Competition for Managers, Corporate Governance and Incentive Compensation

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July 2013

Abstract

Stricter governance standards incentivize managers to perform better and thus can be used as a cheaper substitute for pay for performance. However, when managerial talent is scarce, firms' competition to attract better managers forces firms to pay managers more and thus reduces an individual firm's incentives to invest in corporate governance. In equilibrium, better managers end up at firms with weaker governance, and conversely, better-governed firms employ lower-quality managers. Consistent with these implications, in a sample of US firms, we show that (i) better CEOs are matched to firms with weaker corporate governance and more so in industries with stronger competition for managers, and, (ii) corporate governance is more likely to change when there is CEO turnover, with governance weakening (strengthening) when the incoming CEO is better (worse) than the departing one.

JEL classification: D82, G21, G18.

Keywords: corporate governance, executive compensation, externalities.

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Acknowledgments: We thank Yakov Amihud, Jennifer Arlen, Ramin Baghai, Lucien Bebchuk, Vidhi Chhaochharia, Jeff Coles, Martijn Cremers, Alex Edmans, Andrew Ellul, Julian Franks, Gerard Garvey, Steven Kaplan, Roberta Romano, Alan Schwartz, Henri Servaes and Michael Weisbach for helpful comments, and Jim Albertus for excellent research assistance. We also received useful comments from participants at the 2010 AEA meetings in Atlanta, the 2010 Yale-ECGI-Oxford Conference, the Spring 2011 NBER Law and Economics, the 2011 NYU-Penn Law and Finance Symposium, the 2012 AFA meetings in Chicago, and in seminars at Boston College, DePaul, Emory, Georgia Tech, HEC Paris, London Business School, MIT and New York University. We are grateful for research support from the ESRC (Grant No. R060230004) and the London Business School's Centre for Corporate Governance.

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). Why are executives (and other professionals) paid so much and, apparently, independently of performance?

The literature has evolved into two conflicting camps. The first one, 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 also Bertrand and Mullainathan, 2001, Bebchuk and Fried, 2004, among others). The second camp suggests an efficient explanation: better managers can generate greater value at larger firms and competition for scarce managerial talent forces large firms to pay managers a lot (see Gabaix and Landier, 2008 and Edmans et al., 2009). 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. Some firms choose lower governance and higher pay to attract and retain better managers on purpose. 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 governance. 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 individual rationality constraint is binding and thus the overall 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 have to match the manager's individual rationality constraint by setting generous pay for performance policy anyway. Thus, shareholders would end up bearing the full costs of better corporate governance in the form of higher executive pay, while they would share (for instance, with potential raiders) the benefits of corporate governance (in the form of more takeovers).

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. These associations are ex-ante rational as firms offer these compensation and governance packages to attract scarce managerial talent.

Because we develop an equilibrium model, our empirical tests focus on the equilibrium associations arising out of the various forces. If one can measure managerial talent, the immediate equilibrium prediction of our model is that better quality managers are matched to firms that have weaker governance and receive higher pay. Moreover, CEO turnover and takeovers should be negatively correlated with CEO quality, as takeover defenses are a form of weaker governance that can be offered to attract better-quality managers. In the model, we argue that firms use governance as part of an optimal compensation package. If this is indeed true, changes in corporate governance should primarily arise when there is CEO turnover. Additionally, our equilibrium results imply that these changes 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 2006, data from ExecuComp on the compensation they award their CEOs and on their turnover, M&A data from Thompson Deals, and firm-level corporate governance data from Riskmetrics. We focus on two measures of corporate governance: the G-Index developed by Gompers et al. (2003) (and its individual components), which captures external governance, and CEO duality (an indicator that takes value 1 if the CEO is also the Chairman of the Board, and 0 otherwise), which measures internal governance. Using both measures, we find evidence in favor of our predictions.

To show that the allocation of CEOs and firms is consistent with the matching equilibrium predicted by the model, our test follows a two-stage approach. In the first stage, managerial talent is measured as the CEO fixed effect in a regression of the firm's operating performance on several control variables. In particular, we extract a measure of the 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, CEO tenure and takeovers.

In cross-sectional tests, we find that better managers face *weaker* governance regimes (i.e., the G-Index and the CEO duality indicator are higher), are paid more, are less likely to be replaced, and are less likely to be taken over, results that are consistent with the model predictions. Moreover, we show that there is a stronger negative relationship between corporate governance and CEO quality in industries with greater competition for managers, as measured by the frequency of external hires.

We then focus on the time series, analyzing the choice of corporate governance at the time in which new CEOs are hired (controlling for whether they are internal or external hires). First, we show that the changes in governance primarily happen around CEO turnovers. Further, as predicted by the model, when the new CEO is better than the old one, the quality of corporate governance decreases; conversely, governance increases if the new CEO is of worse quality than the old one.

These time-series results reinforce the cross-sectional empirical evidence and shed light on some possible alternative explanations for the cross-sectional results. For instance, our cross-sectional results might be due to the fact that better CEOs get entrenched over time, leading to the observed association between greater CEO quality, CEO compensation and weaker firm governance. The time-series evidence alleviates this concern because the newly hired CEOs are unlikely to have been entrenched already (in case of external hires) or have had the opportunity to influence boards and governance (in case of internal hires). Additionally, time-series tests focus on the changes rather than on the levels of CEO quality and corporate governance, helping to alleviate the concern that CEO quality and governance are associated due to some omitted (or unobservable) variation in firm and CEO characteristics.

Moreover, our findings hold for both measures of corporate governance, indicating that both external (G-Index) and internal measures of governance (CEO duality) are chosen as part of a CEO incentive contract. When we examine which components of the G-Index are more correlated with changes in CEO talent, we find that the most important provisions are the ones shielding directors and officers from legal liability and the ones restricting shareholder voting rights. These provisions are strengthened when the new CEOs are better than the old ones, both in a cross-sectional setup when we compare different firms and in a time-series setting when we consider CEO turnover. These provisions empower the CEO and enable him/her to fight takeovers more effectively.

The evidence from these tests provides support for our theoretical starting point that competition among firms for scarce managerial talent is an important determinant of executive compensation *and* governance practices observed in equilibrium.

Section 2 discusses related literature. Section 3 presents the model and develops the testable hypotheses. Section 4 presents the empirical evidence and discusses robustness issues. Section 5 concludes.

2 Related Literature

This paper is related to a large literature on executive compensation and corporate governance. The neoclassical view is that executive compensation is the solution to 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: first, managerial rent extraction, and second, optimal equilibrium outcomes.

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 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 focuses on optimal equilibrium outcomes. Developments in this area either relate the level of executive pay to exogenous heterogeneity in firm size or endogenize the managers' incentive compatibility condition. On one hand,

Gabaix and Landier (2008), Terviö (2008), and Edmans et al. (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 the degree they increase their firms' productivity. As a result, better managers match to larger firms. Gabaix et al. (2013) provide further empirical support for the model using data from the recent crisis. Similarly, Edmans et al. (2009) present a model in which both low ownership concentration and its negative correlation with firm size arise as part of an optimal contract.[1] In a similar setup, Edmans and Gabaix (2011) show that inefficient incentive contracts and CEO allocation across firms arise when firms differ in terms of risks or disutilities for managers.

On the other hand, Biais and Landier (2013) discuss that the time series increase in both job complexity and compensation may be explained by an overlapping generations model where managers can choose the level of job complexity. In that case, managers choose to increase job complexity to affect their incentive compatibility condition, thus increasing their total compensation.

Our paper contributes to this literature by adding corporate governance as an important matching mechanism between firms and managers. We show that inefficient choices of governance emerge as equilibrium outcomes because of the externality associated with the competition for managerial talent.

Managers in our model can be incentivized by shareholders through a combina-

[1]Within this framework, the recent rise in compensation can be related to changes in the types of managerial skills required by firms. 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 Custodio et al. (2013) and Frydman and Saks (2010). Cremers and Grinstein (2010) 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.

tion 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 their board would be outside directors (interpreted as an improvement in shareholder governance) decreased significantly their CEO pay-performance sensitivity relative to the control group. Moreover, Bach and Metzger (2013) document that highly talented CEO depart following unexpected tightenings in corporate governance.

