Competition for Managers, Corporate Governance and Incentive Compensation

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April 2015

Abstract

Stricter corporate governance (i.e. separation between the roles of CEO and Chairman of the Board) incentivizes managers to perform better and thus may be used as a substitute for pay for performance. However, in equilibrium, when managerial talent is scarce, firms' competition to attract better CEOs forces firms to pay CEOs more, reducing an individual firm's incentives to hire a separate Chairman of the Board. Consistent with these implications, we empirically document that (i) better CEOs are more likely to also be Chairman of the Board and (ii) more so in industries with more intense competition for CEOs.

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.

Competition for Managers and Corporate Governance

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Abstract

Separation between the roles of CEO and Chairman of the Board incentivizes managers to perform better and thus may be used as a substitute for pay for performance. However, when managerial talent is scarce, competition to attract better CEOs forces firms to pay CEOs more, reducing an individual firm's incentives to hire a separate Chairman of the Board. Consistent with these implications, we empirically document that (i) better CEOs are more likely to also be Chairman of the Board and (ii) more so in industries with more intense competition for CEOs.

Keywords: corporate governance, executive compensation, separate CEO and Chairman.

1 Introduction

Hardly a day goes by without a newspaper headline voicing the public outcry against the pay of corporate executives. 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 ongoing debate on executive pay has kept academics busy for the last twenty years. 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 document that poor corporate governance arises *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.

Our theoretical argument is based on the view that corporate governance and pay for performance are substitutes. When there is little competition for managers, firms 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 follows from the inability of a firm to affect the rents of the top quality CEOs 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 outside the control of a given firm. Therefore, it becomes inefficient for a firm that wants to employ a top quality manager to hire an independent Chairman of the Board as it would have to match the manager's individual rationality constraint by setting generous pay anyway. Thus, shareholders would end up bearing the cost of hiring an independent Chairman of the Board without enjoying the benefits of stricter corporate governance.

As a result, in equilibrium, some firms attract better managers by paying them more and choosing laxer governance standards (i.e., CEO duality); others attract weaker managers by paying them less and choosing stricter governance standards (i.e., separation of the roles of CEO and Chairman of the Board). These associations are ex-ante rational as firms offer these compensation and governance packages as a response to the scarcity of managerial talent.

Three empirical predictions follow from this argument. The first one is that shareholders use duality as part of an incentive contract for new CEOs. The second prediction is that shareholders are more likely to adopt duality when they appoint a higher-quality CEO. The third prediction is that in industries with more competition for CEOs we expect to find a stronger correlation between changes in CEO ability and duality. Conversely, in sectors with less competition for talent, we expect to find lower or even no significant correlation between changes in CEO ability and duality.

To test these predictions, we adopt a difference-in-differences (DID) methodology in which we examine the changes in firms' duality from one year to the next one for firms with a CEO turnover (and thus experiencing a change in CEO ability) as compared with firms with no CEO turnover. The identifying hypothesis is that, con-

ditional on a set of control variables, the treated firms (i.e., those with CEO turnover) are otherwise identical to the control firms (i.e., those with no CEO turnover), so that we can identify the effect that turnover (and change in CEO ability) has on duality. The DID approach alleviates concerns that time-invariant differences across firms (such as their corporate culture or industry) are driving the result. To ensure that our results are not driven by a time-varying factor like managerial entrenchment (the main alternative hypothesis) we control for managerial tenure and a dummy for externally appointed managers.

We test these predictions using a dataset that combines balance-sheet data from Compustat on unregulated firms in the United States over the period 1996 to 2012, data from ExecuComp on the compensation they award their CEOs and on their turnover, and firm-level corporate governance data from ISS. We focus on a measure of internal corporate governance: CEO duality, which is an indicator that takes value 1 if the CEO is also the Chairman of the Board, and 0 otherwise. We obtain our measure of managerial ability from Demerjian et al. (2012), who proxy managerial ability as the managers' efficiency in generating revenues and measure it using data envelopment analysis.

Consistent with the first prediction, we find that changes in duality are more frequent at the time of a CEO turnover than in non-turnover years. The frequency of changes in duality increase by 49% around turnover. This result is economically large: on average, firms change duality about 14% of the years so changes in duality more than triple around turnover. This result survives when we control for firm fixed effects and a set of time varying control variables.

Consistent with the second prediction, we find that increases in duality are associated with increases in CEO ability. This result indicates that duality is used to attract the high-ability managers. In terms of economic significance, hiring a higher-ability CEO is associated with a 9.6% change in the probability of duality compared with hiring a lower-ability CEO.

To test the third prediction on the role of the competition for CEOs, we take advantage of cross-industry differences in the competition for managerial talent. Specifically, we measure the degree of competition for managers in an industry using data from Cremers and Grinstein (2014) on the percentage of CEOs in an industry that had the previous employment within the same industry. To test the prediction that in industries with more competition for CEOs there should be a stronger correlation between changes in CEO ability and duality, we follow two different strategies. First, we add to our basic specification an interaction term of the change in CEO ability and the percentage of within-industry moves from Cremers and Grinstein (2014). We find that the interaction term has a negative and statistically significant coefficient: sectors with more within-industry mobility are associated with a lower correlation between CEO ability and duality. Moreover, the sum of the coefficients on CEO ability and the interaction term is not significantly different from 0. This result indicates that sectors with very high within-industry mobility are associated with no correlation between CEO ability and duality. Second, we estimate our basic specification separately for each Fama-French 49 industry. Then, we plot the relation between the sensitivity of changes in duality to changes in CEO ability against the percentage of within-industry moves. We find a negative correlation between the two variables of -0.278.

We then focus on several robustness checks. The empirical identification in the DID approach comes from the comparison of the change in duality in firms that are subject to a CEO turnover (treated firms) with the change in duality in firms that do not experience such change (control firms). One concern with this approach is that the estimated treatment effect could be due to pre-treatment differences in the characteristics of treated and control firms. We address this concern in three ways. First, we examine the dynamics of duality in the years preceding the CEO turnover. Second, we add further control variables to ensure that our results are not driven by omitted variables that may differ between control and treated firms. Third, we use propensity score matching to pair each firm experiencing a CEO turnover with

its closest match (that did not experience a CEO turnover) and repeat the analysis focusing only on these paired firms.

We also find evidence of an asymmetric effect depending on past duality. When the outgoing CEO is also the Chairman of the Board, the new CEO is more likely to also be hired as the Chairman of the Board. Conversely, when the outgoing CEO is not the Chairman of the Board, the new CEO is also less likely to be hired as Chairman of the Board. We also find that CEO quality tends to be more positively correlated with Duality when the outgoing CEO is not the Chairman of the Board. These findings indicates some stickiness in the decision to separate the roles of CEO and Chairman, simply due to the fact that hiring (or firing) two people is more complex than one.

As a whole, our empirical analysis provides support for our theoretical argument that competition among firms for scarce managerial talent is an important determinant of executive compensation *and* governance practices observed in equilibrium.

The remaining of the paper is organized as follows. Section 2 discusses related literature. Section 3 develops the testable hypotheses and explains the empirical strategy. Section 4 presents the empirical evidence and section 5 discusses robustness issues. Section 6 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? 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.

(2014) 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 and Hermalin and Weisbach (1998) discuss how board characteristics may be an equilibrium outcome that depends on firm and CEO characteristics. Departing from these contributions, Biais and Landier (2013) argue 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 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

[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 (2014) 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.

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, Cuñat et al. (2012) show that there is a positive correlation between changes in governance and performance only when the latter changes are truly random, while Bach and Metzger (2015) 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. Levit and Malenko (2015) also explore the externalities in corporate governance arising from the directors reputational concerns. 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 ability, we follow Demerjian at al (2012) and compute the (unobserved) CEO ability starting from measures of firm performance. An alternative (and complementary) approach is adopted by Milbourn (2003), Murphy and Zábojník (2007), Falato et al. (2015), 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 educa-

tional credentials of the CEOs (which can be viewed as measure of talent). Another, more indirect approach is to measure CEO talent as the CEO fixed effect. This approach has been used by Bertrand and Schoar (2003) to study managerial styles and by Graham et al. (2012) to study executive compensation. We do not follow this approach because we need to be able to sort CEO according to their ability to test the correlation between ability and corporate governance. In other words, we would need to estimate the CEO fixed effects from a regression with performance as the dependent variable and use them as regressors in a regression in which duality is the dependent variable. The methodology proposed by Demerjian at al. (2012) is an efficient way to achieve this result.

3 Empirical Strategy

In this section, we discuss the effect of competition for talent on firms' choice of corporate governance and develop our empirical strategy.

