_H - r I_H$.

(ii) If $\overline{u}_H > (1 - \frac{\delta}{k})\delta Y'^{-1}\left(\delta + r - \frac{\delta^2}{2k}\right) + B$, *the optimal incentive contract is*

$$(b_H, p_H, s_H, g_H, I_H) = \left(\overline{u}_H - p_H, p_H, \delta I_H, 0, Y'^{-1}(r)\right)$$

with $p_H \in [\delta Y'^{-1}(r) + B, \overline{u}_H]$ *and associated profit* $Y(Y'^{-1}(r)) - \overline{u}_H$.

Proof: See Appendix.

Intuitively, when a manager's outside option is low (which is always the case for L-type managers and is true for H types only when $\overline{u}_H$ is sufficiently small), firms only need to satisfy the incentive compatibility condition. Hence, they can choose the bonus $b_i = 0$ and the pay for performance p_i so that to satisfy the incentive compatibility condition with equality: $p(i) = (1 - g_i)\delta I_i + \xi_i$. Given this incentive contract, firms can choose governance $g(i)$ and investment $I(i)$ to maximize expected profits. This implies that $g(i) = \delta/k$ and $I(i) = Y'^{-1}\left(\delta + \frac{r}{e_i} - \frac{\delta^2}{2ke_i}\right)$.

When instead the manager's outside option is high (which happens only for H-type managers when $\overline{u}_H$ is sufficiently high), the participation constraint is strictly binding. Hence, pay for performance is chosen to satisfy the incentive compatibility condition (although the latter will not be strictly binding), $p_H \in [\delta I_H + B, \overline{u}_H]$, while the bonus b_H will make sure that the participation constraint is strictly binding, $b_H = \overline{u}_H - p_H$. Because in this case the manager is paid a rent $\overline{u}_H$, firms face weaker incentives to invest in corporate governance. The manager's rent is unaffected by the firm's choice of corporate governance, and therefore the firm chooses $g_H = 0$. Precisely because of this sub-optimal choice of governance, the firm chooses a sub-optimal level of investment I_H: $I_H = Y'^{-1}(r)$. Notice that firms hiring a H-type in this case are overinvesting because they do not internalize that managers extract some of the marginal value of investing through their compensation. They fail to do so because they take executive compensation $\overline{u}_H$ as given.

It follows from Lemma 1 that firms strictly prefer to hire a $H - type$ manager if

$$\overline{u}_H < Y(I_H) - e\left[Y(I_L) - \delta I_L - \xi(e)\right] + \left(r - \frac{\delta^2}{2k}\right) I_L \tag{10}$$

where $I_H = Y'^{-1}(r)$ and $I_L = Y'^{-1}\left(\delta + \frac{r}{e} - \frac{\delta^2}{2ke}\right)$; they strictly prefer to hire a

$L-type$ manager if

$$\overline{u}_H > Y(I_H) - e\left[Y(I_L) - \delta I_L - \xi(e)\right] + \left(r - \frac{\delta^2}{2k}\right) I_L \tag{11}$$

Given that there are fewer $H-type$ managers than firms, competition among firms will drive their reservation utility $\overline{u}_H$ up to the point where $H-type$ managers appropriate all the excess value they generate. Hence, firms must be indifferent between hiring a H or a L manager. Therefore,

$$\overline{u}_H = Y(I_H) - e\left[Y(I_L) - \delta I_L - \xi(e)\right] + \left(r - \frac{\delta^2}{2k}\right) I_L. \tag{12}$$

For this to be an equilibrium, we need to check that there is no profitable deviation. Increasing the total compensation $b_H + p_H$ for $H-type$ managers above $\overline{u}_H$ would not be profitable because the firm will attract the $H-type$ managers but pay them so much that it will be better off hiring a $L-type$ manager. Decreasing the total compensation for $H-type$ managers below $\overline{u}_H$ would not be profitable because the firm will attract none of the $H-type$ managers but will still be able to hire a $L-type$ manager, obtaining the same expected profits. Therefore, we can conclude with the following result:

Proposition 1 (Competition for managerial talent) *All firms offer two contracts contingent on the observable manager type:*

(i) to the $H-type$ manager, firms offer the contract

$$(b, p, s, g, I) = (\overline{u}_H - p_H, p_H, \delta I_H^*, 0, I_H^*)$$

where $p_H \in [\delta Y'^{-1}(r) + B, \overline{u}_H]$ and $I_H^* \equiv Y'^{-1}(r)$;

(ii) to the $L-type$ manager, firms offer the contract

$$(b, p, s, g, I) = \left(0, (1 - \frac{\delta}{k})\delta I_L^* + \xi(e), (1 - \frac{\delta}{k})\delta I_L^*, \frac{\delta}{k}, I_L^*\right),$$

where $I_L^* \equiv Y'^{-1}\left(\delta + \frac{r}{e} - \frac{\delta^2}{2ke}\right)$, $\xi(e) = \frac{1-\sqrt{1-2AB\frac{1-e}{e}}}{A(1-e)}$ and

$$\overline{u}_H = Y(I_H^*) - e\left[Y(I_L^*) - \delta I_L^* - \xi(e)\right] - \frac{\delta^2}{2k} I_L^* - r\left(I_H^* - I_L^*\right).$$

All $H-type$ managers and $n - m_H$ of the $L-type$ managers are employed.

This is the key result of the model. When the quality of the manager is observable, the competition among firms to employ better managers implies that the latter ones appropriate all the additional rents they produce. Given that corporate governance is used by firms to reduce managerial rents, firms hiring H-type managers are better off by saving the cost of investing in corporate governance. Conversely, firms hiring L-type managers face no competition and can, therefore, keep managerial compensation down to the incentive compatibility constraint. Thus, these firms choose the optimal level of corporate governance. This relation between competition for managers and corporate governance extends to the choice of investment or firm size. Because firms hiring the L-type managers choose the optimal level of governance, they fully internalize the marginal benefits and costs of investing and choose the optimal level of investment, conditional on hiring L-type managers. Conversely, firms hiring the H-type managers choose a higher investment than optimal because, by taking managerial compensation $\overline{u}_H$ as given, they do not internalize the costs of doing so in terms of higher managerial compensation.

3.3 Extensions

In this section, we briefly discuss two extensions of the basic model. First, we consider the case in which there is no effective competition for managers as the number of H-type managers is greater than the number of firms. Second, we consider the case in which there is no information on managerial quality with firms. In both cases, there is no distortion in the choice of corporate governance and investment.

3.3.1 No competition

In this section we consider the special case in which $m_H \geq n$ and thus there is no effective competition for managerial talent. Given that there are enough managers of both types, the participation constraint is redundant for both types and the incentive compatibility condition is strictly binding. Hence:

Proposition 2 (No effective competition for managerial talent) *All firms will hire $H-$type manager, with the contract*

$$(b, p, s, g, I) = \left(0, (1 - \frac{\delta}{k})\delta I^* + B, (1 - \frac{\delta}{k})\delta I^*, \frac{\delta}{k}, I^*\right)$$

where $I^* \equiv Y'^{-1}\left(\delta - \frac{\delta^2}{2k} + r\right)$. *A fraction* n/m_H *of the* $H-$*type manager are hired.*

Proof: See Appendix.

This solution can be considered the "constrained efficient" benchmark (that is, efficient given the principal-agent problem) for the analysis that precedes. In particular, when comparing this benchmark to Proposition 1, we obtain that without competition for managerial talent, the H-type managers are paid less and work in firms with better governance and larger size; whereas there is no difference for firms that hire the L-type managers.