This 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 (2012) formalize this argument in a model where the choice of corporate governance 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 (2011) 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 (2011) shows that earnings management in one firm may induce earnings management in other firms in the presence of relative performance compensation.

To measure CEO quality, we follow Bertrand and Schoar (2003) and Graham et al. (2011) and compute the (unobserved) CEO impact on performance, where the latter is measured by return on assets. The idea is to attribute to CEO quality the return on assets in excess of the value predicted by a set of firm-level and time-varying control variables. An alternative (and complementary) approach is adopted by Milbourn (2003), Murphy and Zábojník (2007), Falato et al. (2012), and Engelberg et al.

(2013) using an empirical proxy for CEO talent based on observable characteristics. These papers show that, when setting CEO compensation, boards reward several reputational, career, and educational credentials of the CEOs (which can be viewed as measure of talent).

3 Theoretical Analysis

To motivate our empirical analysis we develop a simple model in which firms compete for managers by choosing governance as part of an optimal incentive contract. We show that in the presence of competition for scarce managerial talent, in equilibrium, ex-ante identical firms must be indifferent between hiring a better manager and choosing weaker governance regime, and hiring a worse manager 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, or less-experienced, managers (L-type). Types are observable. We assume that the number of L-type managers is greater than the number of firms, $m_L > n$, while the H-type managers are not numerous enough to be hired by all firms, $m_H < n$. Firms can hire at most one manager. Managers and shareholders are risk neutral. All firms are ex-ante identical.

The assumption that good managers are in short supply is the critical ingredient of our model. Without this assumption, there is no effective competition in the managerial market. Therefore there is no interesting interaction between the choice of corporate governance and the competition for managers across firms.[2]

The timeline is as described in Figure 1: At $t = 1$, each firm hires a manager

[2]If the number of H-type managers were to exceed the number of firms ($m_H > n$), in equilibrium all firms would hire an H-type manager, invest a lot in corporate governance ($g_H = 1$) and pay low compensation ($w_H = 0$).

from a pool of candidates of observable quality $q \in \{L, H\}$. Given that abilities are observable, each firm sets a compensation contract which is a function of the manager's quality q. Managers apply for one of the jobs. If a manager is not employed at the end of this stage, he/she receives a reservation utility equal to 0. Similarly, a firm that does not employ any managers receives an output equal to 0. Compensation contracts are represented by a performance-related bonus $w \geq 0$, which is contingent on the verifiable output X produced at $t = 4$.[3] Moreover, as part of the incentive package, at $t = 1$ the firm also chooses the level of corporate governance $g \in [0, 1]$ at a linear cost cg. This cost may for instance reflect the cost of setting up an auditing and information technology for shareholders to monitor the manager. As we explain below, the benefit of corporate governance is that it increases the probability of learning the productivity of current managers so they may be replaced effectively.

At $t = 2$, managers choose action $Z \in \{M, S\}$, where action S generates at $t = 4$ output $X = Y_q$ with probability p and $X = 0$ otherwise, and no private benefit for the manager ($b = 0$). Meanwhile, action M generates a private benefit $b = B$ for the manager and no output ($X = 0$) for the firm. We assume $Y \equiv Y_H > Y_L \equiv y > 0$ (i.e. the productivity of better quality managers is higher). The choice of action is not observable by shareholders and the manager must stay employed until $t = 4$ for the firm to produce output X and private benefits b.[4]

At $t = 3$, with probability g shareholders observe a signal $\widetilde{x} \in \{Y_q, 0\}$ on the expected output X. After observing this signal, shareholders can fire the existing manager and hire a new one. The replacement manager produces a return R.

At $t = 4$, output X is realized and distributed, the performance-related bonus w is paid, and, if still in control, the initial manager receives the private benefit b.

We make the following technical assumptions, which simplify our analysis but are not critical for our results:

[3]This assumption is without loss of generality because allowing for a further payment that is independent of performance would be inefficient: it would simply increase the amount of compensation needed in the case of good performance.

[4]This requirement ensures that firms do not behave strategically and fire a manager that will produce higher output purely to save on pay for performance.

(1) $c \in ((1-p)R, (1-p)R + B)$: this assumption ensures that the choice of corporate governance is not trivial. If $c < (1-p)R$, the optimal choice is always to invest in corporate governance; if instead $c > (1-p)R + B$, it is optimal never to invest in corporate governance.

(2) $py > \max\{B, R\}$: the first inequality ($py > B$) ensures that incentizing the L-type manager to put forth effort is efficient (and thus incentivizing the H-type is efficient); the second inequality makes sure that shareholders have no incentives to fire the L-type manager (and thus also the H-type one) when they have no information of his performance.

(3) The signal $\widetilde{x}$ is perfectly informative. This assumption can be relaxed without substantially changing the model.

(4) When indifferent, firms prefer to hire a H-type manager rather than a L-type one: this tie-breaking assumption simplifies the analysis.

3.2 Competition for Managers

To derive the equilibrium, we proceed by backwards induction, starting from the turnover decision at $t = 3$.

3.2.1 Turnover

If $\widetilde{x} = Y_q$, there is no turnover as no replacement manager can produce an output greater than Y_q. Similarly, if there is no informative signal, there is no turnover as no replacement manager can produce an output greater than py. If instead $\widetilde{x} = 0$, then there is turnover as the new manager can always increase productivity.

3.2.2 Moral Hazard Problem

Now consider the incentive compatibility and participation constraint at $t = 2$ of a manager of type q. Starting with the incentive compatibility condition, if the manager chooses the private-benefit action $Z = M$, output always equals 0 and the

manager's utility equals:

$$U(M) = (1 - g)\, B \tag{1}$$

The manager will receive the private benefit B from choosing action M only if he/she is not replaced at $t = 3$, which happens with probability $1-g$. If the manager chooses the firm-value maximizing action $Z = S$, then his utility equals

$$U(S) = pw \tag{2}$$

He receives compensation w only when output $X > 0$.

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

$$w \geq (1 - g)\frac{B}{p}. \tag{3}$$

Conveniently, under our assumptions, the IC constraint is identical for the two types.

Provided that the IC constraint is satisfied, the corresponding individual rationality (IR) constraint becomes

$$w \geq \frac{\overline{u}_q}{p} \tag{4}$$

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

These constraints highlight the role of corporate governance from the manager perspective: increasing corporate governance implies that the incentive compatibility condition is achievable with lower compensation.

3.2.3 Incentive Contract

Proceeding backwards to $t = 1$, shareholders' expected profits equal $Y_q - w$ if the project is successful (which happens with probability p) and gR if the project fails (which happens with probability $1 - p$). The shareholders' problem is then:

$$\max_{(w,g)} p\,(Y_q - w) + (1 - p)gR - cg \tag{5}$$

subject to the IC and IR conditions (3) and (4), respectively. Analyzing the optimal incentive contracts conditional on the manager's type, we derive the following result:

Lemma 1: *The optimal contract for a manager of type q is:*

$$(w_q, g_q) = \left(\frac{\overline{u}_q}{p}, \max\left\{0, 1 - \frac{\overline{u}_q}{B}\right\}\right).$$

Intuitively, the optimal incentive contract for a type-q manager depends on his reservation utility. If the manager's reservation utility is large ($\overline{u}_q > B$), as shown in Figure 2, the incentive compatibility constraint is redundant and governance is set equal to the lowest level ($g_q = 0$) and incentive pay is set to meet the individual rationality constraint ($w_q = \overline{u}_q/p$). The associated profit equals $pY_q - \overline{u}_q$.

If instead the manager's reservation utility is low ($\overline{u}_q < B$), as shown in Figure 3, both the IC and the IR constraints must be met in equilibrium. Hence, $w_q = \overline{u}_q/p$ and $g_q = 1 - \overline{u}_q/B$. The associated profit is $pY_q - \overline{u}_q - (1 - \overline{u}_q/B)[c - (1-p)R]$. Notice that the last term is the net cost of investing in corporate governance. The firm needs to invest in governance to make sure that the IC constraint is met.