In section 3.1, we explain our theoretical framework and develop the empirical predictions. A theoretical model to clarify the rationale behind our hypotheses is presented in Appendix B. In section 3.2, we explain how we test our empirical predictions.

3.1 Empirical Predictions

Our theoretical framework is based on the premise that corporate governance is part of the incentive contract for CEOs. Hence, our first empirical prediction is:

Prediction 1 (Duality as part of the CEO incentive contract): *Changes in duality are more common in years when a new CEO is hired.*

The model presented in Appendix B is built on two important ingredients. First, firms can incentivize CEOs to exert the necessary effort using a combination of pay

for performance and corporate governance. Tight corporate governance (i.e. separation between CEO and Chairman) reduces CEO discretion and thus reduces the pay for performance that a firm is required to pay to incentivize the CEO. Second, competition for scarce managerial talent may drive up the outside option of talented CEOs so as to render the incentive compatibility condition for talented CEOs redundant. If so, firms hiring highly talented CEOs may find it inefficient to (costly) monitor their CEO by hiring an independent Chairman of the Board.

Therefore, the main result of the model presented in Appendix B is that in equilibrium the rent extracted by the talented CEOs is such that to make firms indifferent between hiring the two types: some firms choose duality and attract the better CEOs while others choose separation and attract the worse CEOs. Provided that we can find an appropriate measure of managerial talent, our second empirical prediction is:

Prediction 2 (Matching CEO ability and duality): *When firms hire higher ability CEOs, they choose duality. Instead, when firms employ lower ability CEOs, they prefer to separate the CEO and Chairman roles.*

Finally, the argument above critically highlights the role of competition for CEOs. Duality emerges only when there is sufficient competition for CEOs. Therefore, conditional on us finding a relevant measure of the effective competition for CEOs:

Prediction 3 (Competition for CEOs and duality): *The relationship between high ability CEOs and duality should be stronger in situations with stronger competition for managers.*

3.2 Empirical Specification

We now turn to the empirical strategy to design an empirical test for these three predictions.

To test the prediction that shareholders use duality as part of an incentive contract

for new CEOs, we estimate a DID specification: we examine the changes in firms' duality from one year to the next one for firms with a CEO turnover as compared with firms with no CEO turnover.

Specifically, we estimate the following specification:

$$Duality\ Chg_{it} = \alpha + \beta\, Turnover_{it} + \omega_{it} + \chi_t + \gamma_i + \xi_{it} \tag{1}$$

where $Duality_{it}$ is an indicator that takes value 1 if the CEO holds the position of Chairman of the Board in year t and firm i, and 0 otherwise; $Duality\ Chg_{it}$ is a dummy variable that takes value 1 if duality changes from year $t-1$ to year t in firm i, and 0 otherwise; $Turnover_{it}$ is a dummy variable that takes value 1 if the CEO for firm i in year t differs from the CEO in the previous year $t-1$, and takes value 0 otherwise; ω_{it}, χ_t, and γ_i are time varying firm characteristics, time, and fixed effects, respectively. We introduce these controls as firms could change duality for reasons unrelated to the CEO turnover. In our settings, we use either industry or firm fixed effects. In the former case, the identification comes from comparing changes in duality in firms that change CEO ability versus changes in duality in firms within the same industry that do not change CEO. In the latter case, with firm fixed effects, the identification arises from the comparison of the changes in duality within a given firm around CEO turnover to otherwise. The identification hypothesis is that, conditional on these control variables, the treated firms (i.e., those with CEO turnover) are otherwise identical to the control firms (i.e., those with no CEO turnover), so that we can identify the effect that turnover has on duality β.

Prediction 1 implies that $\beta > 0$: i.e., there should be more changes in *Duality* in years when new CEOs are hired because duality is chosen as part of the incentive contracts for CEOs.

The second prediction is that shareholders are more likely to adopt duality when they appoint a better CEO. To test this prediction, we estimate a difference-in-differences model in which we examine the correlation between changes in firms' duality from one year to the next one for firms with changes in CEO ability.

Specifically, we estimate the following specification:

$$Duality\ Chg\ Sign_{it} = \alpha + \beta\, Turnover\ Sign_{it} + \omega_{it} + \chi_t + \gamma_i + \xi_{it} \tag{2}$$

where *Duality Chg Sign*$_{it}$ is a categorical variable that takes value 1 in year t if duality increases from year $t-1$ to year t in firm i, 0 if it does not change, and -1 if it decreases; *Turnover Sign*$_{it}$ is a categorical variable that takes value 1 if *Turnover*$_{it} = 1$ and the new CEO has higher *Ability* than the old one, 0 if *Turnover*$_{it} = 0$ and -1 if *Turnover*$_{it} = 1$ and the new CEO has lower *Ability* than the old one. *Ability* is the average CEO ability as measured by Demerjian et al. (2012) for a given CEO-firm match. We discuss this measure in detail in the Data section 4.1. As before, we control for time varying firm characteristics, time, and fixed effects (ω_{it}, χ_t, and γ_i, respectively), as firms could change duality for reasons unrelated to the ability of the new CEO. The identification hypothesis is that, conditional on these control variables, the treated firms (i.e., those with CEO turnover) are otherwise identical to the control firms (i.e., those with no CEO turnover), so that we can identify the effect that CEO ability has on duality β. Prediction 2 implies that $\beta > 0$.

To test the third prediction on the role of the competition for CEOs, we take advantage of cross-industry differences in the competition for managerial talent. Specifically, we estimate the degree of competition for managers in an industry using the *Within Industry* measured by Cremers and Grinstein (2014) as the percentage of CEOs in an industry that had the previous employment within the same industry. In sectors with less insider promotions, there is more competition for CEOs and thus we expect to find a strong correlation between changes in CEO ability and duality. Conversely, in sectors with more insider promotions, there is less competition for talent, and thus we expect to find no significant correlation between changes in CEO ability and duality. In other words, we predict $\beta > 0$ and $\beta = 0$ in specification (2) for competitive environments and non-competitive environments, respectively.

To test this prediction, we estimate the following specification:

$$\begin{aligned} \textit{Duality Chg Sign}_{it} = \alpha + \beta_1 \textit{Turnover Sign}_{it} + \\ \beta_2 \textit{Turnover Sign}_{it} \times \textit{Within Industry}_{it} + \omega_{it} + \chi_t + \gamma_i + \xi_{it} \end{aligned} \tag{3}$$

where $\textit{Duality Chg Sign}_{it}$, $\textit{Turnover Sign}_{it}$, $\textit{Within Industry}_{it}$, ω_{it}, χ_t, and γ_i are as described above. Prediction 3 implies that $\beta_2 < 0$ and $\beta_1 + \beta_2 = 0$.

In what follows we first describe the data and then present our results.

4 Empirical Results

4.1 Data description

We obtain our CEO data from ExecuComp, ISS (former RiskMetrics) and Demerjian et al. (2012). Using ExecuComp, we define *Turnover* as an indicator that takes value 1 if the current CEO is different from the last fiscal year end one.

We use the measure of managerial ability developed by Demerjian et al. (2012). In essence, the authors measure CEO ability as the residual firm productivity, after controlling for inputs and some observable characteristics beyond the CEO's control that may affect firm's productivity. First, they use data envelopment analysis (DEA) to calculate the efficient production frontier of a given industry as the amount of inputs needed to achieve a certain output level. Then, they assign each firm a score between 0 and 1 depending on the distance from the efficient frontier (lower score if further away from the frontier). CEO ability (*Ability*) is the average of such score for a given CEO-firm match.[2]

[2]In more details, Demerjian et al. (2012) calculate the firm efficiency using revenues, as their measure of output, and net property, plant, and equipment (PP&E), net operating leases, net R&D, purchased goodwill, other intangible assets, cost of inventory, and selling, general, and administrative expenses (SG&A), as their measures of inputs. They calculate managerial ability as the residual in the regression of the previously calculated firm efficiency over observables such as total assets, market share, free cash flow indicator, firm age, business segment concentration, foreign currency indicator and, year fixed effects. They run the regression separately for each industry.

Using this methodology instead of manager fixed effects (as done by Graham et al., 2012) provides a series of advantages. First, DEA generates an ordinal ranking with respect to the maximum efficiency that may be achieved, something especially useful in our setting. Second, this procedure does not impose an optimally uniform linear weighting on inputs. Different firms may achieve similar outputs with different combinations of inputs and both firms may lie in the efficient frontier. In other words, this methodology does not penalize for differences in "managerial styles"as long as managers achieve the efficient frontier with that style. Again, this is a useful characteristic of this methodology for our setting since we are interested in managerial ability rather than managerial style.