3.3.2 Unknown managerial quality

We have assumed so far that managerial quality is perfectly observable. This is an important assumption but it can be relaxed. The results can be extended to the cases in which there are only imperfect signals about the quality of managers. As long as these signal contain some information, so that the expected productivity of H-type managers is strictly greater than the productivity of L-type managers, the analysis would follow similarly.

If instead, there is no information with firms about the quality of managers, the results are quite different. In that case, since all managers are ex-ante identical and they are more than the number of firms ($m_H + m_L > n$), there is no effective competition for managers. Hence, the manager's outside option is equal across types and equal to the reservation utility from being unemployed ($\overline{u} = 0$). The manager's expected profitability is then

$$\frac{m_H}{m_H + m_L} + \frac{m_L}{m_H + m_L} e \equiv \overline{e} \tag{13}$$

Adapting the analysis done before, we can show the following result:

Proposition 3 (No information about managerial talent) *The optimal incentive contract is:*

$$(b, p, s, g, I) = \left(0, (1 - \frac{\delta}{k})\delta I^* + \xi(\overline{e}), (1 - \frac{\delta}{k})\delta I^*, \frac{\delta}{k}, I^*\right)$$

where $I^* = Y'^{-1}\left(\delta + \frac{r}{\overline{e}} - \frac{\delta^2}{2k\overline{e}}\right)$ *and* $\xi(\overline{e}) = \frac{1-\sqrt{1-2AB\frac{1-\overline{e}}{\overline{e}}}}{A(1-\overline{e})}$.

Proof: See Appendix.

Notice that the choice of corporate governance is (on average) higher than in the case with known type and competition among firms for scarce managerial talent. However, since the level of investment cannot be conditioned any more on the managerial type, investment is higher than optimal if ex post the firm finds out that the manager is a L-type and lower than optimal if the type is H.

4 Empirical Analysis

In this section, we develop the two main testable implications of the model. Then, we present the empirical methodology. Finally, we discuss our results.

4.1 Empirical Predictions

The model is based on two basic ideas. First, pay-for-performance and corporate governance are substitute mechanisms to solve an principal-agent problem.[5] Second, firms with poor corporate governance generate a spillover for other firms via the market for managers. Specifically, the option to work for firms with weaker governance raises the participation constraint for managers and forces other firms to pay managers more.[6] Hence, our first test is:

Prediction 1 (Externality in corporate governance): *Executive compensation and the proportion of pay-for-performance in a firm is decreasing in the quality of the governance of the firm itself and the governance of its competitors.*

The main result of the model is Proposition 1: in equilibrium some firms will attract better managers by paying them more, choosing weaker governance standards and larger size; others will attract worse managers by paying them less, choosing

[5]Formally, from the IC constraint, $p_i = (1 - g_i)\delta I + \xi(e_i)$, so that corporate governance g_i and executive compensation p_i are substitutes.

[6]Formally, this follows from the participation constraint after replacing the outside option for a manager who works in firm i, $\overline{u}_i$ with the IC constraint of a competitor j: $\overline{u}_i = (1 - g_j)\delta I + B$, which is decreasing in g_j.

stricter corporate standards and smaller size. Thus, provided that we can find an appropriate measure of managerial talent, our main empirical prediction is:

Prediction 2 (Matching equilibrium): *Better quality managers receive higher pay, are matched to firms that have weaker governance standards and larger size.*

4.2 Empirical methodology

To test for the presence of spillover effects in the choice of corporate governance, we regress the total CEO compensation of firm i at the end of year t on a measure of firm i's own corporate governance and on the corporate governance of the firms that constitute the outside option for firm i's CEO. We calculate this outside option as follows: we assume that a current CEO can find a CEO job in another firm of similar size.

Hence, to test the first prediction, we estimate the following equation:

$$\begin{aligned} \text{Compensation}_{it} = \; & \alpha_G \times \text{Governance}_{it} + \alpha_E \times \text{Outside Governance}_{it} + \\ & + \beta X_{it} + \varphi_{ind/i} + \lambda_t + \varepsilon_{it} \end{aligned} \tag{14}$$

where the dependent variable is total compensation, X_{it} are time variant firm-specific controls that could affect compensation and λ_t and $\varphi_{ind/i}$ are time and either industry or firm dummies, respectively. Our model would predict that both α_G and α_E should be negative. The first prediction ($\alpha_G < 0$) captures the idea that corporate governance is a substitute for executive compensation. The second prediction ($\alpha_E < 0$) reflects the idea that there is a positive externality in the choice of corporate governance across firms: the firm can pay the CEO less if the outside option is worse.

To further explore the choice of governance as part of an optimal incentive contract, we estimate the specification above by employing as dependent variable a measure of the use of variable pay (the size of bonuses and stock option as a percentage of total compensation) instead of total compensation. As before, our model would predict that both α_G and α_E should be negative.

To make sure that the governance channel is independent of the effect of size uncovered by Gabaix and Landier (2008), our time variant firm-specific controls (X_{it})

include the firm's market capitalization. We also control for CEO characteristics (age, tenure and whether the CEO is an external hire) and board composition (its size, the proportion of independent directors and whether the CEO is also the Chairman of the Board). We do so to make sure that our effect is not due to an unobservable variable that captures the power or the influence of the CEO, as argued by Bebchuk and Fried (2004). We control for board size because larger boards are less effective at monitoring CEOs (as argued by Yermack, 1996). Similarly, we control for the fraction of independent directors because firms with more independent directors are more effective at disciplining managers (Weisbach, 1988). The inclusion of year dummies is to capture any economy-wide time pattern in managerial compensation.

Finally, to be able to test our main empirical prediction, we need to develop a measure of managerial ability (γ_j). For this purpose, we follow Bertrand and Schoar (2003) and Graham, Li and Qiu (2008) and compute the (unobserved) CEO impact on performance, where the latter is measured by return on assets. The idea is to attribute to CEO ability the return on assets in excess of the value predicted by firm-level and time-varying control variables. More precisely, we estimate

$$ROA_{it} = \beta X_{it} + \delta_t + z_{ind} + \gamma_j + \varepsilon_{it}, \tag{15}$$

where ROA_{it} stands for return on assets for firm i in period t. X_{it} are some time variant firm characteristics that include size, book leverage, cash, interest coverage, dividend earnings, Tobin's q and governance measures. δ_t are time fixed effects. z_{ind} are industry fixed effects. The parameter γ_j is a fixed effect for a CEO, i.e., a dummy variable that takes value one when CEO j works in firm i and zero otherwise. This is our measure of managerial ability as it captures the unobserved (and time invariant) managerial effect on return on assets. There is an important caveat in this analysis: γ_j does not capture absolute CEO ability, but CEO ability *relative* to the industry.

Thus, the crucial identification strategy for our model is that the firm could have attracted any other manager in their industry if it wanted. Cremers and Grinstein (2009) document that most of the managerial mobility takes place within an industry so industry dummies constitute a natural starting point.[7]

[7]To control for any endogenous manager-firm matching, we repeat the estimation of γ_j including firm fixed effects instead of industry dummies. Results are qualitatively similar but some coefficients lose statistical significance. We believe the inclusion of industry dummies is more appropriate, specially given the rather low mobility of CEOs across firms.