The equilibrium in the market for managers is a follows:

Proposition 1 (Competition for managerial talent) *A mass m_H of firms hire H-type managers. The compensation contract for an H-type manager is:*

$$w_H = \min\left\{(Y-y)\frac{B}{B+(1-p)R-c}, (Y-y) + \frac{c-(1-p)R}{p}\right\} > 0$$

and

$$g_H = \max\left\{0, 1 - \frac{p(Y-y)}{B+(1-p)R-c}\right\} < 1.$$

The remaining $n - m_H$ firms hire L-type managers and offer them the contract:

$$(w_L, g_L) = (0, 1).$$

Proof: See Appendix.

This is the key result of the model. Because there is a scarcity of H-type managers, in equilibrium, competition among firms will be so that the rent awarded to H-type managers ($\overline{u}_H$) makes firms indifferent between hiring a H-type or a L-type manager. If hiring a H-type manager leads to higher profits than hiring a L-type manager, then

a firm can marginally increase the compensation to H-type managers, attracting one of them for sure, increasing profit. If instead hiring a L-type manager leads to a higher profit, all firms would hire a L-type manager and thus H-type managers would be willing to work for less.

Since firms take H-type managers' rents ($\overline{u}_H$) as given and corporate governance is used by firms to reduce managerial rents, firms hiring H-type managers find high levels of corporate governance suboptimal. Conversely, firms hiring L-type managers face no competition for them and can, therefore, keep managerial compensation down to the incentive compatibility constraint. Thus, these firms choose the efficient level of corporate governance.

The solution also highlights a potential reason for the imperfect substitutability of corporate governance and executive compensation. If they could coordinate firms would prefer to set $g_H = 1$ so as to reduce as much as possible the rents that H types enjoy. They do not do so in the competitive equilibrium because each firm does not internalize the externality their choices of corporate governance impose on other firms. Specifically, in our model, when firms increase corporate governance, they reduce the reservation utility of managers working in other firms. Hence, they bear all the cost of higher governance but only enjoy part of the benefits.

3.3 Empirical Predictions

The model starts with the assumption that corporate governance is part of the incentive contract for managers. Hence, our first prediction is:

Prediction 1 (Governance as part of a managerial incentive contract): *Changes in corporate governance should be more common in years when a new manager is hired.*

The main result of the model is that in equilibrium some firms will attract better managers by paying them more and choosing weaker governance standards; while others will attract worse managers by paying them less and choosing stricter corporate

standards. Thus, provided that we can find an appropriate measure of managerial talent, our second empirical prediction is:

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

Competition for managers plays a critical role in the model. If the number of H-type managers were to exceed the number of firms, all firms would hire an H-type manager, choose high governance ($g_H = 1$) and low pay ($w_H = 0$). More precisely, our model predicts that better managers are matched to firms that have lower corporate governance only when the competition among firms to attract them is high.[5] Therefore, conditional on us finding a relevant measure of the effective competition for managers, our model predicts:

Prediction 3 (Competition for managers and governance): *The relationship between high quality managers and weaker governance standards should be stronger in sectors with stronger competition for managers.*

4 Empirical Analysis

We now turn to the empirical analysis to test the three predictions of the model. We focus on the CEO as the empirical counterpart for what we call "manager" in the model because he/she is the main decision maker within a firm. In what follows we first describe the data and then present our results.

[5]The effect of competition in our model is discontinuous: if $n_H < n$, governance is negatively correlated with talent (because managerial talent is scarce), whereas if $n_H \geq n$, governance is uncorrelated with managerial talent (because there is no effective competition for talented managers). The effect of competition on the correlation between governance and talent can be continuous if we modify our model to include an initial stage auction for the an H-type manager, whose productivity Y_H is unknown but common to all firms. In that case, a higher number of firms participating in this (common value) auction to attract the H-type manager implies a higher rent to the H-type manager, and therefore lower corporate governance for more talented managers.

4.1 Data description

We use firm-level financial variables from Compustat: *ROA* is the ratio of EBITDA (item `ib`) before CEO compensation (item `tdc1`) 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`). *Accruals* are the discretionary accruals calculated using the modified Jones model as in Dechow et al. (1995). *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).[6] A

[6]The list of provisions included in the *G-Index* is 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,

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.

As a further measure of corporate governance, we use *Duality* (also available from RiskMetrics), which is an indicator that takes value 1 if the CEO holds the position of Chairman of the Board in the same firm/year, and 0 otherwise. When the CEO is also granted the role of Chairman of the Board, he/she is likely to enjoy more authority and discretion over the management of the firm. Conversely, when the CEO and the Chairman of the Board are different individuals, the board may be able to monitor the CEO more effectively and restrict his/her discretion. In this sense, when *Duality* equals 1, there is weaker corporate governance than when *Duality* equals 0 (as suggested by Core at al., 1999).

We obtain our measures of executive compensation from ExecuComp. We measure *Total Compensation* as the natural logarithm of item `tdc1`. We define *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. In addition, we define *Turnover* as an indicator that takes value 1 if the current CEO is different from the CEO in the year before.

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 *G-Index* data availability. However, *Duality* is only available from 1996 onwards.

4.2 Governance as part of a CEO incentive contract

In Table 2, we study whether corporate governance is used as part of the incentive contract for new CEOs. As suggested by Prediction 1 of the model, we should expect a higher frequency of changes of corporate governance when there is a CEO turnover

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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.

than otherwise.

In Panel A, we indeed find that changes in *G-Index* and *Duality* become significantly more frequent in years when there is a change of CEO. The frequency of changes in *G-Index* grows by 60 percent, from 22 to 35 percent. Moreover, the frequency of changes in *Duality* doubles, from 16 to 31 percent.

In Panel B, we test whether the distribution of the changes in *G-Index* and *Duality* differ systematically depending on whether there is a CEO turnover or not. As highlighted by the Wilcoxon test, the distribution of the changes in corporate governance is significantly affected by turnover events. Interestingly, on average *G-Index* tends to increase and Duality to decrease over time. This trend is magnified in case of turnover.

These results support Prediction 1 of the model. Corporate governance seems to be used as part of the incentive package for new CEO.

4.3 Matching CEO quality and governance

To assess our main empirical prediction (Prediction 2), first we develop a measure of CEO quality; then, we test the relation between CEO quality and governance in two ways: (i) whether firms with higher-quality managers exhibit lower governance (that is, focusing on the cross-sectional differences across firms); and (ii) whether firms decrease corporate governance when they hire a better manager (that is, emphasizing the time-series changes within a firm).

4.3.1 CEO quality

We follow Bertrand and Schoar (2003) and Graham et al. (2011) and compute the (unobserved) CEO impact on performance, where the latter is measured by return on assets. The idea is to attribute to CEO quality the return on assets in excess of the value predicted by a set of firm-level and time-varying control variables. More precisely, we estimate

$$ROA_{it} = \beta X_{it} + \delta_t + z_{ind} + \gamma_j + \varepsilon_{it}, \tag{6}$$

where ROA_{it} stands for return on assets for firm i in period t (computed before CEO payment); X_{it} are some time variant firm characteristics, which include size, book leverage, cash, interest coverage, dividend earnings, Tobin's q and governance measures; δ_t are time fixed effects; and 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 quality as it captures the unobserved (and time invariant) managerial effect on return on assets *relative* to the industry and controlling for firm characteristics.

In Table 3, we report three variations of equation (6). In column 1, we produce CEO quality as the CEO fixed effects from a regression of ROA on market capitalization, leverage, cash, interest coverage, dividend policy, Tobin's q, accruals, and year and industry fixed effects. We are able to estimate 2406 individual CEO fixed effects. CEO quality is -0.01 on average and varies between -0.89 and 0.34. This measure of quality will be the main one in our analysis.

For robustness, in column 2, we also compute CEO quality adding our measures of governance (*G-Index* and *Duality*) and total compensation to the set of control variables. This takes care of concerns that either governance and executive compensation might have a direct effect on performance (independently of CEO quality). In this case we can only estimate 2088 CEO fixed effects because *Duality* is only available from 1996.

It is interesting to notice that in column 2, our measures of governance are negatively correlated with ROA. Namely, a weakening of governance standards (due to either an increase in *G-Index* or in *Duality*) is associated with lower performance. For comparison, in column 3, we estimate the same specification as in column 2 without CEO fixed effects. In that case, we find that governance variables have no significant effect on performance. The comparison between the results in columns 2 and 3 seems to imply that corporate governance is beneficial to a firm only after one controls for the selection of CEO quality. In other words, the direct (positive) effect of corporate governance on firm performance seems to be offset by the (negative) impact of corporate governance on the firm's capacity to attract high quality managers.