Other researchers (such as Falato et al., 2015) provide alternative measures of managerial ability based on press coverage, the age at which a given manager got the first CEO position, etc. We use the measure provided by Demerjian et al. (2012) as it is closer to our hypotheses. First, the high-ability manager in our hypothesis is more productive than the low-ability one, precisely the measurement criteria behind Demerjian et al. (2012). Second, variables such as press coverage or education could influence the decision on duality through other channels, such as public outrage. Last but not the least, it is important to notice that this measure of managerial ability has been calculated for reasons that are independent of the purpose of our paper. Demerjian et al. (2012) focus on appointment abnormal returns and the importance of managerial ability in resolving the new equity puzzle.

We define *Turnover Sign* as follows: *Turnover Sign* $= 1$ if *Turnover* $= 1$ and the current CEO has higher *Ability* than the previous one; *Turnover Sign* $= -1$ if *Turnover* $= 1$ and the current CEO has lower *Ability* than the previous one; and, *Turnover Sign* $= 0$ if *Turnover* $= 0$.

We obtain *Duality* from ISS/RiskMetrics: it 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. We define *Duality Chg* as dummy variable that takes value 1 if duality

changes and 0 otherwise; *Duality Chg Sign* as a categorical variable that takes value 1 if duality increases, 0 if it does not change, and -1 if it decreases.

We proxy the (lack of) competition for managerial talent by the percentage of CEOs that were hired from within a given industry: *Within Industry* is defined as the percentage of CEOs that were employed in the same Fama-French industry two fiscal years before they were promoted to CEO. As argued in the empirical predictions section, competition for managers affects duality choices through the managers' individual rationality constraints. To satisfy this individual rationality constraints a firm must pay the manager his/her reservation utility, which is the rent he/she would obtain if he/she would work for another firm. Empirically, the probability that a CEO finds an alternative position is directly affected by the number of firms that could potentially employ him/her. If firms in an industry tend to hire from within their own employees, this creates a relatively small "CEO talent pools", as documented by Cremers and Grinstein (2014). Hence, the percentage of CEOs either internally promoted or previously working at a firm within the industry is inversely correlated with the competition for managers. Cremers and Grinstein (2014) document that these differences across industries in terms of percentage of internally promoted managers arise from the importance of firm-specific skills.

In all specifications, we control for the past value of *Duality*, previous year firm performance (as measured by returns on assets *ROA*), firm size (as measured by the firm market capitalization *Market Cap*), CEO entrenchment (as measured by *Tenure*, which is the difference between the current year and the year the executive became CEO), and we allow for different effect when the CEO is hired from outside the firm (*External Dummy* is a dummy variable that takes value 1 if the CEO is externally appointed and 0 otherwise).

The definitions of all the variables are in the Appendix A. 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 winsorize all our non-categorical variables at the 1% level. We use the 49 Fama-French Industry classification: our final sample includes 43 different industries.

Summary statistics for all the variables are reported in Table 1. Our dataset spans the period from 1996 to 2012, covers 3387 different CEOs and 1992 different firms.

4.2 Duality as part of the CEO incentive contract

In this section, we study whether duality is used as part of the incentive contract for new CEOs. As suggested by Prediction 1, we should expect a higher frequency of changes of duality when there is a CEO turnover than otherwise.

In Table 2, we report estimation results for specification (1). Consistent with Prediction 1, we find that changes in *Duality* are more frequent around CEO turnover than in non-turnover years. For example, in column (1), results show that the frequency of changes in *Duality* increase by 49% around turnover. This result is both statistically significant at the 1% level and very economically significant. On average, firms change *Duality* about 14% of the years so changes in *Duality* more than triple around turnover.

We control for the lagged value of *Duality*, previous firm performance (lagged *ROA*), firm size (*Market Cap*), cases in which the CEO is hired from outside the firm (*External Dummy*), and CEO power (*Tenure*). We include these controls to ensure that, conditional on them, firms that experience CEO turnover are otherwise similar to firms that do not experience CEO turnover. The coefficients on these control variables provides further support for our identification. First, we find that *L.Duality* is negative and significant. This implies that firms do not remove duality in non-turnover years. That is, once duality is chosen around turnover, firms do not remove it during the job tenure of the CEO. Similarly, *Tenure* has a negative coefficient

implying that changes in duality are less likely as CEOs tenure increases, although this result is not robust across specifications. Likewise, the negative coefficient in *External Dummy* indicates that firms are even less likely to change duality during the CEO job tenure when he/she was hired externally. This result is in line with our predictions as negotiations with external hires at the recruitment period are probably more explicit in conditions such as duality than internally promoted ones. Second, *L.ROA* is insignificant. This result implies that firms do not change duality in response to previous fiscal year firm performance, providing evidence against the alternative hypothesis that firms change duality often and in response to (poor) firm performance. Finally, we also find that *Market Cap* is positive and significant, implying that bigger firms tend to change duality more often.

To further control for differences across firms, column (2) on Table 2 shows that results are robust to the inclusion of firm fixed effects. In this case, our identification strategy relies on the assumption that within a given firm, conditional on the observable controls described above, years are otherwise similar in CEO turnover and non-CEO turnover. The coefficient on our main variable of interest, *Turnover*, both remains statistically significant at the 1% level and has a similar point estimate. This result indicates that our previous result is not driven by differences across firms. Furthermore, columns (3) and (4) introduce different lags of *Turnover* to account for delays in the implementation of changes in *Duality*. Column (3) includes industry fixed effects while column (4) includes firm fixed effects. Results show that some changes in *Duality* take place with a delay of 1 year but there is no significant changes in *Duality* after two fiscal years. It is also important to notice that, as one would expect, the economic magnitude of the delayed effect is much smaller than the contemporaneous one.

Given the discrete nature of our dependent variable, we repeat the analysis using a logit model and obtain very similar (untabulated) results. We use linear probability models in our main specifications to improve the comparison across settings.

4.3 Matching CEO ability and duality

In this section, we estimate specification (2) to test whether shareholders grant duality to high ability managers while they separate the chairman and CEO role for low ability managers.

Consistent with Prediction 2, in column (1) of Table 3, we find that the coefficient on *Turnover Sign* is positive and significant. Increases in duality are associated with increases in CEO ability. This result indicates that duality is not only part of the optimal compensation contract but also that firms use it to attract the high ability managers. To appreciate the economic significance of this result notice that hiring a higher-ability CEO is associated with a 9.6% change in the probability of duality compared with hiring a lower-ability CEO. In column (2), we show that our results are robust to controlling for differences across firms by including firm fixed effects.

In columns (3) and (4), we introduce lag values of *Turnover Sign* to account for delays in the implementation of *Duality* changes. Results only document a contemporaneous effect.

Across all specifications, *Tenure* is always positive and statistically different from 0: as CEOs gain power they are more likely to enjoy duality. More importantly, the economic significance of the coefficient is smaller than the recruitment mechanism discussed in this paper. For example, in Table 3 column (1), we find that the probability of duality increases by 1% for every additional year in CEO tenure. Hence, it takes on average 10 years as a CEO for the impact of tenure on duality to be comparable to the changes in duality undertaken to attract high-ability CEOs. In untabulated statistics, we find that CEOs employment length has a median of 6 years, with the 75 percentile around 10 years. Hence, only a minority of CEOs reach the employment length that generates enough power to lead (on average) to duality. Therefore, we argue that the effect of increasing duality to attract highly talented CEOs is independent of power.

We also control for *L.ROA* and find insignificant results. Similarly to the previous section, this is evidence in support of our identification as we find no evidence that previous firms performance affects the probability that firms introduce or remove duality. We also find that *Market Cap* positively affects the probability of implementing duality implying that larger tend to grant duality to their CEOs. *External Dummy* does not have an effect on change in duality implying that externally appointed managers are equally like to implement than to remove duality. Controlling for the past *Duality* is also very important: mechanically, increases in *Duality* are obviously less likely if past *Duality* is equal to 1.

Given the discrete nature of our dependent variable, we repeat the analysis using an ordered logit model and obtain very similar (untabulated) results. We use linear probability models in our main specifications to improve the comparison across settings.

4.4 Competition for CEOs and duality

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; the relationship between high-ability CEOs and duality should be stronger the larger the competition for managers.