We use the estimated fixed effects $\widehat{\gamma}_j$ as regressors in the following specification:

$$\mathrm{Y}_{it} = \beta_\gamma \times \widehat{\gamma}_j + \upsilon_{jt} + \chi_t + z_{ind} + \xi_{it}, \tag{16}$$

where $\widehat{\gamma}_j$ are the CEO Ability coefficients estimated from regression (15). χ_t and z_{ind} are time and industry dummies and υ_{it} are a set of CEO characteristics. Time dummies should control for any time pattern while industry dummies control for the average quality of CEOs hired in a given industry. These are crucial for our analysis since we can only analyze governance up to the reference subsample average. Additionally, regression (16) presents a problem of generated regressors. We correct for it by adjusting the weight of each observation by the inverse of the $\widehat{\gamma}_j$ standard error from the first-stage estimation.

We estimate the specification above for different dependent variables Y_{it}, that correspond to different empirical predictions. Y_{it} will in turn be our measures of Corporate Governance, Executive Compensation and Firm Size. Our model predicts that (i) better managers work in firms that have lower corporate governance (that is, we expect $\beta_\gamma < 0$ when Y_{it}=Governance$_{it}$); (ii) better managers are paid more (that is, $\beta_\gamma > 0$ when Y_{it}=Compensation$_{it}$); and (iii) better managers work in larger firms (that is, $\beta_\gamma > 0$ if Y_{it}=Firm Size$_{it}$).

An additional empirical implication of our mode is that poor-quality managers should be replaced at an interim stage while better quality managers stay until the end. We test this empirical prediction using a duration model as follows

$$h(t) = Pr(T = t|T \geq t, X_{it}) = F(\beta_\gamma \times \widehat{\gamma}_j + \upsilon_{jt} + \chi_t + z_{ind} + \xi_{it} \tag{17}$$

where h(t) is the hazard function, defining the failure event as manager turnover. As above, χ_t and z_{ind} are time and industry dummies and υ_{it} are a set of CEO characteristics. The model's prediction is a positive correlation between CEO quality and employment length.

To sum up, we test the main prediction of the model by running a within-industry two-stage analysis. In the first stage, we obtain individual CEO skills relative to the other CEOs employed in the industry from specification (15). In the second stage, we run regressions (16) and (17), to test whether these relative CEO abilities (compared with other CEO abilities in the industry) are correlated with corporate governance, CEO compensation, firm size and turnover, as predicted by our model.

Finally, our model highlights the role of corporate governance as part of an optimal compensation contract. Therefore, most of the changes in corporate governance should happen around turnover, when the new compensation contract is agreed. More precisely, we should observe a negative correlation between the change in the manager quality and the change in firms' governance standards. To test this prediction we estimate the following logit model:

$$\text{Governance Chg}_{it} = F(\beta_T Turnover_{it} + \upsilon_{jt} + \chi_t + z_{ind} + \xi_{it}), \tag{18}$$

where Governance Chg_{it} measure the changes in corporate governance and Turnover_{it} captures the changes in managerial ability ($\widehat{\gamma}_j$). As in all the previous regressions, χ_t and z_{ind} are time and industry dummies and υ_{it} are a set of CEO characteristics.

4.3 Data description

We use firm-level financial variables from Compustat: *ROA* is the ratio of EBITDA (item `ib`) over lagged total assets (item `at`); *Cash* is cash and short-term investments (item `che`) over net property, plant, and equipment at the beginning of the fiscal year (item `ppent`); *Interest Coverage* is earnings before depreciation, interest, and tax (item `oibdp`) over interest expenses (item `xint`); and *Dividend Earnings* is the ratio of the sum of common dividends and preferred dividends (items `dvc` and `dvp`) over earnings before depreciation, interest, and tax (item `oibdp`). We define *Book Leverage* as the ratio of long and short term debt (items `dltt` and `dlc`) to the sum of long and short term debt plus common equity (items `dltt`, `dlc` and `ceq`) and Tobin's q as the ratio of firm's total market value (item `prcc_f` times the absolute value of item `csho` plus items `at` and `ceq` minus item `txdb`) over total assets (item `at`). *Market Cap* is the firm's total market value (item `prcc_f` times the absolute value of item `csho` plus items `at` and `ceq` minus item `txdb`). All variables are winsorized at the 1 percent level.

As commonly done, we exclude financial, utilities and governmental and quasi governmental firms (SIC codes from 6000 to 6999, from 4900 to 4999 and bigger than 9000; respectively) both because their measure of return on assets may not be appropriate and/or because their competition for managerial talent may be distorted. We use the 49 Fama-French Industry classification: our final sample includes 36 different industries.

Our principal measure of firm corporate governance is the Gompers et al. (2003) governance index, which we obtain from RiskMetrics. The *G-Index* ranges from 1 to 24 and one point is added for each governance provision restricting shareholders right with respect to managers (for further details see Gompers et al. 2003).[8] A higher *G-Index* indicates more restrictions on shareholder rights or a greater number of anti-takeover measures. Therefore, a higher value of the *G-Index* corresponds to a lower g in our theoretical representations. Hence, all coefficient signs on the empirical predictions using the *G-Index* switch sign with respect to the ones using our theoretical g governance measure. To fill the gaps between reported values, we follow Gompers et al. (2003) and assume that any change happens at the end of the missing period.[9]

One limitation of the *G-Index* is that it measures outside governance, that is the strength of anti-takeover rules. As such, it is only partly in the control of shareholders as differences in this index may be driven by state legislation. As a complementary proxy for corporate governance we use *CEO Duality*, which is a dummy variable that takes the value 1 if the CEO is also the Chairman of the board. This has been emphasized, for example, by Fahlenbrach (2009), as an important measure of corporate governance that is in the control of shareholders.

As a robustness check, we also control for *Board Size*, which is defined as the logarithm of the number of board members, and the *Fract Indep*, which is the proportion of independent directors on the board.

We obtain our measures of executive compensation from ExecuComp focusing on the CEO as the "manager". We measure *Total Compensation* as natural logarithm of item `tdc1`. We define *Pay for Performance* as the ratio of bonuses and stock options (the latter is the natural logarithm of the Black Scholes value of options granted:

[8]The list of provisions included in the G-Index are as follows: Antigreenmail, Blank Check, Business Combination laws, Bylaw and Charter amendment limitations, Control-share Cash-out laws, Classified Board (or staggered board), Compensation Plans, Director indemnification Contracts, Control-share Acquisition laws, Cumulative Voting, Directors Duties provisions, Fair-Price provisions, Golden Parachutes, Director Indemnification, Limitations on director Liability, Pension Parachutes, Poison Pills, Secret Ballot, Executive Severance agreements, Silver Parachutes, Special Meeting limitations, Supermajority requirements, Unequal Voting rights, and Limitations on action by Written Consent.

[9]We check for robustness by using linear interpolation, finding no significant change in the results.

item `option_awards_blk_value`) and total compensation, measured in percentage terms.

We also use ExecuComp to define: *CEO Tenure* as the difference between the current year and the year the executive became CEO (item `becameceo`); *CEO Age* as the age of the CEO and *External* as a dummy variable that takes value one if the CEO was not an executive in the firm the year before being appointed as CEO, and zero otherwise.

Summary statistics for all the variables are reported in Table 1. Our dataset spans the period from 1993 to 2007 as this corresponds to the RiskMetrics data availability.

4.4 Results

In this section, first we follow the same approach as in Gabaix and Landier (2008) but test for the presence of a positive externality in the choice of corporate governance across firms. Then, we address the main prediction of the model: whether firms choose weaker governance to attract better quality managers.