This result is consistent with evidence in Cuñat et al. (2012) showing that there is a positive correlation between changes in governance and performance only when the latter changes are truly random.

4.3.2 Cross-sectional evidence

In Table 4, we use the estimated fixed effects from regression (6), $\widehat{\gamma}_j$, as regressors in the following specification:

$$\mathrm{Y}_{it} = \beta_\gamma \times \widehat{\gamma}_j + \upsilon_{jt} + \chi_t + z_{ind} + \xi_{it}, \tag{7}$$

where $\widehat{\gamma}_j$ is the CEO quality, as estimated from column 1 of Table 3; 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.

In Panel A of Table 4, we estimate the specification above for different dependent variables: Y_{it} will in turn be our measures of corporate governance (*G-Index* and *Duality*), executive compensation (total compensation and pay for performance) 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} equals *G-Index* and *Duality*); (ii) better managers are paid more (that is, $\beta_\gamma > 0$ when Y_{it} equals total compensation and pay for performance); and (iii) better managers work in larger firms (that is, $\beta_\gamma > 0$ when Y_{it} equals firm size).

We find empirical support for all these predictions. In column 1, we consider the relation between the *G-Index* and managerial quality. As predicted by the model, increases in managerial quality are associated with increases in the *G-Index* (which indicates decreases in governance). In column 2, we use *Duality* as an alternative measure of corporate governance. As predicted by the model, increases in managerial quality are associated with increases in *Duality*, which indicates a worsening of corporate governance. In columns 3 and 4, we report the correlations between managerial talent and compensation. In column 3, we find that better managers are paid more. In column 4, we also show that better managers have higher pay for performance. In

column 5, we also confirm that better CEOs work in larger firms, as also argued by Gabaix and Landier (2008).

In terms of economic magnitude, Panel A implies that holding all else constant, one standard deviation increase in CEO talent (which corresponds to an increase by 0.01 according to Table 3) implies a 0.14 point increase in *G-Index* (or decrease in governance), a 12% increase in the probability of CEO duality, and a 27% increase in total compensation.

An additional empirical implication of our model is that poor-quality managers should face stronger corporate governance, for instance, they should have face a higher chance of being replaced. Therefore, in Panel B, we estimate the following duration model:

$$h[t; X(t)] = F(\beta_\gamma \times \widehat{\gamma}_j + \upsilon_{jt} + \chi_t + z_{ind} + \xi_{it}) \tag{8}$$

where $h[t; X(t)]$ is the hazard function and the failure event is manager turnover. As usual, $h[t; X(t)]$ describes the instantaneous rate of turnover at T given that there has been no turnover until t. 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.

We test these predictions in columns 1 and 2 of Panel B. Column 1 presents our baseline analysis, while column 2 focuses on those CEOs under 65 years of age as these CEOs are less likely to be affected by retirement. Overall, we find support for our hypothesis in all the specifications: one standard deviation increase in CEO quality leads to around a 14% decrease in the hazard rate (column 1). In un-tabulated results, we estimate the model with constant hazard rates and find very similar results.

Takeovers are a mechanism to replace managers. According to our model, we would expect lower quality CEOs to be associated with a higher probability of takeovers. In columns 3 and 4 of Panel B, we estimate specification (7) with Y_{it} being a dummy variable for takeovers, with our model predicting $\beta_\gamma < 0$. Column 3 analyzes all deals while column 4 focuses only on completed transactions.

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 (6). In the second stage, we show that 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.

4.3.3 Time series evidence

Our model highlights the role of corporate governance as part of an optimal compensation contract. Therefore, 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 manager quality and the change in firms' governance standards. To test this prediction we estimate the following model:

$$\text{Governance Chg}_{it} = \beta_T Turnover_{it} + \upsilon_{jt} + \chi_t + z_{ind} + \xi_{it}, \tag{9}$$

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

The results are reported in Table 5 and Table 6, where we use *G-Index* and *Duality* as our measures of corporate governance, respectively. 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 a new CEO is appointed. Moreover, we would expect governance to increase when the new CEO is of lower quality than the earlier CEO. Conversely, governance should decrease when the new CEO is of better quality than the older one.

As shown in Table 2, changes in *G-Index* happen in 35 percent of the observations (when there is a turnover): in 17 percent of the cases governance worsens (as the *G-Index* increases) while in 18 percent of the cases governance improves (as the *G-Index* decreases). There is a CEO turnover in about 16 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 9 percent of the cases the new CEO is of worse quality than the earlier one (*Turnover Down*).

In column 1 of Table 5, we show that CEO turnovers are associated with a higher frequency of governance changes. This is consistent with the model's assumption that governance is chosen as part of the CEO incentive scheme. In the remaining columns, we test whether governance increases around turnovers when the new CEO is worse than the old one and decreases when the new CEO is better than the old one. In column 2, we test whether the *G Chg* (which takes value 1 if there is an increase in *G-Index*, 0 if there is no change; and -1 if there is a decrease) is correlated with the quality of the new CEO. The indicator *Turnover Up* is indeed positively correlated with *G Chg*: in other words, governance worsens when the new CEO is better than the old one. Interestingly, we find no significant effect when the new CEO is worse than the old one: there is no significant increase in corporate governance in those cases. In column 3, the dependent variable is an indicator that takes value 1 if the *G-Index* increases and 0 in all other cases. We find that the indicator *Turnover Up* is indeed positively correlated with increases in governance, highlighting the role of lower corporate governance as part of the optimal compensation contract to attract high quality managers. If a firm hires a better manager, the probability of increasing *G-Index* raises by 4 percent. In column 4, we study decreases in the *G-Index* (or improvement in corporate governance): the dependent variable is an indicator that takes value 1 if the *G-Index* decreases and 0 in all other cases. We find that the employment of worse managers is associated with increases in governance (as our model would predict). When a firm employs a worse manager, the probability of decreasing *G-Index* increases by 3.6 percent.

In Table 6, we repeat this analysis using *Duality* as our measure of corporate governance. Recall from Table 2 that changes in *Duality* happen in 31 percent of the observations when there is CEO turnover: in 7 percent of the cases governance worsens (as the *Duality* increases) while in 24 percent of the cases governance improves (as the *Duality* decreases).

In column 1, we show that CEO turnovers are associated with a higher frequency

of governance changes while in column 2, we find that *D Chg* (which takes value 1 if there is an increase in *Duality*, 0 if there is no change; and -1 if there is a decrease) is not correlated with the quality of the new CEO. Both indicators *Turnover Up* and *Turnover Down* are negatively correlated with *G Chg*: in other words, governance (as measured by Duality) improves in case of turnover, independently of the quality of the CEO. In column 3, where we focus on increases in *Duality*, we find that the indicator *Turnover Up* is indeed uncorrelated with increases in governance. However, in column 4, where we focus on decreases of *Duality*, we find that the employment of worse managers is associated with a strengthening of corporate governance (as our model would predict). If a firm hires a worse manager, the probability of removing CEO duality increases by 14 percent. Hence, there seems to be a general decrease in *Duality* around turnover, but this effect is more pronounced when a firm hires a worse manager.

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 the role of corporate governance as an important component in the matching between CEOs and firms.

4.3.4 Components of the G-Index

Table 7 provides a detailed analysis of the evidence that better managers are employed in firms with weaker corporate governance by examining individual components of the *G-Index*. In Panel A, we report the correlation between CEO quality (as estimated in Table 2) and each of the 5 sub-indexes of the *G-Index*: Delay (measuring the ability to delay an hostile takeover), Protection (which considers the six provisions protecting directors and officers from legal liability or job termination), Voting (which measures shareholder voting rights), Other (which includes miscellaneous indicators, like limits on director duties and pension parachutes) and State Law (focusing on the six state takeover laws: antigreenmail, business combination freeze, control share acquisition, fair price, director duties laws and redemption rights statutes). The indicators that are more strongly positively correlated with CEO quality are Protection and Other.