To do so, we follow two different strategies. First, we estimate specification (3), where we interact *Turnover Sign* with our proxy for competition for managerial talent *Within Industry*. Second, we repeat the estimation of equation (2) separately for each Fama-French 49 industry,

$$Duality\ Chg\ Sign_{it} = \alpha + \beta_{\gamma}^{ind} Turnover\ Sign_{it} + \upsilon_{jt} + \chi_t + \xi_{it}, \tag{4}$$

separately for each industry. Then, we plot the relation between the different coefficients β_{γ}^{ind} and *Within Industry*. The identification assumption is that sectors with less mobility from other industries are associated with a lower degree of competition

for managers. Therefore, we predict a negative correlation between β_{γ}^{ind} and the percentage of insider promotions.

Table 4 presents the results of both approaches. In Panel A column (1), we show evidence in support of Prediction 3. We document a negative coefficient on the interaction term between *Turnover Sign* and *Within Industry*: sectors with more within-industry mobility are associated with a lower correlation between CEO ability and duality. Moreover, the sum of the coefficients on *Turnover Sign* and the interaction term is not significantly different from 0. This result indicates that sectors with very high within-industry mobility are associated with no correlation between CEO ability and duality. In column (2), we show the results are robust to the introduction of firm fixed effects. The discussion for the controls in these regressions follows similarly as in the previous section.

In Table 4 Panel B, we plot the relationship between the coefficients β_{γ}^{ind} estimated using equation (4) on the vertical axis and the *Within Industry*, as reported by Cremers and Grinstein (2014), in the horizontal axis. Each point in the plot corresponds to a different industry and 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. We also plot the linear fit of all the different data points, showing that higher competition for managers implies a stronger role of duality as a mechanism to attract CEO ability. In numbers, the correlation between the different β_{γ}^{ind} and the percentage of internal promotions is -0.278, which is statistically different from zero at the 1% level.

Given the discrete nature of our dependent variable, we repeat the analysis using an ordered logit model and obtain very similar (untabulated) results. We use linear probability models in our main specifications to improve the comparison across settings.

In summary, this picture provides evidence that the competition for managers

plays a crucial role in the choices of duality of firms that want to attract highly talented managers, our key insight. 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.

5 Robustness Results

The empirical identification in the DID approach presented in Section 3 comes from the comparison of the change in duality in firms that are subject to a CEO turnover (treated firms) with the change in duality in firms that do not experience such change (control firms). One concern with this approach is that the estimated treatment effect could be due to pre-treatment differences in the characteristics of treated and control firms. We address this concern in three ways. First, we examine the dynamics of duality in the years preceding the CEO turnover. Second, we add further control variables to control for omitted variables that may differ between control and treated firms. Third, we repeat the analysis using propensity score matching.

Furthermore, we provide additional results to complement our analysis: we split the sample into two groups (those firms that had duality before CEO turnover and those that did not) and repeat the analysis separately for each sub-sample.

5.1 Dynamics

To examine the dynamic effects of CEO turnover on duality, in columns (1) and (2) of Table 5, we show that when we include lead-lag controls for two years before and after CEO turnover the economic (and statistical) significance of *Turnover* stays very high and does not significantly change from the results in Table 2. Although some lead and lag controls are statistically significant, its economic significance is 15-times smaller than the contemporaneous effect.

More importantly, in columns (3) and (4) of Table 5, we show that the inclusion

of one- and two-year lead controls does not change our results in Table 3: the point estimate on the contemporaneous effect remains similar.

All specifications in Table 5 include the same controls as in Tables 2 and 3 but we do not report the results for brevity as we find no differences in the magnitude and significance of the coefficients.

5.2 Omitted variables

In this section, we augment our main specifications with further controls to show that our results are not driven by omitted variables. First, in Table 6 Panel A, we include additional board characteristics such as *Board Size* and the fraction of independent directors (*Fract Indep*) to our baseline specifications. These additional board of directors characteristics do not change our results. The point estimates (and significance) of our variables of interests remain very similar to our baseline result. Importantly, these robustness results highlight that unobserved time-varying corporate governance changes at the firm level do not explain our main results.

Second, in Table 6 Panel B, we include lagged stock returns (*L.Returns*) as an additional control. This robustness check further ensures that changes in duality are not driven by time-varying firm performance captured by stock returns rather than accounting performance. The coefficient on lagged stock returns is not statistically significant, confirming the finding about accounting firm performance (*L.ROA*) in our main specification.[3]

Finally, in untabulated tests, we also document a positive correlation between our proxy of ability and both total executive compensation and different measures of performance such as *ROA*, *Sales*, *Tobins' q*, and *Returns*. This is consistent with the results reported by Demerjian et al. (2012).

[3]We use use accounting firm performance instead of market firm performance in our main specification as the market measure may already incorporate some forward-looking information, especially around (expected) turnover.

5.3 Propensity score matching

In this section, we use propensity score matching as a robustness test for our results.

First, we estimate a propensity score matching model where we match each turnover firm to its most similar non-turnover firm using standard propensity score matching methodology. We match firms using lagged return on assets (*L.ROA*), market capitalization (*Market Cap*), whether the CEO is an external hire (*External Dummy*), industry, and year. We allow one match per turnover (treated) firm with replacement. Then, we use this matching to calculate the average changes in duality in firms that experience turnover (treated group) versus its matched non-turnover firms (control group). Table 7 Panel A shows the average treatment effect. On average, firms that experience CEO turnover change duality 50% more often than non-turnover firms. This confirms our hypothesis that duality changes take place around CEO turnover.

In Panel B, we use the results from this matching to provide support for our main hypothesis (that firms use duality to attract high-ability CEOs) in two different ways. In column (1), we run a regression of our main dependent variable, changes in duality (*Duality Chg Sign*), on our main independent variable, ability changes (*Turnover Sign*), including only the turnover observations and its matched pairs. We find that hiring a high-ability CEO is associated with a 5.6% greater probability of increasing duality with respect to firms hiring a low ability CEO when each firm is compared to its closest match. This result is significant at the 5% level. In column (2), we make use of the fact that a propensity score matching is equivalent to an OLS setting given the appropriate weighting matrix. Hence, we estimate regression (2), that is, our main regression on the sign of duality changes on changes in managerial ability, using the weights obtained in the propensity score matching in Panel A. We find that firms hiring a high ability CEO are associated with a 3.6% more probability of increasing duality with with respect to firms hiring a low ability CEO when each firm is compared to its closest match. This result is significant at the 5% level.

Our main hypothesis implies a research design with two potential treatments: CEO ability can increase ($Treatment = 1$), CEO ability can decrease ($Treatment = -1$), while control firms are those that do not replace their CEO ($Treatment = 0$). So far we have used the traditional matching technique to match treated observations in a similar way, independently of whether CEO ability increases of decreases. As a robustness check, in Panel C, we use the so-called regression adjustment treatment effects. This technique fits a different model for the treated and non-treated samples and then calculates the effects of treatment as the differences in these estimations. We use a multinomial logit for the three possible cases: no treatment, increase in managerial ability and decrease in managerial ability. Then, we calculate the average treatment on the treated effect as the sample mean of the difference in each treatment case versus the non-treatment case. The results indicate that duality tends to decrease when the new CEO is of lower ability than the previous one but no change in duality when the new CEO is of higher ability.

5.4 Asymmetric effect

In this section, we focus on the asymmetric effect of increasing duality compared to decreasing ability. In Table 8 Panel A, we repeat the analysis reported in Table 2 on duality as part of the CEO incentive contract separately for firm that had duality before CEO turnover and firms that did not. Intuitively, the economic significance of the coefficient for the cases when firms had CEO duality before CEO turnover is larger than for those cases that firms did not have duality before CEO turnover. However, the economic significance of the results for the subsample where firm did not have duality are still large: firms are 50% more likely to increase duality around turnover than they are to increase it any other year.[4]

In Panel B, we repeat the analysis reported in Table 3 on the matching between

[4]In untabulated summary statistics, we find that the variable *Duality Chg* has a mean of 0.152 when there is no duality in the previous year and a mean of 0.121 when there is duality in the previous year.

CEO ability and duality restricting the sample to cases when firms had duality before the turnover (columns (1) and (3)) and cases in which the firm had no duality before the turnover (columns (2) and (4)). Column (1) indicates that firms are very likely to separate the roles of duality and chairman if the departing CEO was holding both positions. Given the similar point estimates for *Turnover Up* and *Turnover Down*, this result is independent on the ability of the incoming CEO. Instead, when comparing the point estimates on *Turnover Up* and *Turnover Down* in column (2), the results indicate that firms are more likely to establish duality only when better managers are appointed. Although the difference is not statistically significant, the probability of granting the incoming manager duality is about 30% higher when he/she is of higher ability that the incumbent CEO than when he/she is of lower ability. Results are similar when we control for firm fixed effects in columns (3) and (4).