4.4.1 Governance Externality

Table 2 tests for the presence of a positive externality in the choice of corporate governance across firms, by estimating specification (14). To measure a CEO's outside option in a given year, we need to define the firms he could potentially work for if he were to leave the current firm. We match the firm for which the CEO is currently working with two firms in each of the 49 Fama-French industries, according to their market capitalization. Specifically, we select the two firms in that industry that are closest in market capitalization to the market capitalization of the firm the CEO is currently working for and we average their corporate governance measure. We then calculate *Competitor Governance* as the equally weighted average of these competing firms' governance measures, using as a measure of corporate governance either the *G-Index* scores or the *CEO Duality* indicator, as corresponding.[10]

[10]As a robustness check, we also calculate this outside option by as the weighted average of the governance indicators in similar-sized firms operating in different industries, where the weights are the CEO-transition probabilities estimated by Cremers and Grinstein (2009). Results are very similar and available upon request.

The governance measure in Table 2 is *G-Index*. In Panel A, the dependent variable is *Total Compensation* in firm i in year t. In Panel B, the dependent variable is *Pay for Performance*, the proportion of flexible pay as a percentage of total pay in firm i in year t. In Panel A, we show that, as predicted by our model, firms with weaker governance and with weaker competitors' governance pay their CEOs more. In other words, a worsening of governance standards in the firms competing for managerial talent is costly for the firm (even after controlling for its own governance), as it is associated with higher CEO compensation in equilibrium.

Panel B offers evidence that governance and pay for performance are substitutes. According to the model pay for performance p is decreasing in the quality of corporate governance g of the firm itself and of its competitors. Consistent with the evidence in Fahlenbrach (2009), in Column 1 we find that firms with weaker corporate governance (higher *G-Index*) make greater use of pay for performance. We extend Fahlenbrach's analysis to show that also competitors' corporate governance matters: if competitors have weaker corporate governance, then firms pay a larger portion of total compensation in the form of bonuses and stock options.

Since we control for market capitalization, the finding that governance matters for executive compensation is not due to spurious correlation with firm size. We confirm the result in Gabaix and Landier (2008) that executive compensation is indeed highly correlated with firm size but we show that the correlation between executive compensation and governance is statistically significant even *after* controlling for firm size.

The basic results are robust to several changes in specifications. First, as shown in Column 2, the results do not change when we control for board composition, as measured by the size of the board and the proportion of independent directors. Hence, the effect we are uncovering is not due to other governance variables.

Second, in Column 3, results weaken a little but do not change significantly when we control for CEO characteristics. In particular, the effect we are emphasizing is not due to CEO tenure, age or whether the CEO is an external (rather than an internal) hire. Third, the inclusion of firm fixed effects in Column 4 leads to similar point estimates but no statistical significance. However, this is to be expected given that most of our variables are not changing much over time at the firm level. Finally, the

results are robust to different specifications for clustering the standard errors; the table reports standard errors clustered at the firm and at the year level.

In terms of economic magnitude, Table 2, Panel A column 2 implies that a one standard deviation higher G-Index is associated with a 5% higher total compensation for the CEO. A similar increase in the Outside G-Index is associated with a 2.5% higher total compensation for the CEO. Similarly, Table 2, Panel B column 2 implies that a one standard deviation higher G-Index is associated with a 1% greater use of variable pay. A similar increase in the Outside G-Index is associated with a slightly smaller effect.

Table 3 offers a robustness analysis of these results where we use the *CEO Duality* indicator as our measure of corporate governance. The basic results are similar when using this measure, although they no longer statistically significant when we control for CEO characteristics or board composition.

4.4.2 Governance as a Selection Mechanism

We now turn to the main prediction of the model: firms might choose a low level of corporate governance to attract a better manager. To test this prediction, we first need to estimate CEO fixed effects. In Table 4, we show the results from regression (15) with several time dependent regressors (X_{it}) and time independent industry fixed effects (z_{ind}). We report the regression coefficients, overall fit of the model and some descriptive statistics of the estimated CEO fixed effects. We report the mean, minimum, maximum and standard deviation of the estimated CEO ability to show that CEO choice does indeed matter for firm performance.

Table 5 presents the empirical evidence regarding regression (16) and (17) in Panel A and B, respectively. Specifically in Panel A, we show evidence that better managers are employed by firms with lower corporate governance (Columns 1 and 2), are paid more (Column 3 and 4) and work in bigger firms (Columns 5). We use Weighted-Least-Squares estimators, where the weights are the inverse of the standard deviation of the CEO fixed effects estimated in the first stage. We control for industry/year fixed effects, and CEO characteristics (CEO tenure, age and external dummy).

First, in Columns 1 and 2 we focus on the main empirical prediction of our paper: the relation between corporate governance and managerial ability. To undertake this

test, we use the *G-Index* and *CEO Duality* as dependent variables. The results are statistically and significantly different from zero: as predicted by the model, increases in managerial quality are indeed associated with decreases in governance.[11]

In Column 3 and 4, we report the correlations between managerial talent (as proxied by the CEO fixed effect) and total compensation and pay for performance. Overall, we find strong support for our empirical prediction that better managers are paid more, and that they are paid more in the form of flexible pay (bonuses and options). In Column 5, we also confirm that better CEOs work in larger firms, as argued by Gabaix and Landier (2008).

In terms of economic magnitude, Table 5 implies that holding all else constant, one standard deviation increase in CEO talent (which corresponds to an increase by 0.1216 according to Table 4) implies a 0.4 point increase in G-Index (or decrease in governance), a 6% increase in the probability of CEO Duality, and a 12% increase in flexible pay.

In Panel B, we show evidence on specification (17). According to the model, better-quality managers stay longer in their firms. Using the estimated measure of CEO quality, we test a constant hazard rate duration model (in Columns 1 and 2) and a Cox model (in Columns 3 and 4). Columns 1 and 3 present our baseline analysis while, in columns 2 and 4, we focus on those CEOs under 65 years of age as these CEOs are less likely to be affected by retirement. Overall, we find strong support for our hypothesis in all the specifications: one standard deviation increase in the CEO ability leads to an 18% decrease in the hazard rate (using the specification reported in Column 1).

In Table 6, we sharpen the test of the key prediction of the model by looking at changes in governance around CEO turnovers. If poor corporate governance is chosen as part of the CEO incentive contract to attract better quality managers, we would expect that changes in corporate governance should be more common in times when

[11]It is important to notice the smaller number of observations in Column 1, where the *G-Index* is the dependent variable. The reason is that the *G-Index* is not available every year and we do not want to impose any assumptions on the specific year in which the actual change happens. Hence, we restrict the set of observations to all and only the observations for which we have a *G-Index*. This reduces the sample to about half of the entire sample (4,307 observations compared with 8,610 total observations).

the CEO is turned over. Moreover, we would expect governance to increase when the new CEO is of lower quality than the earlier CEO; and vice-versa governance should decrease when the new CEO is of better quality of the older one.

In Table 6 Panel A, we report summary statistics on changes in the G-Index and CEO turnover. Changes in governance happen in 34 percent of the observations: in 24 percent of the cases governance worsens (as the G-Index increases) while in 10 percent of the cases governance improves (as the G-Index decreases). There is a CEO turnover in about 17 percent of the observations. In 7 percent of the observations, the new CEO is of better quality than the earlier one (*Turnover Up*), while in 10 percent of the cases the new CEO is of worse quality of the earlier one (*Turnover Down*).