In Panel B, we consider the changes in each indicator at the time of a turnover. In particular, we focus on the whether governance decreases around turnover when the new CEO is better than the old one using the same specification estimated in Table 4, column 2. We find that the indicators of Protection, Voting, Other Provisions and State Law increase significantly when the new CEO is better than the old one. Delay instead does not change. Interestingly, Voting also decreases when the new CEO is worse than the old one.

The combination of the results in Panels A and B suggests that the important provisions are the ones shielding directors and officers from legal liability and the ones restricting shareholder voting rights. These provisions increase when the new CEOs are better than the old ones; restrictions in voting rights also decrease when the the new CEOs are better than the old ones.

4.4 Competition for managers and governance

We now study how the role of corporate governance as part of an optimal compensation contract depends on the competition for managers, and test Prediction 3 of the model. To do so, we repeat the estimation of equation (7) separately for each Fama-French 49 industry,

$$\text{Governance}_{it} = \beta_{\gamma}^{ind} \times \widehat{\gamma}_j + \upsilon_{jt} + \chi_t + \xi_{it} \tag{10}$$

where $\widehat{\gamma}_j$ are the CEO Quality coefficients estimated from regression (6), χ_t are time dummies, υ_{it} are a set of CEO characteristics and *ind* is a different code for each industry. Then, we estimate the correlation between the different coefficients β_{γ}^{ind} and our measure of the competition for managers: the percentage of insider promotions calculated by Cremers and Grinstein (2010). The identification assumption is that sectors with less mobility across firms would be associated with both a larger number of internal promotions and a lower degree of competition for managers. Therefore, our model predicts a negative correlation between β_{γ}^{ind} and the percentage of insider promotions.

Figure 4 plots the relationship between CEO quality and corporate governance as

a function of the degree of competition for managers. Specifically, on the vertical axis we plot the coefficient of the regression of corporate governance (*G-Index*) on CEO quality for a given industry; that is, β_γ^{ind} as per equation (10). On the horizontal axis we plot the percentage of internally promoted CEOs in that industry, as reported by Cremers and Grinstein (2010).

Each point in the figure corresponds to a different industry. The number reported next to each point is the number of the industry that generated that data point, coded following the 49 Fama French industries. To ensure robust results, we only include industries that have at least 100 observations.[7]

We also plot the linear fit of all the different data points. The figure shows that higher competition for managers implies a steeper relationship between corporate governance and managerial quality. This implies a more important role of corporate governance as part of an optimal compensation contract. In numbers, the correlation between the different β_γ^{ind} and the percentage of internal promotions is -0.245, which is statistically different from zero at the 1 percent level.

In short, this picture provides evidence that the competition for managers plays a crucial role in the choices of corporate governance of firms that want to attract highly talented managers, the key insight of our model. Indeed, firms seem to use corporate governance as part of an optimal compensation contract more aggressively in those industries where the competition for talent is more severe.

4.5 The effect of governance on performance

Throughout the paper, we argue that there is a relationship between a firm's choice of corporate governance and the quality of the manager it can employ, measuring the latter in terms of the firm's performance while this manager is CEO relative to that of the respective industry (see equation 6). One possible concern with our

[7] In Figure 4, we exclude industries number 15 and 24 (rubber and plastic products, and aircraft) because they may constitute outliers. If we include these industries, the results remain unchanged and the correlation between the different β_γ^{ind} and the percentage of internal promotions is -0.249, which is statistically different from zero at the 1 percent level.

approach is that corporate governance might have a direct effect on our measure of firm performance (ROA), and our findings may pick up this effect rather than being evidence that lower corporate governance serves to attract better managers, as we argue.

To control for this possible alternative explanation, in Table 8 we replicate our main empirical test (Panel A of Table 4) using CEO quality as estimated in column 2 of Table 3. Recall that in that specification, we add our corporate governance indicators and executive compensation as controls in the first stage regression. Using this alternative first stage, we find that the results improve both in economic magnitude and in statistical significance. For instance, holding all else constant, one standard deviation increase in CEO talent implies a 0.6 point increase in *G-Index* (or decrease in governance), which is significantly different from zero at the 1% level.[8]

The reason for the improvement in the results under this new specification is intuitive. As previous literature on governance has suggested, the direct effect of corporate governance on firm performance is positive and thus not controlling for it works against finding support for our empirical predictions, while controlling for it strengthens our finding.

5 Conclusion

In this paper, we explore 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: setting up a generous pay-for-performance scheme to reward managers if things go well, and investing in corporate governance to punish managers if things go badly. We show that when managerial quality is observable and managerial skills are scarce, competition among firms to hire better managers implies that in equilibrium firms choose lower levels of corporate governance.

[8]Similarly, all the other results in the paper are robust to using this alternative measure of CEO quality.

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 while the benefit of corporate governance (due to a reduction in the value of managers' outside options) are partly shared with other firms.

We provide novel empirical evidence supporting our model. We develop an empirical measure of managerial talent and find that it is negatively correlated with indicators of corporate governance, firm size, takeovers, and CEO tenure. Moreover, we find a stronger negative relationship between corporate governance and CEO quality in industries with greater competition for managers, where the latter is measured as the frequency of external hires. Finally, in support of the assumption that compensation and governance are chosen as part of an optimal incentive package, we find that corporate governance changes significantly when a new CEO is hired, with better CEOs being offered weaker 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.[9] Since private equity funds hold concentrated stakes

[9]See, for example, Jensen (1989) for a theoretical argument, Kaplan (1989) for evidence on operational improvements due to private equity ownership in early wave of leveraged buyouts (LBOs), and Acharya, Gottschalg, Hahn and Kehoe (2010) on the LBOs during 1995 to 2005 (in the U.K. and Western Europe).

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 with dispersed shareholders that concentrated private equity investors can "arbitrage" through their investments in active governance.

Finally, our results also have important corollaries for the regulation on corporate governance. In our model, firms do not internalize the positive externality corporate governance causes to other firms in the economy through the high quality managers' reservation utility. Hence, from this perspective, our model prescribes regulation increasing corporate governance.

More importantly, our model also highlights the effects regulation on corporate governance might have on the matching between managers and firms. Specifically, if a given sector implements regulation tightening corporate governance, the equilibrium outcome might be two folded. On one hand, firms (and not managers) will end up paying the cost of this tighter regulation in the form of higher managerial compensation when employing a high quality manager. In this case, regulation on corporate governance might result in both inefficient expenses in regulation compliance and excessively high executive compensation. On the other hand, sector specific regulation on corporate governance might distort the allocation of talent across different sectors in the economy, as top quality managers might migrate to sectors were corporate governance regulation is laxer. This latter path is more likely to occur if the sector specific tightening in corporate governance comes hand in hand with a sector specific public scrutiny on executive pay.

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Appendix: Proof of Proposition 1

By assumption, there is an excess of L managers. Hence, $\overline{u}_L = 0$. It follows from Lemma 1 that firms hiring a L manager set $g_L = 1$ and $w_L = 0$ with associated profits

$$\pi_L = py - c + (1-p)R$$

Any firm can achieve this level of profit, and they may be able to do better by hiring the more productive H-type manager. Given Lemma 1, the expected profit from hiring a H managers is:

$$\pi_H = pY - \overline{u}_H - \max\left\{0, \left(1 - \frac{\overline{u}_H}{B}\right)[c - (1-p)R]\right\}.$$

To find the optimal contract for the H-type managers, we need to solve for the endogenously determined $\overline{u}_H$. First, we can establish the following result: in equilibrium, firms must obtain the same profits hiring the H-type or the L-type manager. The reasoning is as follows. Given $m_H < n$, $m_L > n$, in any equilibrium, some firms employ L-type managers. Suppose there is an equilibrium in which firm j employs an H- type with contract $\left(w_H^j, g_H^j\right)$ and obtains higher profits than firms employing an L-type. This cannot be an equilibrium because a firm employing an L-type would profitably deviate to $\left(w_H^j + \varepsilon, g_H^j\right)$, with ε close enough to zero, hiring the H-type manager previously employed by firm j for sure and would increase profits. On the contrary, suppose there is an equilibrium in which firm k employs an H-type with contract $\left(w_H^k, g_H^k\right)$ and obtains lower profits than firms employing an L-type with contract $\left(w_L^k, g_L^k\right)$. Then, this firm would always find it profitable to employ an L-type manager, who are in excess supply, and offer the contract $\left(w_L^k, g_L^k\right)$.