6 Conclusion

In this paper, we explore the joint role played by corporate governance and competition among firms to attract better managers. In a principal agent problem, there are two ways to induce the CEO to make the right decision: setting up a generous pay-for-performance scheme to reward CEOs if things go well, and hiring an independent Chairman of the Board to monitor the CEO. We show that when managerial ability is observable and managerial skills are scarce, competition among firms to hire better CEOs implies that in equilibrium firms choose lower levels of corporate governance, i.e. choose duality.

Intuitively, the result follows from the fact that rents for scarce managerial talent are not under the control of 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 (i.e., separation between CEO and Chairman), it would have to pay higher costs: the remuneration package for the CEO would not be affected

and the firm would have to also pay for a Chairman of the Board.

We use the measure of CEO ability developed by Demerjian et al. (2012), and find that it is positively correlated with CEO duality. Moreover, we find a stronger negative relationship between corporate governance and CEO ability 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.

Finally, our results also have important corollaries for corporate governance regulation as firms do not internalize the positive externality corporate governance causes to other firms in the economy through the high-ability managers' reservation utility. Hence, from this perspective, our findings prescribe that mandating separation between CEO and Chairman of the Board across all firms would be socially optimal.

However, sector specific regulation (for instance, regulation targeted exclusively to the financial sector) might backfire. 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-ability 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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Table 1: **Summary statistics**

This table presents the summary statistics for the variables used in the empirical section. Appendix A includes variables definitions. The sample consists of 13067 firm-year observations that correspond to 3387 different CEOs and 1992 different firms, covering the period from 1996 to 2012.

	Mean	Std Dev	Min	p25	Median	p75	Max
Duality	0.579	0.494	0	0	1	1	1
Duality Chg	0.135	0.341	0	0	0	0	1
Duality Chg Sign	-0.009	0.367	-1	0	0	0	1
Ability	0.019	0.114	-0.405	-0.054	0.010	0.084	0.474
Turnover	0.112	0.315	0	0	0	0	1
Turnover Sign	-0.018	0.334	-1	0	0	0	1
Turnover Up	0.047	0.211	0	0	0	0	1
Turnover Down	0.065	0.246	0	0	0	0	1
Within Industry	0.811	0.098	0.530	0.740	0.810	0.890	1.000
ROA	0.055	0.109	-2.127	0.022	0.059	0.102	0.573
Market Cap	8.026	1.527	3.180	6.920	7.862	9.035	11.583
External Dummy	0.284	0.451	0	0	0	1	1
Tenure	7.329	7.567	0	2	5	10	61
Board Size	9.158	2.320	3	7	9	11	26
Fract Indep	0.708	0.162	0.000	0.600	0.750	0.833	1.000
Returns	0.006	0.044	-0.307	-0.014	0.006	0.027	0.348

Table 2: **Duality as part of the CEO incentive contract**

In this table, we examine the changes in duality and the hiring of higher ability CEOs. We regress changes in Duality on changes in CEOs ability. *Duality Chg* is dummy variable that takes value 1 if duality changes, 0 otherwise. *Turnover* is a dummy variable that takes value 1 if there is CEO turnover in that fiscal year, 0 otherwise. *L.* indicates one fiscal year lagged variables and *L2.* indicates two fiscal years lagged variables. *Duality* is dummy variable that takes value 1 if the firm has duality, 0 otherwise; *ROA* is the firm return on assets, *Market Cap* is the firm market capitalization; *External Dummy* is a dummy variable that takes value 1 if the CEO is externally appointed, 0 otherwise; *Tenure* is the difference between the current year and the year the executive became CEO. To simplify the comparison across our results, we estimate linear probability models in all specification. All regressions include year dummies and industry fixed effects or firm fixed effects. 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.

	(1)	(2)	(3)	(4)
Dep Variable	Duality Chg	Duality Chg	Duality Chg	Duality Chg
Turnover	0.502***	0.520***	0.512***	0.523***
	(0.015)	(0.017)	(0.016)	(0.019)
L.Turnover			0.101***	0.063***
			(0.013)	(0.015)
L2.Turnover			0.009	-0.005
			(0.011)	(0.012)
L.Duality	-0.044***	-0.162***	-0.023***	-0.150***
	(0.008)	(0.014)	(0.008)	(0.015)
L. ROA	-0.031	-0.037	-0.035	-0.072
	(0.025)	(0.035)	(0.032)	(0.058)
Market Cap	0.012***	0.021**	0.012***	0.022**
	(0.002)	(0.010)	(0.002)	(0.011)
External Dummy	-0.019***	-0.009	-0.031***	-0.015
	(0.007)	(0.015)	(0.008)	(0.016)
Tenure	-0.001*	-0.001	-0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Year FE	Y	Y	Y	Y
Industry FE	Y	N	Y	N
Firm FE	N	Y	N	Y
Observations	12,540	12,540	10,547	10,547
R-squared	0.245	0.380	0.255	0.390

Table 3: **Matching CEO ability and duality**

In this table, we examine the changes in duality with respect to the changes in managerial ability. We regress changes in Duality on changes in managerial ability. *Duality Chg Sign* is a categorical variable that takes value 1 if duality increases, 0 if it does not change, and −1 if it decreases. *Turnover Sign* is a categorical variable that takes value 1 if there is CEO turnover in that fiscal year and the new CEO has higher ability than the previous one, 0 if there is no turnover and −1 there is CEO turnover in that fiscal year and the new CEO has lower ability than the previous one. *L.* indicates one-year lagged variables and *L2.* indicates two-year lagged variables. *Duality* is dummy variable that takes value 1 if the firm has duality, 0 otherwise; *ROA* is the firm return on assets, *Market Cap* is the firm market capitalization; *External Dummy* is a dummy variable that takes value 1 if the CEO is externally appointed, 0 otherwise; *Tenure* is the difference between the current year and the year the executive became CEO. To simplify the comparison across our results, we estimate linear probability models in all specification. All regressions include year dummies and industry fixed effects or firm fixed effects. 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.

	(1)	(2)	(3)	(4)
Dep Variable	Duality Chg Sign	Duality Chg Sign	Duality Chg Sign	Duality Chg Sign
Turnover Sign	0.048***	0.033**	0.037**	0.033*
	(0.017)	(0.017)	(0.019)	(0.019)
L.Turnover Sign			0.002	0.021
			(0.012)	(0.014)
L2.Turnover Sign			-0.001	0.008
			(0.010)	(0.011)
L.Duality	-0.336***	-0.658***	-0.339***	-0.678***
	(0.009)	(0.014)	(0.010)	(0.015)
L. ROA	-0.007	0.010	0.006	0.038
	(0.022)	(0.030)	(0.040)	(0.048)
Market Cap	0.021***	0.015	0.020***	0.009
	(0.003)	(0.011)	(0.003)	(0.013)
External Dummy	0.005	0.023	0.002	0.009
	(0.008)	(0.020)	(0.009)	(0.022)
Tenure	0.010***	0.023***	0.010***	0.024***
	(0.001)	(0.001)	(0.001)	(0.001)
Year FE	Y	Y	Y	Y
Industry FE	Y	N	Y	N
Firm FE	N	Y	N	Y
Observations	12,540	12,540	10,547	10,547
R-squared	0.198	0.422	0.198	0.428

Table 4: **Competition for CEOs and duality**

In this table, we show the impact of competition for managers on the choice of corporate governance. Panel A reports the changes in Duality with relation to CEO turnover interacted with the industry percentage of insider promotions, according to specification (3). In Panel B, we estimate specification (2) *Duality Chg Sign*= $\beta_{\gamma}^{ind} \times TurnoverSign + \upsilon_{jt} + \chi_t + \xi_{it}$, separately for each industry. The plot shows the value of the estimated coefficient on *Turnover Sign* (β_{γ}^{ind}) as a function of the measure of the degree of competition for managers in that industry (the *Within Industry*). *Duality Chg Sign* is a categorical variable that takes value 1 if duality increases, 0 if it does not change, and -1 if it decreases. *Turnover Sign* is a categorical variable that takes value 1 if there is CEO turnover in that fiscal year and the new CEO has higher ability than the previous one, 0 if there is no turnover and -1 if there is CEO turnover in that fiscal year and the new CEO has lower ability than the previous one. *Within Industry* is the percentage of CEOs in that industry that had the previous employment within the same industry, as measured by Cremers and Grinstein (2014). *L.Duality* is dummy variable that takes value 1 if the firm has duality in the previous year and 0 otherwise; *L.ROA* is the previous fiscal year firm return on assets, *Market Cap* is the firm market capitalization; *External Dummy* is a dummy variable that takes value 1 if the CEO is externally appointed, 0 otherwise; *Tenure* is the difference between the current year and the year the executive became CEO. To simplify the comparison across columns, we estimate linear probability models in all specification. All regressions include year dummies and industry fixed effects or firm fixed effects. 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.