In Table 6 Panel B, we conduct the main test. In Column 1, we show that CEO turnovers are associated with a higher frequency of governance change. This is consistent with the model's assumption that governance is chosen as part of the CEO incentive scheme. In Columns 2 and 3, we test whether governance increases when the new CEO is worse than the old one and decreases when the new CEO is better than the old one. The indicator *Turnover Up* is indeed positively correlated with increases in governance in Column 2; while the indicator *Turnover Down* is indeed positively correlated with decreases in governance in Column 3.

In Columns 4 and 5, we restrict the sample to the observations in which there is CEO turnover, thus excluding all observations for which there is no turnover. We confirm the results found in Columns 2 and 3: governance worsens when the new CEO is of better quality of the old one (in Column 4) whiel governance improves when the new CEO is of worse quality of the old one (in Column 5).

Overall, these results provide evidence that better managers are paid more and are offered weaker corporate governance at the time of their hiring, consistent with our model.

5 Discussion

5.1 CEO power and governance

In our model, governance is chosen by firms as part of an optimal compensation arrangement taking account also the governance choices of other firms. Weak governance arises in the model as a mechanism for attracting better CEOs. This is consistent with the models by Almazan and Suarez (2003) and Marino and Zabojnik (2008), and the evidence in Rajan and Wulf (2006). Almazan and Suarez (2003) show that under certain conditions, shareholders find it optimal to relinquish some power to the CEO in order to save on the overall compensation costs. Marino and Zabojnik (2008) argue that perks may be part of an efficient incentive scheme when there are complementarities between consumption of perks and managerial effort. Rajan and Wulf (2006) consider a broad range of perks that are offered to CEOs and divisional managers and provide evidence that perks are used to enhance productivity.

A plausible alternative is that weak governance is not chosen by firms but is in fact an outcome of influence exercised by entrenched CEOs over time, a view that is consistent with Hermalin and Weisbach (1998) and Bebchuk and Fried (2004). To alleviate the concerns that CEO power and influence are the missing variables that explain the correlation between pay and governance, we control for CEO characteristics and board composition in Tables 2 and Table 3. Moreover, in Table 5, we show that CEOs that get entrenched are more likely to be of higher quality, which is not necessarily value destroying for shareholders.

5.2 Compensation versus governance trade-off

A key feature of our model is the assumption that there is a trade-off each firm faces in providing incentives to managers through pay and through stronger governance. If the costs of designing and enforcing governance were relatively low, such trade-off would not have much bite. Such costs are, however, at the heart of agency problems due to separation of ownership and control. Acharya and Volpin (2010) model such costs as arising due to the dispersed nature of ownership of firms. Intuitively, each owner does not internalize the full benefit of her investment in monitoring or information generation and thereby incentives to govern are weak. The owners may

choose delegated monitors, e.g., Board of Directors, but this delegation involves its own set of monitoring needs and agency problems. Conversely, if firms were financially constrained, then the costs of providing incentives through pay might become enormously high relative to costs of governance.

While we did not fully explore in our model and empirical tests the relative costs of pay and governance in optimal compensation arrangements, this seems to be a fruitful avenue for further research. In particular, it would be interesting to test if the governance externality we have highlighted is even more perverse in financially constrained firms. Such firms cannot afford to raise their CEO pay in response to weak governance of competitors, and must weaken their governance as well. This may render these firms even more financially constrained, precipitating their exit (or precluding their entry in the first place). Studying financially constrained firms may thus also help investigate the full efficiency costs of firms being forced by the managerial labor market to pick weak governance while hiring better talent.

5.3 Implications for regulation of corporate governance

Finally, it is interesting to consider implications of our model and results for regulation of governance. At a direct level, it provides a rationale for why governance standards might help. It would prevent firms from weakening governance too much for luring better managers and thereby allow all firms to retain stronger governance practices. In equilibrium, this would imply lower reservation wages for top management. As discussed above, when firms are financially constrained, this can free up pledgeable cash flows, lead to greater external financing and investments, and potentially even greater entry of new firms.

However, our model and results are not structurally calibrated to provide a firm recommendation on what this level of governance standards might be. Indeed, if they were picked to be too high, the ability of firms to use pay for providing incentives would get curbed excessively and the governance costs might in themselves reduce pledgeable cash flows and ability to invest. Subject to this important caveat, since weak governance in our model is an outcome of externality and coordination problem between firms, it provides a more reasonable justification for governance regulation than one that is based on according greater contracting powers to regulators relative

to investors.

6 Conclusion

In this paper, we theoretically explored the joint role played by corporate governance and competition among firms to attract better managers. In our principal agent problem, there are two ways to induce the manager to make the right decision: paying compensation in case of better performance and investing in corporate governance to punish managers if things go badly. We showed that when managerial ability is observable and managerial skills are scarce, competition among firms to hire better managers implies that in equilibrium firms will choose lower levels of corporate governance. Intuitively, the result follows from the fact that managerial rents cannot be influenced by an individual firm but instead are determined by the value of managers when employed somewhere else. Hence, if a firm chooses a high level of corporate governance, the remuneration package will have to increase accordingly to meet the participation constraint of the manager. It is therefore firms (and not managers) that end up bearing the costs of higher corporate governance with little benefit.

We provided novel empirical evidence supporting our model. Consistent with the presence of externality in corporate governance, executive compensation in a given firm is decreasing in the quality of firm's own corporate governance as well as in the governance of a matched competitor firm. In support of the assumption that executive compensation and corporate governance are chosen as part of an optimal compensation package, corporate governance changes significantly only when a new CEO is hired with better CEOs being offered weaker governance. Finally, the allocation of CEOs and firms is consistent with the model: we provided an empirical measure of managerial talent and found it is negatively correlated with indicators of corporate governance.

Our finding that corporate governance affects the matching between managers and firms has important implications for the debate on executive pay and governance. Specifically, while better governance may incentivize managers to perform better, it also reduces firms' ability to attract the best managers. These two effects offset each other and may explain why it has proven so hard so far to find direct evidence

that corporate governance increases firm performance. A notable exception is the link between governance and performance found in firms owned by private equity: Private equity ownership features strong corporate governance, high pay-for-performance but also significant CEO co-investment, and superior operating performance.[12] Since private equity funds hold concentrated stakes in firms they own and manage, they internalize better (compared, for example, to dispersed shareholders) the benefits of investing in costly governance. Our model and empirical results can be viewed as providing an explanation for why there exist governance inefficiencies in firms that concentrated shareholders such as private equity investors can "arbitrage" through their investments in active governance.

[12]See, for example, Jensen (1989) for theoretical argument, Kaplan (1989) for evidence on operational improvements due private equity ownership in early wave of leveraged buyouts (LBOs), and Acharya, Hahn and Kehoe (2008) on the LBOs during 1995 to 2005 (in the U.K. and the Western Europe).