Therefore, it must be that employing an H-type manager leads to the same profits as employing an L-type manager ($\pi_H = \pi_L$). Under these conditions, Assumption 4 implies that all H-type managers and only $n - m_H$ of the L-type managers will be employed. The condition that employing an H-type manager leads to the same profit as hiring an L-type can be solved for $\overline{u}_H$:

$$\overline{u}_H = \min\left\{p(Y-y)\frac{B}{B + (1-p)R - c}, p(Y-y) + c - (1-p)R\right\}$$

From Lemma 1, this implies that $w_H = \min\{(Y-y)B/[B + (1-p)R - c], Y - y + [c-(1-p)R]/p\} > 0$ (because both terms in the curly brackets are strictly positive) and $g_H = \max\{0, 1 - p(Y-y)/[B + (1-p)R - c]\} < 1$ (because both terms in the curly brackets are strictly smaller than 1).

This equilibrium is unique because there is a unique $\overline{u}_H$ that equates $\pi_H = \pi_L$ and there is a one-to-one mapping between $\overline{u}_H$ and the incentive contract (w_H, g_H), as shown in Lemma 1.■

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 before CEO compensation over lagged total assets. *Market Cap* is the firm market capitalization. *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 earnings before depreciation, interest, and tax over interest expenses. *Dividend earnings* is the sum of common dividends and preferred earnings over earnings before depreciation, interest, and tax. Tobin's q is the ratio of a firm's total market value over total assets. *Accruals* are the discretionary accruals calculated using the modified Jones model as in Dechow et al. (1995). *G-Index* is the Gompers et al. (2003) governance index. *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. *Turnover* is an indicator that takes value 1 if the current CEO is different from the CEO in the year before. The sample consists of 8916 firm-year observations that correspond to 2406 different CEOs and 1637 different firms, covering the period from 1992 to 2006. *Duality* is only available for 7301 observations as it is only available from 1996.

Variable	Mean	Std. Dev.	Min	Max
ROA	0.06	0.10	-0.51	0.38
Market Cap.	8.09	1.49	3.43	11.31
Book Leverage	0.37	0.31	-2.44	3.43
Cash	0.92	3.66	0.00	93.43
Interest Coverage	37.49	111.62	-678.89	725.78
Dividend Earnings	0.09	0.13	-0.61	1.29
Tobin's q	1.90	1.27	0.50	19.82
Accruals	0.00	0.07	-1.07	0.80
G Index	9.52	2.66	2	18
Duality	0.79	0.41	0	1
Total Comp.	7.87	1.02	5.20	10.47
Turnover	0.16	0.37	0	1

Table 2: **Corporate Governance Changes and CEO Turnover**

This table analyzes the changes in corporate governance and their relationship to turnover. Panel A shows the frequency of *G-Index* and *Duality* changes. It shows the frequency of *G-Index* and *Duality* changes, *I(G Chg)* and *I(D Chg)*, respectively, during no CEO turnover periods and around CEO turnover. It also shows the t-test for the differences in the frequency. Panel B analyzes the distribution of the *G-Index* and *Duality* changes. It analyzes the proportion of *G-Index* and *Duality* decreases, no changes and increases among all observations, during no CEO turnover periods and around CEO turnover. It also shows the t-stat for the Wilcoxon test of equality of distribution for the no CEO turnover and CEO turnover distributions.

Panel A. Frequency of changes in governance

	No CEO Turnover	CEO Turnover	T-test
I(G Chg)	21.87%	34.78%	9.61***
I(D Chg)	16.25%	31.49%	15.98***

Panel B. Changes in governance

	All Observations	No CEO Turnover	CEO Turnover
G Chg			
Decreases (-1)	12.31%	11.28%	17.02%
No change (0)	75.82%	78.13%	65.22%
Increase (+1)	11.87%	10.59%	17.76%
Wilcoxon Test:			0.901
D Chg			
Decreases (-1)	12.40%	11.03%	24.00%
No change (0)	82.15%	83.75%	68.51%
Increase (+1)	5.45%	5.21%	7.49%
Wilcoxon Test:			10.636***

Table 3: **Estimation of CEO Quality**

In this table, we estimate CEO quality. To do so, in columns (1) and (2), 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 quality. The dependent variable is *Return on Assets*. The control variables are *Market Cap*, *Book Leverage*, *Cash*, *Interest Coverage*, *Dividend earnings*, Tobin's *q*, *Accruals*, and year and industry dummies. In columns (2) and (3), we also include *G-Index*, *Duality*, and *Total Comp*. All control variables are lagged one year. In columns (1) and (2), we include dummy variables that take value 1 for a specific CEO in a given firm and zero otherwise. Standard errors are reported in parentheses and 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 Quality are also reported.

	(1)	(2)	(3)
L.Market Cap.	-0.007	0.000	0.009
	(0.006)	(0.007)	(0.002)***
L.Book Leverage	0.012	0.011	-0.030
	(0.011)	(0.010)	(0.013)**
L.Cash	0.002	0.002	-0.001
	(0.003)	(0.004)	(0.001)
L.Interest Coverage	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)***
L.Dividend Earnings	0.002	0.001	0.040
	(0.015)	(0.017)	(0.012)***
L.Tobin's q	0.018	0.016	0.019
	(0.007)***	(0.007)**	(0.005)***
L. Accruals	0.005	0.017	0.066
	(0.022)	(0.025)	(0.027)**
L. Total Comp		-0.000	-0.000
		(0.000)	(0.000)**
L. G Index		-0.004	0.001
		(0.002)*	(0.001)
L.Duality		-0.007	-0.004
		(0.004)*	(0.003)
Industry/ Year F.E.	Y	Y	Y
CEO fixed effects	Y	Y	N
Observations	8,916	7,301	7,301
R-squared	0.705	0.714	0.231
CEO fixed effects identified	2406	2088	—
CEO Quality Mean	-0.012	-0.012	—
CEO Quality Std. Dev.	0.097	0.096	—
CEO Quality Min	-0.890	-0.887	—
CEO Quality Max	0.344	0.349	—

Table 4: **CEO Quality, Governance, Compensation & Size**

In Panel A, we regress corporate governance, different components of compensation and firm size on the CEO quality obtained in Table 2, column 1. In Panel B, we estimate the probability of takeover (in Columns 1 and 2) and a Cox model (in Columns 3 and 4) of CEO employment duration. In Panel A, we use *G-Index* and *Duality* as a measure of corporate governance. We use total compensation (*Total Comp*) and pay for performance (*Pay Perf.*) as a measure of executive pay and market capitalization (*Market Cap*) as a measure of firm size. *CEO Quality* are the coefficients on the CEO fixed effects obtained in column (1) in Table 2. Columns (1), (3), (4), and (5) in Panel A present linear regressions. Column (2) in Panel A presents a logit model. All regressions in Panel A include a dummy for external CEOs, industry fixed effects and year dummies. In Panel B, Columns (1) and (2) report a Cox duration model to estimate CEO employment length. Column (1) uses the entire sample of CEOs, while column (2) only includes those CEOs under 65 years of age. Results are reported in terms of Hazard Rates. Columns (3) and (4) report a tobit model on takeovers. In column (3) we report the results for all takeovers, while in column (4) we include only completed takeovers. Regressions in Panel B include market capitalization, a dummy for external CEOs and industry fixed effects and year dummies. Standard errors are reported in parentheses and clustered at the firm level. *, **, or *** indicates that the coefficient is statistically significantly different from zero at the 10%, 5%, or 1% level, respectively.