Panel A: Interaction Effect

	(1)	(2)
Dep Variable	Duality Chg Sign	Duality Chg Sign
Turnover Sign * Within Industry	-0.423**	-0.298*
	(0.169)	(0.163)
Turnover Sign	0.391***	0.276**
	(0.138)	(0.133)
L. Duality	-0.333***	-0.655***
	(0.009)	(0.014)
L. ROA	-0.005	0.011
	(0.022)	(0.031)
Market Cap	0.021***	0.014
	(0.003)	(0.011)
External Dummy	0.004	0.021
	(0.008)	(0.020)
Tenure	0.009***	0.023***
	(0.001)	(0.001)
Year FE	Y	Y
Industry FE	Y	N
Firm FE	N	Y
Observations	12,415	12,415
R-squared	0.198	0.421

Panel B: Cross-Industry Analysis

The number next to each data point indicates the industry code: 2 = Food Products, 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, 21 = Machinery, 22 = Electrical Equipment, 24 = Aircraft, 33 = Personal Services, 34 = Business Services, 35 = Computers, 36 = Computer Software, 37 = Electronic Equipment, 38 = Measuring and Control Equipment, 39 = Business Supplies, 41 = Transportation, 42 = Wholesale, 43 = Retail, 44 = Restaurants, Hotels, Motels. We include only industries with more than 100 observations.

Table 5: **Lead-Lag analysis**

In this table, we examine the lead-lag effects of our results. We regress changes in Duality on changes in managerial ability, including leads and lags. *Duality Chg* is dummy variable that takes value 1 if duality changes and 0 otherwise. *Turnover* is a dummy variable that takes value 1 if there is CEO turnover over the previous year and 0 otherwise. *Duality Chg Sign* is a categorical variable that takes value 1 if duality increases, 0 if it does not change, and −1 if it decreases. *Turnover Sign* is a categorical variable that takes value 1 if there is CEO turnover in that year and the new CEO has higher ability than the previous one, 0 if there is no turnover and −1 there is CEO turnover in that fiscal year and the new CEO has lower ability than the previous one. *L.* indicates one-year lagged variables and *L2.* indicates two-year lagged variables. *F.* indicates one-year lead variables and *F2.* indicates two-year lead variables. Regressions also include the following (unreported) controls: *L.Duality* is dummy variable that takes value 1 if the firm has duality in the previous year and 0 otherwise; *L.ROA* is the previous fiscal year firm return on assets, *Market Cap* is the firm market capitalization; *External Dummy* is a dummy variable that takes value 1 if the CEO is externally appointed, 0 otherwise; *Tenure* is the difference between the current year and the year the executive became CEO. To simplify the comparison across our results, we estimate linear probability models in all specification. All regressions include year dummies and industry fixed effects or firm fixed effects. 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.

	(1)	(2)	(3)	(4)
Dep Variable	Duality Chg	Duality Chg	Duality Chg Sign	Duality Chg Sign
Turnover	0.505***	0.525***		
	(0.019)	(0.023)		
L.Turnover	0.115***	0.079***		
	(0.016)	(0.019)		
L2.Turnover	0.011	-0.005		
	(0.013)	(0.015)		
F.Turnover	0.032***	0.056***		
	(0.012)	(0.016)		
F2.Turnover	-0.025***	-0.007		
	(0.010)	(0.013)		
Turnover Sign			0.043**	0.043*
			(0.022)	(0.022)
L.Turnover Sign			0.004	0.026
			(0.015)	(0.017)
L2.Turnover Sign			-0.009	0.010
			(0.012)	(0.014)
F.Turnover Sign			-0.002	0.019
			(0.012)	(0.016)
F2.Turnover Sign			-0.005	0.018
			(0.010)	(0.013)
Controls	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Industry FE	Y	N	Y	N
Firm FE	N	Y	N	Y
Observations	7,388	7,388	7,388	7,388
R-squared	0.246	0.391	0.208	0.446

Table 6: **Further control variables**

In this table, we further examine the changes in duality around turnover. *Duality Chg* is dummy variable that takes value 1 if duality changes and 0 otherwise. *Duality Chg Sign* is a categorical variable that takes value 1 if duality increases, 0 if it does not change, and −1 if it decreases. *Turnover* is a dummy variable that takes value 1 if there is CEO turnover in that year and 0 otherwise. *Turnover Sign* is a categorical variable that takes value 1 if there is CEO turnover in that fiscal year and the new CEO has higher ability than the previous one, 0 if there is no turnover and −1 there is CEO turnover in that fiscal year and the new CEO has lower ability than the previous one. *Board Size* is the number of board members. *Fract Indep* is the number of board members classified as independent divided by the total number of board members. *L.Returns* are the previous fiscal year firm returns. *L.Duality* is dummy variable that takes value 1 if the firm has duality in the previous year and 0 otherwise; *L.ROA* is the previous fiscal year firm return on assets, *Market Cap* is the firm market capitalization; *External Dummy* is a dummy variable that takes value 1 if the CEO is externally appointed, 0 otherwise; *Tenure* is the difference between the current year and the year the executive became CEO. To simplify the comparison across columns, we estimate linear probability models in all specification. All regressions include year dummies and industry fixed effects or firm fixed effects. 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.

Panel A: Additional Board Characteristics

	(1)	(2)	(3)	(4)
Dep Variable	Duality Chg	Duality Chg	Duality Chg Sign	Duality Chg Sign
Turnover	0.504***	0.520***		
	(0.015)	(0.017)		
Turnover Sign			0.046***	0.031*
			(0.017)	(0.017)
Board Size	0.002	-0.002	-0.006***	-0.021***
	(0.002)	(0.003)	(0.002)	(0.004)
Fract Indep	0.044**	-0.011	0.310***	0.264***
	(0.021)	(0.039)	(0.025)	(0.046)
L.Duality	-0.046***	-0.162***	-0.350***	-0.663***
	(0.008)	(0.014)	(0.009)	(0.014)
L.ROA	-0.028	-0.038	-0.002	0.010
	(0.024)	(0.035)	(0.022)	(0.028)
Market Cap	0.010***	0.021**	0.021***	0.023**
	(0.002)	(0.010)	(0.003)	(0.011)
External Dummy	-0.020***	-0.009	-0.005	0.018
	(0.007)	(0.015)	(0.008)	(0.020)
Tenure	-0.001	-0.001	0.011***	0.023***
	(0.001)	(0.001)	(0.001)	(0.001)
Year FE	Y	Y	Y	Y
Industry FE	Y	N	Y	N
Firm FE	N	Y	N	Y
Observations	12,540	12,540	12,540	12,540
R-squared	0.245	0.380	0.212	0.429

Panel B: Firm Returns

	(1)	(2)	(3)	(4)
Dep Variable	Duality Chg	Duality Chg	Duality Chg Sign	Duality Chg Sign
Turnover	0.500***	0.512***		
	(0.016)	(0.019)		
Turnover Sign			0.037**	0.029*
			(0.019)	(0.018)
L.Returns	0.088	0.109	-0.054	-0.101
	(0.071)	(0.079)	(0.086)	(0.091)
L.Duality	-0.038***	-0.164***	-0.339***	-0.677***
	(0.008)	(0.015)	(0.010)	(0.015)
L.ROA	-0.058*	-0.095	0.010	0.055
	(0.034)	(0.060)	(0.041)	(0.048)
Market Cap	0.012***	0.021*	0.020***	0.011
	(0.002)	(0.011)	(0.003)	(0.013)
External Dummy	-0.026***	-0.012	0.002	0.010
	(0.008)	(0.016)	(0.009)	(0.022)
Tenure	-0.001**	-0.000	0.010***	0.024***
	(0.001)	(0.001)	(0.001)	(0.001)
Year FE	Y	Y	Y	Y
Industry FE	Y	N	Y	N
Firm FE	N	Y	N	Y
Observations	10,547	10,547	10,547	10,547
R-squared	0.248	0.387	0.198	0.428

Table 7: **Propensity score matching**

In this table, we present robustness results using propensity score matching. *Duality Chg* is dummy variable that takes value 1 if duality changes, 0 otherwise. *Turnover* is a dummy variable that takes value 1 if there is CEO turnover in that fiscal year, 0 otherwise. *Duality Chg Sign* is a categorical variable that takes value 1 if duality increases, 0 if it does not change, and −1 if it decreases. *Turnover Sign* is a categorical variable that takes value 1 if there is CEO turnover in that fiscal year and the new CEO has higher ability than the previous one, 0 if there is no turnover and −1 there is CEO turnover in that fiscal year and the new CEO has lower ability than the previous one. *L.ROA* is the previous fiscal year firm return on assets, *Market Cap* is the firm market capitalization; *External Dummy* is a dummy variable that takes value 1 if the CEO is externally appointed, 0 otherwise. *, **, or *** indicates that the coefficient is statistically significantly different from zero at the 10%, 5%, or 1% level, respectively.