Appendix

Proof of Lemma 1: Given that there are lots of L-type managers, their participation constraint is redundant (that is, $\overline{u}_L = 0$) and the incentive compatibility condition is strictly binding for the L-type managers. Hence,

$$p_L = (1-g)\delta I_L + \xi(e)$$

and $b_L = 0$. Hence, the founder's problem is simply

$$\max_{(g_L, I_L)} \; e\left[Y(I_L) - (1-g_L)\delta I_L - \xi(e)\right] + (1-e)g_L\delta I_L - k\frac{g_L^2}{2}I_L - rI_L$$

From the first order condition of this problem,

$$g_L^* = \frac{\delta}{k} \text{ and } I_L^* = Y'^{-1}\left(\delta + \frac{r}{e} - \frac{\delta^2}{2ke}\right)$$

Conversely, because of the scarcity of H-type managers, their participation constraint may or may not be binding. The case in which the participation constraint is not binding, $\overline{u}_H \leq (1-g_H)\delta I_H + B$, meeting the incentive compatibility condition implies also meeting the participation constraint. In such case, the founder's problem is simply

$$\max_{(g_H, I_H)} \; Y(I_H) - (1-g_H)\delta I_H - B - k\frac{g_H^2}{2}I_L - rI_L$$

From the first order condition of this problem,

$$g_H^* = \frac{\delta}{k} \text{ and } I_H^* = Y'^{-1}\left(\delta + r - \frac{\delta^2}{2k}\right)$$

Using the expression above, the initial constraint is satisfied if $\overline{u}_H \leq (1-\frac{\delta}{k})\delta Y'^{-1}\left(\delta + r - \frac{\delta^2}{2k}\right) + B$. If instead $\overline{u}_H > (1-\frac{\delta}{k})\delta Y'^{-1}\left(\delta + r - \frac{\delta^2}{2k}\right) + B$, the participation constraint is binding when the incentive compatibility constraint is satisfied. In such case, b_H and p_H are set so that

$$b_H + p_H = \overline{u}_H \;\&\; p_H \geq (1-g_H)\delta I_H + B$$

Thus, the founders problem becomes

$$\max_{(g_H, I_H)} \; Y(I_H) - \overline{u}_H - k\frac{g_H^2}{2}I_L - rI_L$$

From the first order conditions, $g_H^* = 0$ and $I_H^* = Y'^{-1}(r)$. ■

Proof of Proposition 2: The firm's profit can be written as:

$$\Pi_i = \begin{cases} e\left[Y(I) - \delta I\right] - e\xi(e) + g_L\delta I - rI - \frac{kIg_L^2}{2} & \text{if } i = L \\ Y(I) - \delta I - B + g_H\delta I - rI - \frac{kIg_H^2}{2} & \text{if } i = H \end{cases}$$

From the first order condition, notice that the optimal choice of governance is independent of the manager's type: $g_L = g_H = \frac{\delta}{k}$. Also notice that the profits are strictly greater with $i = H$. Hence, all firms hire H-types and the optimal incentive contract is:

$$b^* = 0,\; g^* = \frac{\delta}{k},\; p_i^* = (1-\frac{\delta}{k})\delta I + B$$

while $I^* : Y'(I^*) = \delta\left(1 - \frac{\delta}{2k}\right) + r$. ■

Proof of Proposition 3: As before, the severance payment is $s = (1-g)\delta$. If the manager chooses action $Z = M$, output will always equal 0 and his utility equals

$$U_M(M) = b + (1-g)\delta I + B$$

If he chooses action $Z = S$, then his utility equals

$$U_M(S) = b + (1-g)\delta I + \overline{e}\left[p - (1-g)\delta I\right] - \frac{1}{2}A\overline{e}(1-\overline{e})\left[p - (1-g)\delta I\right]^2$$

Hence, we can derive the incentive compatibility condition $U_M(S) \geq U_M(M)$ as follows

$$\left[p - (1-g)\delta I\right] - \frac{1}{2}A(1-\overline{e})\left[p - (1-g)\delta I\right]^2 \geq \frac{B}{\overline{e}} \tag{A1}$$

The corresponding participation constraint is

$$b + (1-g)\delta I + \overline{e}[p - (1-g)\delta I] - \frac{1}{2}A\overline{e}(1-\overline{e})\left[p - (1-g)\delta I\right]^2 \geq 0 \tag{A2}$$

At $t = 1$, the founder chooses p to minimize the incentive pay subject to the incentive compatibility condition (A1) and participation constraint (A2):

$$\begin{aligned} &\min_{(b,g,p,I)} \; b + (1-g)\delta I + \overline{e}[p - (1-g)\delta I] - \frac{kg^2 I}{2} \\ &s.t. (A1) \text{ and } (A2) \end{aligned}$$

Given that all managers are ex-ante equal, there is no competition for them. Since any contract offered to a manager must give them utility equal to, at least, $B > 0$, to ensure they do not choose $Z = M$, the participation constraint is redundant and the incentive compatibility condition is strictly binding for both managers. Given this, we can write the incentive compatibility condition as

$$\xi - \frac{1}{2}A(1-e)\xi^2 = \frac{B}{\overline{e}}$$

where $\xi = [p - (1-g)\delta I]$. By solving this second order equation in ξ, we find that

$$\xi = \frac{1 - \sqrt{1 - 2AB\frac{1-\overline{e}}{\overline{e}}}}{A(1-\overline{e})} \equiv \xi(\overline{e})$$

This implies that:

$$p = (1-g)\delta I + \xi(\overline{e})$$

and the associated profit is:

$$\Pi_i = \overline{e}\left[Y - \delta I\right] - \overline{e}\xi(\overline{e}) + g\delta I - rI - \frac{kg^2 I}{2}$$

From the first order conditions, $g^* = \frac{\delta}{k}$ & $I^* = Y'^{-1}\left(\delta\left(1 - \frac{\delta}{2\overline{e}k}\right) + \frac{r}{\overline{e}}\right)$. ■

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Figure 1: Timeline.

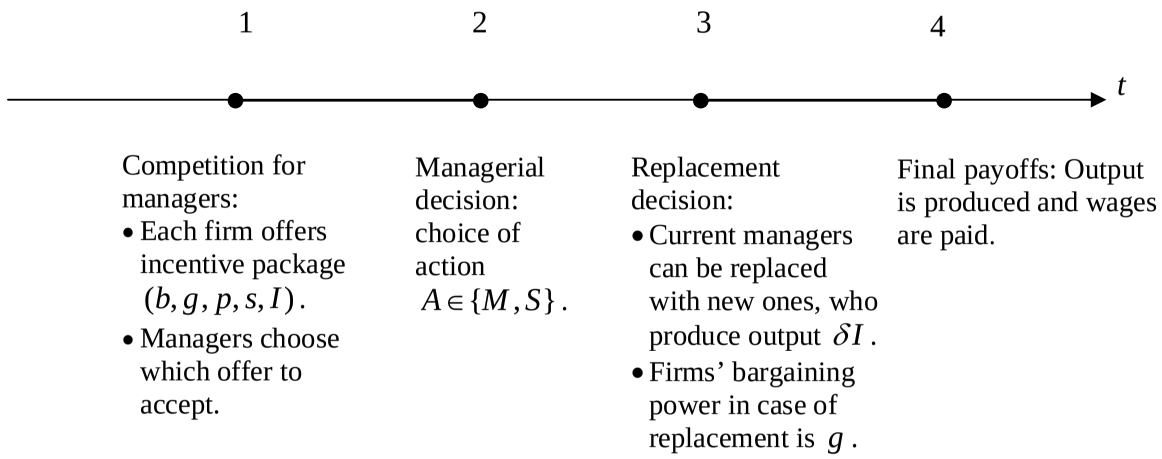

Table 1. Summary Statistics.