Panel A: Governance, Compensation & Size

Dep Variable	G-Index	Duality	Total Comp.	Pay Perf.	Market Cap.
	(1)	(2)	(3)	(4)	(5)
CEO Quality	1.351	1.190	2.743	0.290	5.938
	(0.763)*	(0.579)**	(0.286)***	(0.060)***	(0.541)***
Industry/ Year F.E.	Y	Y	Y	Y	Y
Observations	3,967	7,301	8,916	6,150	8,916
R-squared	0.088	0.067	0.154	0.087	0.214

Panel B: CEO Employment Length

Model	Cox	Cox	Logit	Logit
Dep Variable	Turnover	Turnover	Takeover	Completed T.
Observations	All sample	Age $\leq$ 65	All sample	All sample
	(1)	(2)	(3)	(4)
CEO Quality	0.068	0.061	-4.064	-3.548
	(0.044)***	(0.042)***	(0.817)***	(0.809)***
Industry/ Year F.E.	Y	Y	Y	Y
Market Cap.	Y	Y	Y	Y
Observations	8028	7290	7570	7569

Table 5: **CEO Turnover and G-Index**

In this table, we regress the change in corporate governance (as measured by *G-Index*) on CEO turnover and *CEO Quality*. *I(G Chg)* is a dummy variable that takes value 1 if *G-Index* changes from the previous period and 0 otherwise. *G Chg* is a variable that takes value 1 if *G-Index* increases from the previous period, 0 if it does not change and -1 if it decreases. *G Chg Up* is a dummy variable that takes value 1 if *G-Index* increases from the previous period and 0 otherwise. *G 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. *Up* is a dummy variable that takes value 1 if the current CEO is better than the previous one, 0 otherwise. We estimate linear probability models in all specifications. All regressions include a dummy for external CEOs, industry fixed effects and year dummies. Standard errors are reported in parentheses and clustered at the firm level. *, **, or *** indicates that the coefficient is statistically significantly different from zero at the 10%, 5%, or 1% level, respectively.

Dependent Variable:	I(G Chg)	G Chg	G Chg Up	G Chg Down
	(1)	(2)	(3)	(4)
Turnover	0.079			
	(0.015)***			
Turnover Up		0.085	0.039	
		(0.033)**	(0.021)*	
Turnover Down		-0.030		0.036
		(0.027)		(0.012)***
Up		0.044	0.050	
		(0.015)***	(0.010)***	
Down		0.063		0.023
		(0.013)***		(0.005)***
Market Cap.	-0.016	0.006	0.003	0.014
	(0.004)***	(0.004)	(0.003)	(0.002)***
Industry/ Year F.E.	Y	Y	Y	Y
Observations	3,967	3,967	3,967	3,967
R- squared	0.108	0.033	0.064	0.042

Table 6: **CEO Turnover and Duality**

In this table, we regress the change in corporate governance (as measured by *Duality*) on CEO turnover and *CEO Quality*. *I(D Chg)* is a dummy variable that takes value 1 if *Duality* changes from the previous period and 0 otherwise. *D Chg* is a variable that takes value 1 if *Duality* increases from the previous period, 0 if it does not change and -1 if it decreases. *D Chg Up* is a dummy variable that takes value 1 if *Duality* increases from the previous period and 0 otherwise. *D Chg Down* is a dummy variable that takes value 1 if *Duality* 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 *Duality* 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 *Duality* 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 *Duality* and the new CEO is worse than the previous one (that is, CEO quality goes down over the period) and 0 otherwise. *Up* is a dummy variable that takes value 1 if the current CEO is better than the previous one, 0 otherwise. We estimate linear probability models in all specifications. All regressions include a dummy for external CEOs, industry fixed effects and year dummies. Standard errors are reported in parentheses and clustered at the firm level. *, **, or *** indicates that the coefficient is statistically significantly different from zero at the 10%, 5%, or 1% level, respectively.

Dependent Variable:	I(D Chg)	D Chg	D Chg Up	D Chg Down
	(1)	(2)	(3)	(4)
Turnover	0.156			
	(0.014)***			
Turnover Up		-0.085	-0.004	
		(0.031)***	(0.009)	
Turnover Down		-0.081		0.142
		(0.031)***		(0.014)***
Up		0.020	0.008	
		(0.010)**	(0.005)	
Down		0.005		-0.027
		(0.009)		(0.005)***
Market Cap.	-0.020	-0.006	-0.004	-0.007
	(0.003)***	(0.002)***	(0.001)***	(0.001)***
Industry/ Year F.E.	Y	Y	Y	Y
Observations	7,301	7,301	7,301	7,301
R- squared	0.353	0.374	0.030	0.060

Table 7: **Individual Components of G-Index and CEO Quality**

In this table, we show detailed results regarding the relationship between our proxy of CEO quality and the sub-components of the *G-Index*. In Panel A, regressions include a dummy variable for external CEOs, industry fixed effects and year dummies. In Panel B, we regress the change in each *G-Index* sub-index on CEO turnover and changes in *CEO Quality*. *[Sub-index] Chg* is a variable that takes value 1 if the corresponding *G-Index* sub-index increases from the previous period, 0 if it does not change and -1 if it decreases. *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. *Up* is a dummy variable that takes value 1 if the current CEO is better than the previous one, 0 otherwise. We estimate linear probability models in all specifications. All regressions include a dummy for external CEOs, industry fixed effects and year dummies. Standard errors are reported in parentheses and clustered at the firm level. *, **, or *** indicates that the coefficient is statistically significantly different from zero at the 10%, 5%, or 1% level, respectively.

Panel A: Cross-sectional evidence

Dependent Variable	Delay	Protection	Voting	Other	State Law
	(1)	(2)	(3)	(4)	(5)
CEO Quality	0.163	0.945	-0.025	0.496	0.079
	(0.351)	(0.329)***	(0.208)	(0.258)*	(0.364)
Industry/ Year F.E.	Y	Y	Y	Y	Y
Observations	3,967	3,967	3,967	3,967	3,967
R-squared	0.063	0.077	0.055	0.086	0.056

Panel B: Time-series evidence

Dependent Variable:	Delay Chg	Protection Chg	Voting Chg	Other Chg	State Law Chg
	(1)	(2)	(3)	(4)	(5)
Turnover Up	-0.003	0.063	0.042	0.070	0.044
	(0.021)	(0.026)**	(0.017)**	(0.022)***	(0.015)***
Turnover Down	-0.009	0.003	-0.046	-0.028	-0.012
	(0.019)	(0.022)	(0.016)***	(0.019)	(0.014)
Up	0.060	0.050	0.058	0.037	0.039
	(0.010)***	(0.011)***	(0.008)***	(0.010)***	(0.008)***
Down	0.013	0.045	0.012	0.023	0.011
	(0.009)	(0.010)***	(0.008)	(0.009)**	(0.008)
Market Cap.	0.017	0.015	0.013	0.006	0.015
	(0.003)***	(0.003)***	(0.002)***	(0.003)**	(0.002)***
Industry/ Year F.E.	Y	Y	Y	Y	Y
Observations	3,967	3,967	3,967	3,967	3,967
R-squared	0.046	0.044	0.060	0.041	0.070

Table 8: **Robustness Check: Alternative Measure of CEO Quality**

In this table, we regress corporate governance, firm size and different components of compensation on CEO quality. *G-Index* and *Duality* are our measures of corporate governance. Executive compensation (*Total Comp*) is the logarithm of CEO total compensation. Firm size is measured as *Market Cap*. *CEO Quality* are the coefficients on the CEO fixed effects obtained in column 2 in Table 3. Columns (1), (3), (4), and (5) present linear regressions. Column (2) presents a logit model. All regressions include a dummy for external CEOs, industry fixed effects and year dummies. Standard errors are reported in parentheses and clustered at the firm level. *, **, or *** indicates that the coefficient is statistically significantly different from zero at the 10%, 5%, or 1% level, respectively.