Panel A: Propensity Score Matching

	Dep Var: Duality Chg		
	Coef.	Std. Err.	z
Turnover			
(1 vs 0)	0.506	0.015	33.08***

Panel B: Regressions on Matched Sample

	(1)	(2)
Dep Variable	Duality Chg Sign	Duality Chg Sign
Turnover Sign	0.028**	0.036**
	(0.014)	(0.015)
L. ROA		-0.183**
		(0.087)
Market Cap		-0.005
		(0.007)
External Dummy		0.085***
		(0.023)
Year FE	N	Y
Industry FE	N	Y
Observations	2,928	2,792
R-squared	0.001	0.041

Panel C: Regression Adjustment Treatment Effects

	Dep Var: Duality Chg Sign		
	Coef.	Std. Err.	z
Turnover Sign			
(1 vs 0)	-0.004	0.015	-0.29
(-1 vs 0)	-0.072	0.038	-1.90*

Table 8: **Asymmetric effect**

In this table, we examine the changes in duality around turnover separately for firms that have duality before turnover and firms that do not. Panel A reports the relation between Duality and CEO turnover, while Panel B shows the relation between Duality and CEO ability. In both Panels, Columns (1) and (3) include only firm-year observations where a given firm had duality during the previous fiscal year. Instead, Columns (2) and (4) include only firm-year observations where a given firm had no duality during the previous fiscal year. *Duality* is dummy variable that takes value 1 if there is no separation between CEO and Chairman, and 0 otherwise. *Turnover* is a dummy variable that takes value 1 if there is CEO turnover in that fiscal year and 0 otherwise. *Turnover Up* is a dummy variable that takes value 1 if there is CEO turnover in that fiscal year and the new CEO has higher ability than the previous one and 0 otherwise. *Turnover Down* is a dummy variable that takes value 1 if there is CEO turnover in that fiscal year and the new CEO has lower ability than the previous one and 0 otherwise. *L.ROA* is the previous fiscal year firm return on assets. *Market Cap* is the firm market capitalization. *External Dummy* is a dummy variable that takes value 1 if the CEO is externally appointed, 0 otherwise. *Tenure* is the difference between the current year and the year the executive became CEO. To simplify the comparison across columns, we estimate linear probability models in all specification. All regressions include year dummies and industry fixed effects or firm fixed effects. 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.

Panel A: Duality as part of a CEO incentive contract

	(1)	(2)	(3)	(4)
Dep Variable	Duality	Duality	Duality	Duality
Previous Duality?	Y	N	Y	N
Turnover	0.774***	0.071***	0.736***	0.085***
	(0.015)	(0.020)	(0.020)	(0.022)
L. ROA	-0.033	-0.128**	-0.013	-0.090
	(0.028)	(0.050)	(0.017)	(0.067)
Market Cap	-0.004**	0.036***	-0.008	0.027
	(0.002)	(0.005)	(0.009)	(0.017)
External Dummy	-0.012**	0.003	-0.025*	0.029
	(0.006)	(0.013)	(0.015)	(0.026)
Tenure	-0.000	0.001	-0.003***	0.014***
	(0.000)	(0.001)	(0.001)	(0.002)
Year FE	Y	Y	Y	Y
Industry FE	Y	Y	N	N
Firm FE	N	N	Y	Y
Observations	7,377	5,163	7,377	5,163
R-squared	0.617	0.082	0.692	0.532

Panel B: CEO ability and duality

	(1)	(2)	(3)	(4)
Dep Variable	Duality Chg	Duality Chg	Duality Chg	Duality Chg
Previous Duality?	Y	N	Y	N
Turnover Up	0.788***	0.088***	0.751***	0.090***
	(0.021)	(0.030)	(0.028)	(0.034)
Turnover Down	0.764***	0.059**	0.724***	0.081***
	(0.019)	(0.025)	(0.026)	(0.028)
L. ROA	-0.033	-0.126**	-0.014	-0.089
	(0.028)	(0.050)	(0.017)	(0.067)
Market Cap	-0.004**	0.036***	-0.008	0.027
	(0.002)	(0.005)	(0.009)	(0.017)
External Dummy	-0.012**	0.003	-0.024	0.028
	(0.006)	(0.013)	(0.015)	(0.026)
Tenure	-0.000	0.001	-0.003***	0.014***
	(0.000)	(0.001)	(0.001)	(0.002)
Year FE	Y	Y	Y	Y
Industry FE	Y	Y	N	N
Firm FE	N	N	Y	Y
Observations	7,377	5,163	7,377	5,163
R-squared	0.617	0.082	0.692	0.532

Appendix A Variable Definition

This appendix provides a detailed definition of the variables in our analysis.

Duality is a dummy variable that takes value 1 if the CEO is also the Chairman on the board and 0 otherwise.

Duality Chg is dummy variable that takes value 1 in year t if duality changes from year $t-1$ and year t and 0 otherwise.

Duality Chg Sign is a categorical variable that takes value 1 in year t if duality increases from year $t-1$ to year t, 0 if it does not change, and -1 if it decreases.

Ability is the average for a given CEO-firm match of the measure of CEO ability from Demerjian et al. (2012).

Turnover is a dummy variable that takes value 1 in year t if the CEO in year t differs from the CEO in year $t-1$ and takes value 0 otherwise.

Turnover Sign is a categorical variable that takes value 1 if *Turnover*$=1$ and the new CEO has higher *Ability* than the previous one, 0 if *Turnover*$=0$ and -1 if *Turnover*$=1$ and the new CEO has lower *Ability* than the previous one.

Turnover Up is a dummy variable that takes value 1 if *Turnover*$=1$ and the new CEO has higher *Ability* than the previous one, and 0 otherwise.

Turnover Down is a dummy variable that takes value 1 if *Turnover*$=1$ and the new CEO has lower *Ability* than the previous one, and 0 otherwise.

Market Cap is the firm's total market value (Compustat item `prcc_f` times the absolute value of Compustat item `csho` plus Compustat items `at` and Compustat item `ceq` minus Compustat item `txdb`).

External Dummy is a dummy variable that takes value 1 if the CEO was not previously an employee of the firm and 0 otherwise.

Tenure is the difference between the calendar year and the year the executive became CEO.

Within Industry is the percentage of CEOs in that industry that had the previous employment within the same industry as measured by Cremers and Grinstein (2014).

Board Size is the number of board members.

Fract Indep is the number of board members classified as independent (I) divided by the total number of board members.

ROA is the ratio of EBITDA (Compustat item `ib`) before CEO compensation (ExecuComp item `tdc1`) over lagged total assets (Compustat item `at`).

Returns is the growth rate in *Market Cap*.

Appendix B Theoretical Model

To motivate our empirical predictions, we develop a simple model in which firms compete for CEOs by choosing duality as part of the optimal incentive contract. We show that in the presence of competition for scarce managerial talent, in equilibrium, ex-ante identical firms are indifferent between hiring a better CEO and appointing him/her also as Chairman of the Board (thus choosing a weaker governance regime), and hiring a worse CEO and appointing a separate, independent Chairman of the Board to monitor him/her (thus setting a stronger governance regime).

B.1 Setup of the Model

Consider an economy with n firms and m managers (potential CEOs). There are two types of CEOs, m_H are high-ability, well-established managers with a strong track-record (H-type), and m_L are low-ability, or less-experienced, managers (L-type). Types are observable. We assume that the number of L-type CEOs is greater than the number of firms, $m_L > n$, while the H-type CEOs are not numerous enough to be hired by all firms, $m_H < n$. There is also a large supply of experienced Chairmans of the Boards with an exogenously given reservation utility $\overline{u}_R$. Firms can hire at most one CEO and one Chairman of the Board. CEOs can also be Chairmans (of their own company) but not *vice versa*. Managers and shareholders are risk neutral. All firms are ex-ante identical.

The assumption that good CEOs are in short supply is the critical ingredient of our model. Without this assumption, there is no effective competition in the managerial market and no interesting interaction between the choice of duality (or corporate governance in general) and the competition for CEOs across firms.