This table presents the summary statistics for the variables used in the empirical section. *Return on Assets (ROA)* is the ratio of operating cash flow over lagged total assets. *Book Leverage* is the ratio of long and short term debt to the sum of long and short term debt plus common equity. *Cash* is the sum of cash and short-term investments over net property, plant, and equipment at the beginning of the fiscal year. *Interest Coverage* is earning before depreciation, interest, and tax over interest expenses. *Dividend earnings* is the sum of common dividends and preferred earnings over earning before depreciation, interest, and tax. *Tobin's q* is the ratio of firm's total market value over total assets. *Market Cap* is the firm market capitalization. *G-Index* is the Gompers et al. (2003) governance index. *CEO Duality* is a dummy variable that takes value one if the CEO is also the Chairman on the board, zero otherwise. *Total Comp* is the logarithm of CEO total compensation. *Pay for Performance* is the proportion of variable pay (bonuses and stock options) over total pay in percentage. *Board Size* is the logarithm of the number of board members. *Fract Indep* is the proportion of independent directors that sit in the board. *CEO Tenure* is the difference between the current year and the year the executive became CEO; *CEO Age* is the age of the CEO. The sample consists of 10126 firm-year observations that correspond to 2610 different CEOs and 1551 different firms, covering the period from 1992 to 2008. CEO Age and CEO Tenure is only available for 7623 observations and directors data (which is needed to define Board Size, Duality and Fraction of Independent directors) is only available from 1996.

Variable	Mean	Std. Dev.	Min	Max
ROA	0.051	0.097	-0.470	0.319
Book Leverage	0.361	0.249	0	1.329
Cash	0.949	2.780	0.001	40.827
Interest Coverage	51.154	184.598	-31.232	1545.536
Dividend Earnings	0.082	0.104	-0.061	0.615
Tobin's q	1.906	1.202	0.737	9.181
Market Cap.	8.071	1.516	4.474	12.272
G-Index	9.415	2.624	2	18
CEO Duality	0.653	0.175	0	1
Total Comp.	7.827	1.027	4.738	9.864
Pay for Performance	68.761	22.693	0	99.897
Board Size	2.208	0.264	1.099	3.258
Fract Indep	0.791	0.406	0	1
CEO Tenure	7.914	7.406	0	56
CEO Age	56.236	7.335	33	91
External	0.131	0.337	0	1

Table 2. Corporate Governance Externality: G-Index

In these two tables, we regress CEO compensation (*Total Comp.*) and *Pay for Performance* on market capitalization and measures of corporate governance for the firm and its size-matched comparables. In Panel A, the dependent variable is *Total Comp.* and in Panel B the dependent variable is *Pay for Performance*. We use the *G-Index* as our measure of corporate governance. In columns 1-3, regressions include industry/year fixed effects; in column 4, we control for year dummies and firm fixed effects. In columns 2-4, we also control for CEO characteristics (*CEO Tenure*, *CEO Age* and *External*). In columns 3 and 4, we control for board composition (*Board Size*, *Fract Indep* and *CEO Duality* in Panel A and *G-Index* in Panel B). Standard errors are reported in parentheses and are clustered at the firm level in the first line and at the year level in the second line. *, **, or *** indicates that the coefficient is statistically significantly different from zero at the 10%, 5%, or 1% level, respectively, under that clustering.

Panel A: Dependent Variable: Total Comp.; Governance: G-Index

	(1)	(2)	(3)	(4)
Market Cap	0.458	0.459	0.453	0.485
	(0.010)***	(0.010)***	(0.013)***	(0.029)***
	(0.007)***	(0.008)***	(0.009)***	(0.030)***
Own Governance	0.023	0.023	0.018	0.001
	(0.006)***	(0.006)***	(0.006)***	(0.010)
	(0.002)***	(0.002)***	(0.002)***	(0.007)
Competitor Governance	0.011	0.010	0.009	0.004
	(0.005)**	(0.005)*	(0.006)	(0.005)
	(0.003)***	(0.004)**	(0.003)**	(0.003)
Industry / Year F.E.	Y	Y	Y	N
CEO Characteristics	N	Y	Y	Y
Board Composition	N	N	Y	Y
Firm FE and Year dummies	N	N	N	Y
Observations	9,833	8,964	7,370	7,370
R-squared	0.527	0.533	0.535	0.776

Panel B: Dependent Variable: Pay for Performance; Governance = G-Index

	(1)	(2)	(3)	(4)
Market Cap	7.047	6.886	6.815	8.931
	(0.235)***	(0.241)***	(0.286)***	(0.866)***
	(0.152)***	(0.126)***	(0.210)***	(0.661)***
Own Governance	0.422	0.317	0.215	0.045
	(0.137)***	(0.137)**	(0.142)	(0.260)
	(0.061)***	(0.064)***	(0.080)**	(0.173)
Competitor Governance	0.248	0.256	0.323	0.156
	(0.133)*	(0.134)*	(0.143)**	(0.139)
	(0.119)*	(0.095)**	(0.094)***	(0.105)
Industry / Year F.E.	Y	Y	Y	N
CEO Characteristics	N	Y	Y	Y
Board Composition	N	N	Y	Y
Firm FE and Year dummies	N	N	N	Y
Observations	9,833	8,964	7,370	7,370
R-squared	0.302	0.318	0.320	0.611

Table 3. Corporate Governance Externality: CEO Duality

In these two tables, we regress CEO compensation (*Total Comp.*) and *Pay for Performance* on market capitalization and measures of corporate governance for the firm and its size-matched comparables. In Panel A, the dependent variable is *Total Comp.* and in Panel B the dependent variable is *Pay for Performance*. We use the *CEo Duality* as our measure of corporate governance. In columns 1-3, regressions include industry/year fixed effects; in column 4, we control for year dummies and firm fixed effects. In columns 2-4, we also control for CEO characteristics (*CEO Tenure*, *CEO Age* and *External*). In columns 3 and 4, we control for board composition (*Board Size*, *Fract Indep* and *CEO Duality* in Panel A and *G-Index* in Panel B). Standard errors are reported in parentheses and are clustered at the firm level in the first line and at the year level in the second line. *, **, or *** indicates that the coefficient is statistically significantly different from zero at the 10%, 5%, or 1% level, respectively, under that clustering.

Panel A: Dependent Variable: Total Comp. ;Governance = CEO Duality

	(1)	(2)	(3)	(4)
Market Cap	0.463	0.462	0.454	0.486
	(0.010)***	(0.011)***	(0.013)***	(0.029)***
	(0.007)***	(0.008)***	(0.009)***	(0.029)***
Own Governance	0.117	0.135	0.094	0.038
	(0.034)***	(0.036)***	(0.036)***	(0.029)
	(0.026)***	(0.028)***	(0.029)***	(0.020)*
Competitor Governance	0.063	0.056	0.054	0.034
	(0.033)*	(0.034)	(0.034)	(0.029)
	(0.025)**	(0.026)*	(0.025)*	(0.030)
Industry / Year F.E.	Y	Y	Y	N
CEO Characteristics	N	Y	Y	Y
Board Composition	N	N	Y	Y
Firm FE and Year dummies	N	N	N	Y
Observations	8,024	7,357	7,357	7,357
R-squared	0.521	0.527	0.534	0.776

Panel B: Dependent Variable: Pay for Performance; Governance = CEO Duality

	(1)	(2)	(3)	(4)
Market Cap	7.012	6.740	6.849	8.940
	(0.257)***	(0.268)***	(0.294)***	(0.874)***
	(0.180)***	(0.176)***	(0.209)***	(0.665)***
Own Governance	-0.156	1.266	0.503	0.550
	(0.787)	(0.816)	(0.837)	(0.857)
	(0.677)	(0.746)	(0.759)	(0.575)
Competitor Governance	1.867	1.464	1.432	1.501
	(0.933)**	(0.938)	(0.934)	(0.868)*
	(0.813)**	(0.901)	(0.942)	(0.805)*
Industry / Year F.E.	Y	Y	Y	N
CEO Characteristics	N	Y	Y	Y
Board Composition	N	N	Y	Y
Firm FE and Year dummies	N	N	N	Y
Observations	8,024	7,357	7,357	7,357
R-squared	0.292	0.312	0.319	0.611

Table 4. Estimation of CEO Ability

In this table, we estimate CEO ability. To do so, we regress *Return on Assets* on a set of control variables and a dummy variable for each CEO-firm match. The coefficients on these dummies are our proxy for CEO ability. The dependent variable is *Return on Assets* and the control variables are *Market Cap*, *Book Leverage*, *Cash*, *Interest Coverage*, *Dividend earnings* and *Tobin's q* and year dummies. All explanatory variables are lagged one year. We include dummy variables that take value 1 for a specific CEO in a given firm and zero otherwise. Standard errors are clustered at the firm level and *, **, or *** indicates that the coefficient is statistically significantly different from zero at the 10%, 5%, or 1% level, respectively. Summary statistics for the estimated CEO Ability are also reported.