Dependent Variable	G-Index	Duality	Total Comp.	Pay Perf.	Market Cap.
	(1)	(2)	(3)	(4)	(5)
CEO Quality	6.125	1.705	1.963	0.19	3.977
	(0.812)***	(0.597)***	(0.298)***	(0.064)***	(0.527)***
Industry/ Year F.E.	Y	Y	Y	Y	Y
Observations	3,246	7,301	4,951	7,301	7,301
R-squared	0.088	0.073	0.154	0.087	0.214

Figure 1: **Timeline**

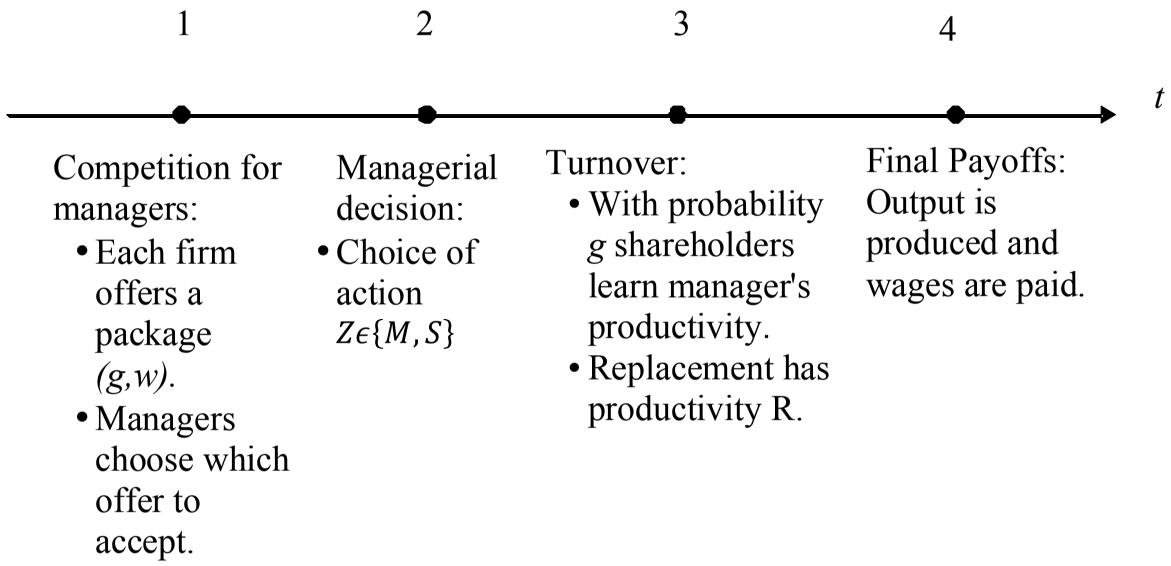

Figure 2: **Incentive Contracts with High Reservation Utility**

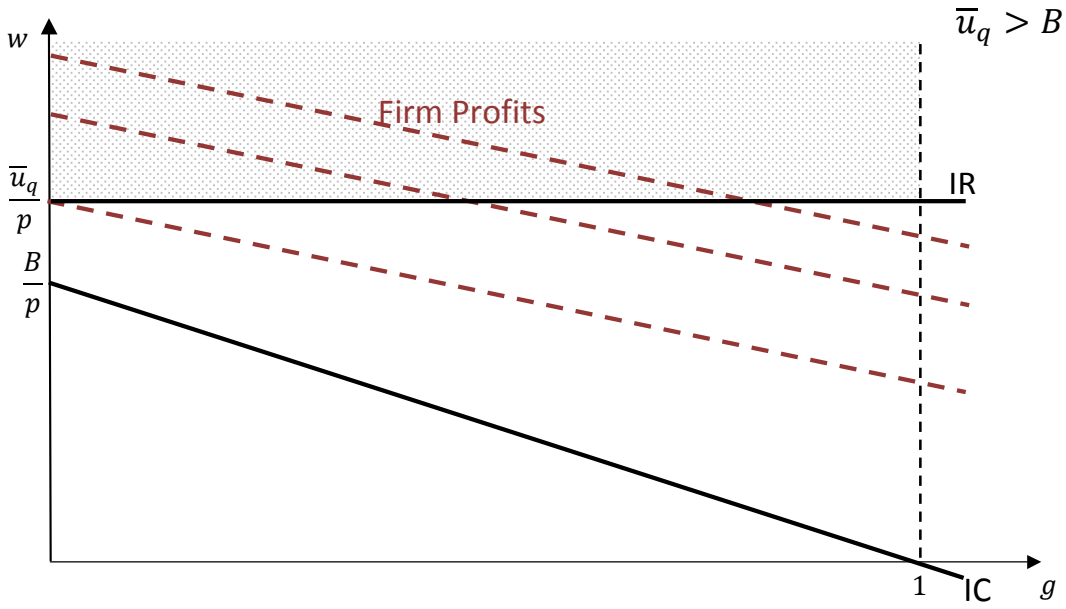

Figure 3: **Incentive Contracts with Low Reservation Utility**

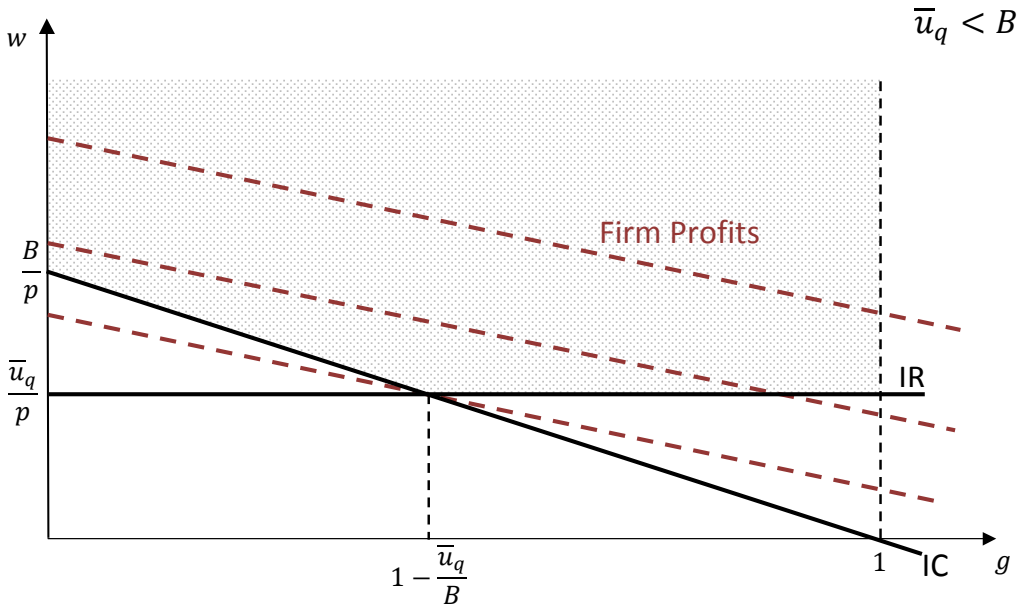

Figure 4: **Competition for Managers**

In this figure, we show the cross-industry differences in the correlation between corporate governance and managerial quality. We estimate the regression $G-Index = \beta_{\gamma}^{ind} \times \widehat{\gamma}_j + \upsilon_{jt} + \chi_t + z_{ind} + \xi_{it}$, separately for each industry. The figure below plots the value of the estimated coefficient on *CEO Quality* (β_{γ}^{ind}) with respect to our measure of the degree of competition for managers in that industry (the *Percentage of Insider Promotions* as per Cremers and Grinstein, 2010). The number next to each data point indicates the industry code: 1 = Agriculture, 2 = Food Products, 3 = Candy & Soda, 4 = Beer & Liquor, 5 = Tobacco Products, 6 = Recreation, 7 = Entertainment, 8 = Printing and Publishing, 9 = Consumer Goods, 10 = Apparel, 11 = Healthcare, 12 = Medical Equipment, 13 = Pharmaceutical Products, 14 = Chemicals, 15 = Rubber and Plastic Products, 16 = Textiles, 17 = Construction Materials, 18 = Construction, 19 = Steel Works Etc, 20 = Fabricated Products, 21 = Machinery, 22 = Electrical Equipment, 23 = Automobiles and Trucks, 24 = Aircraft, 25 = Shipbuilding, Railroad Equipment, 26 = Defense, 27 = Precious Metals, 28 = Non-Metallic and Industrial Metal Mining, 29 = Coal, 30 = Petroleum and Natural Gas, 31 = Utilities, 32 = Communication, 33 = Personal Services, 34 = Business Services, 35 = Computers, 36 = Computer Software, 37 = Electronic Equipment, 38 = Measuring and Control Equipment, 39 = Business Supplies, 40 = Shipping Containers, 41 = Transportation, 42 = Wholesale, 43 = Retail, 44 = Restaurants, Hotels, Motels, 45 = Banking, 46 = Insurance, 47 = Real Estate, 48 = Trading. We include only industries with more than 100 observations.