Dependent Variable:	ROA
L.Market Cap.	-.0163***
	(.0062)
L.Book Leverage	.0058
	(.0151)
L.Cash	.0025
	(.0026)
L.Interest Coverage	-5.81e-06
	(.0000)
L.Dividend Earnings	-.0346**
	(.0171)
L.Tobin's q	.0307***
	(.0038)
Industry / Year F.E.	Y
Observations	10126
CEO-Industry effects identified	2674
CEO Ability Mean	.0058
CEO Ability Std. Dev.	.1216
CEO Ability Min	-.7982
CEO Ability Max	.5255

Table 5. CEO Ability, Governance, Compensation & Size

In these table, we show the results regarding the empirical predictions of our model. In Panel A, we regress corporate governance, firm size and different components of compensation on the CEO ability obtained in Table 4. In Panel B, we estimate a constant hazard function model (in Columns 1 and 2) and a Cox model (in Columns 3 and 4) of CEO turnover. In Panel A, we use *G-Index* and *CEO Duality* as measure of corporate governance. Executive compensation is measured as *Total Comp* and *Pay for Performance*, which are the logarithm of CEO total compensation and the percentage of variable pay (made up of bonuses and stock options) over total compensation, respectively. Firm size is *Market Cap*. *CEO Ability* are the coefficients on the CEO fixed effects obtained in Table 4. All regressions in Panel A include CEO Characteristics (CEO Tenure, CEO Age, External dummy), industry fixed effects and year dummies and coefficients are estimated with Weighted Least Squares to correct for estimation errors in the first stage. In Panel B, Columns 1 and 3 use the entire sample of CEOs, while Columns 2 and 4 only include those CEOs under 65 years of age. Results are reported in terms of Hazard Rates. Regressions in Panel B include market capitalization, CEO Characteristics (CEO Age, External dummy), industry fixed effects and year dummies. Standard errors are reported in parenthesis and clustered at the firm level in the first line and at the year level in the second line. *, **, or *** indicates that the coefficient is statistically significantly different from zero at the 10%, 5%, or 1% level, respectively.

Panel A: Governance, Compensation & Size

Dependent Variable:	G-Index	CEO Duality	Total Comp.	Pay for Perf.	Market Cap
	(1)	(2)	(3)	(4)	(5)
CEO Ability	3.193	0.488	5.086	98.024	10.669
	(1.558)**	(0.182)***	(0.445)***	(10.660)***	(0.719)***
	(1.807)	(0.098)***	(0.280)***	(8.521)***	(0.421)***
Industry / Year F.E.	Y	Y	Y	Y	Y
CEO Characteristics	Y	Y	Y	Y	Y
Observations	4,307	7,108	8,610	8,610	8,610
R-squared	0.238	0.245	0.506	0.428	0.714

Panel B: CEO Duration Model

Model	Exponential	Exponential	Cox	Cox
Observations	All CEOs	CEOs with age < 65	All CEOs	CEOs with age < 65
	(1)	(2)	(3)	(4)
CEO Ability	0.218	0.223	0.186	0.176
	(0.048)**	(0.058)*	(0.065)*	(0.072)*
	(0.052)*	(0.28)**	(0.051)*	(0.020)**
Industry / Year F.E.	Y	Y	Y	Y
Market Cap.	Y	Y	Y	Y
CEO Characteristics	Y	Y	Y	Y
Observations	8610	7819	8610	7819

Table 6. CEO Turnover and Corporate Governance

In this table, we regress the change in corporate governance (as measured by *G-Index*) on CEO turnover and and *CEO Quality*. In Panel A we report the summary statistics on changed in *G-Index* and CEO turnover. *G-Index Chg* is a dummy variable that takes value 1 if G-Index changes from the previous period and 0 otherwise. *G-Index Chg Up* is a dummy variable that takes value 1 if G-Index increases from the previous period and 0 otherwise. *G-Index Chg Down* is a dummy variable that takes value 1 if G-Index decreases from the previous period and 0 otherwise. *Turnover* is a dummy variable that takes value 1 if the CEO changes over the period since the last measurement of G-Index and 0 otherwise. *Turnover Up* is a dummy variable that takes value 1 if the CEO changes over the period since the last measurement of G-Index and the new CEO is better than the previous one (that is, CEO quality goes up over the period) and 0 otherwise. *Turnover Down* is a dummy variable that takes value 1 if the CEO changes over the period since the last measurement of G-Index and the new CEO is worse than the previous one (that is, CEO quality goes down over the period) and 0 otherwise. In Panel B, we estimate a logit specification of the changes in corporate governance regressed on the measures of CEO turnover defined above. In columns 4 and 5, we restrict the sample to the observations in which there is a CEO turnover. All regressions include CEO Characteristics (CEO Tenure, CEO Age, External dummy), industry fixed effects and year dummies. Standard errors are reported in parenthesis and clustered at the firm level in the first line and at the year level in the second line. *, **, or *** indicates that the coefficient is statistically significantly different from zero at the 10%, 5%, or 1% level, respectively.

Panel A: Summary Statistics

	Mean	Std.Dev	Min	Max
G-Index Chg	0.336	0.472	0	1
G-Index Chg Up	0.239	0.426	0	1
G-Index Chg Down	0.098	0.297	0	1
Turnover	0.176	0.381	0	1
Turnover Up	0.072	0.259	0	1
Turnover Down	0.104	0.306	0	1

Panel B: Regression Results

Dep Variable:	G-Index Chg	G-Index Chg Up	G-Index Chg Down	G-Index Chg Up	G-Index Chg Down
Observations	All	All	All	Turnover=1	Turnover=1
	(1)	(2)	(3)	(4)	(5)
Turnover	0.367	-0.341	0.127		
	(0.082)***	(0.133)**	(0.196)		
	(0.140)***	(0.078)***	(0.201)		
Turnover Up		0.494		0.593	
		(0.183)***		(0.198)***	
		(0.227)**		(0.219)***	
Turnover Down			1.123		1.128
			(0.210)***		(0.218)***
			(0.225)***		(0.213)***
Market Cap.	0.011	-0.124	0.176	-0.174	0.097
	(0.027)	(0.029)***	(0.036)***	(0.065)***	(0.066)
	(0.028)	(0.048)**	(0.034)***	(0.060)***	(0.066)
Industry / Year Fixed Effect	Y	Y	Y	Y	Y
CEO Characteristics	Y	Y	Y	Y	Y
Observations	3374	3359	3370	788	796
R-squared	0.0339	0.0628	0.0485	0.1205	0.1066