The timeline is as follows: At $t = 1$, each firm hires a CEO from a pool of candidates of observable ability $q \in \{L, H\}$. Given that abilities are observable, each firm sets a compensation contract which is a function of the manager's ability q. CEOs 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 CEOs receives an output equal to 0. Compensation contracts are represented by a performance-related bonus $w_C \geq 0$, which is contingent on the verifiable output X produced at $t = 3$.[1] Moreover, as part of the incentive package, at $t = 1$ the firm also chooses whether to appoint an independent Chairman of the Board or to allow duality (i.e., the CEO is also appointed to be the Chairman of the Board). An independent Chairman may monitor the CEO but needs to be incentivized. For that purpose the Chairman (if different from the CEO) is paid a performance related

[1]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.

bonus $w_R \geq 0$, which is contingent on the verifiable output X produced at $t = 3$.

At $t = 2$, CEOs choose action $Z \in \{M, S\}$, where action S generates at $t = 3$ output $X = Y_q$ with probability p and $X = 0$ otherwise, and no private benefit for the manager; while action M generates a private benefit B for the manager and no output ($X = 0$) for the firm. We assume $Y_H - Y_L \equiv \Delta > 0$ (i.e. the productivity of better ability managers is higher). The choice of action is not observable by shareholders. At the same time, if there is an independent Chairman of the Board (no duality), she can monitor the CEO. For an effort cost c, the Chairman can reduce the private benefits for the CEO from B to $(1 - \mu)B$, with $\mu < 1$. The choice of effort is not observable by shareholders.[2]

At $t = 3$, output X is realized and distributed, the performance-related bonuses (w_C, w_R) are paid, and the manager receives the private benefit.

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

(1) $\mu B \in (\overline{u}_R + c, p\Delta + \overline{u}_R + c]$: this assumption ensures that the choice of duality is not trivial. If $\mu B < \overline{u}_R + c$, the benefits of monitoring (μB) are very small and the optimal choice is always duality for all types of managers. If instead $\mu B > \overline{u}_R + c + p\Delta$, the benefits of monitoring (μB) are very large and the optimal choice is never duality for all types of managers.

(2) $m_L > (n - m_H)/(1 - \mu)$: there are so many type-L managers that their participation constraint is redundant. Removing this assumption would not change the nature of the results but would require to take into consideration the participation constraint of the type-L manager explicitly.

(3) $pY_L > B$: this inequality ensures that incentivizing the L-type CEO to choose action S is efficient (and thus *a fortiori* incentivizing the H-type is efficient). This assumption implies that shareholders always prefer that the incentive compatibility condition for the CEO is met.

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

B.2 Incentive Contracts

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

[2]The functional form chosen for the monitoring technology captures in a simple way the idea of decreasing returns to scale from monitoring.

B.2.1 Payoffs

There are six cases to consider: (i) If the CEO chose action M , and the Chairman exerted no effort or shareholders chose CEO duality, the payoffs for the CEO is B, the payoffs for the Chairman and the shareholders are 0; (ii) if the CEO chose action M, and the Chairman exerted effort, the firm payoffs for the CEO would be $B(1-\mu)$, the payoff for the Chairman would be $-c$, and for shareholders 0; (iii) if the CEO chose action S and the firm produced $X = Y_q$, depending on the manager's ability, and the Chairman exerted no effort or shareholders chose CEO duality, the payoff for the CEO would be w_c, the payoff for the Chairman of the board would be w_R, and for shareholders would be $Y_q - w_C - w_R$; (iv) if the CEO chose action S and the firm produced $X = 0$, and the Chairman exerted no effort or shareholders chose CEO duality, the payoff for the CEO would be 0, the payoff for the Chairman of the board would be 0, and for shareholders would be 0; (v) if the CEO chose action S and the firm produced $X = Y_q$ and the Chairman exerted effort, the payoff for the CEO would be w_c, the payoff for the Chairman of the board would be $w_R - c$, and for shareholders would be $Y_q - w_C - w_R$ and (vi) if the CEO chose action S and the firm produced 0 and the Chairman exerted effort, the payoff for the CEO would be 0, the payoff for the Chairman of the board would be $-c$, and for shareholders would be 0.

Given that the probability of success conditional on the choice of action S is p, we can represent the expected payoffs for the CEO, Chairman of the Board and shareholders in Table B.1.

B.2.2 Moral hazard problems

Looking at Table B.1, we can immediately derive the incentive compatibility conditions for the CEO. If the CEO expects no monitoring, he chooses action S iff $pw_c \geq B$; conversely, if the CEO expects monitoring, he chooses action M iff $pw_c \geq B(1-\mu)$. Intuitively, monitoring reduces the wage required to satisfy the incentive compatibility condition.

From Table B.1, we can also see that the Chairman of the Board will monitor only if her monitoring activity affects the CEO's decision. If the Chairman of the Board expects that the CEO to chooses action M (or action S) independently of her monitoring effort, she would not exert any effort. This can be seen in Table B.1 as an horizontal comparison of the payoffs for the Chairman.

More precisely, the Chairman will monitor if only if monitoring induces the CEO to switch from action M to action S and if she is compensated for the monitoring costs $pw_R \geq c$.

Therefore, we can summarize our findings as follows:

Lemma 1 (IC Constraints): *There are three cases to consider: (i) If* $pw_C \geq B$, *the*

CEO chooses action S and the Chairman exerts no monitoring; (ii) if $B > pw_C \geq B(1-\mu)$ *and* $pw_R \geq c$*, the CEO chooses action S and the Chairman monitors; and (iii) in all other cases, the CEO chooses action M and the Chairman does not monitor.*

The results in Lemma 1 state intuitively that there are two ways to incentivize the CEO: (i) by paying him a relatively high wage $w_C \geq B/p$; and (ii) by paying him a relatively low wage ($w_C \in [B(1-\mu)/p, B/p)$) and providing the Chairman of the board with enough incentives to monitor the CEO (setting $w_R \geq c/p$).

So far, we have focused only on the incentive compatibility constraints. The pay for CEOs and Chairmans needs also to satisfy their participation constraints.

The Chairmans have a reservation utility $\overline{u}_R$, which is exogenously given. The CEO's reservation utility depends on their type: $\overline{u}_q$ with $q \in \{H, L\}$ and will be endogenously determined later as we solve for the equilibrium in the market for CEOs. We can thus derive the individual rationality constraints as follows:

Lemma 2 (IR Constraints): *There are three cases to consider: (i) when only the IC constraint for the CEO is met, his IR constraint is* $w_C \geq \overline{u}_q/p$ *and the IR constraint for the Chairman is* $w_R \geq \overline{u}_R/p$*; (ii) when both the IC constraints for the CEO and the Chairman are met, the IR constraint of the CEO is* $w_C \geq \overline{u}_q/p$ *and the IR constraint for the Chairman is* $w_R \geq (\overline{u}_R + c)/p$*; and (iii) when the IC constraint for the CEO is not met, the IR constraint for the CEO is* $B \geq \overline{u}_q/p$ *and the IR constraint for the Chairman is not met.*

Lemma 2 emphasizes that the IR constraint for the CEO depends on his ability and is independent of whether there is an independent Chairman to monitor him or not: a CEO of ability $q \in \{H, L\}$ accepts an offer only if $w_C \geq \overline{u}_q/p$. Hiring an independent Chairman of the Board is possible only if shareholders pay her $w_R \geq \overline{u}_R/p$ (if she is not expected to exert effort) and $w_R \geq (\overline{u}_R + c)/p$ (if she is expected to exert effort). Notice that shareholders can hire a Chairman only if the latter expects that the IC constraint for the CEO is met; otherwise, there is simply no money to pay her.

We can now turn to study how shareholders choose between duality and separation and whether managerial ability affects this decision.

B.2.3 Incentive Contract with Duality

Consider first the case in which there is duality. In such case, the IC and IR constraints for the Chairman of the board are irrelevant.

The shareholders' problem is then:

$$\begin{aligned} \max_{w_C} \quad & p\left(Y_q - w_C\right) \\ \text{s.t. (IC)} \quad & pw_C \geq B \\ \text{and (IR)} \quad & pw_C \geq \overline{u}_q \end{aligned} \tag{B.1}$$

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

Proposition 1 (Optimal contract with duality) *The optimal contract for a manager of type q is:*

$$w_C = \max\{B, \overline{u}_q\}/p$$

and shareholders' payoff is

$$pY_q - \max\{B, \overline{u}_q\} \equiv \Pi_q^D.$$

Intuitively, the optimal incentive contract for a type-q CEO depends on his reservation utility. If the CEO's reservation utility is large ($\overline{u}_q > B$), the incentive compatibility constraint is redundant and the incentive pay is set to meet the individual rationality constraint ($w_C = \overline{u}_q/p$). The associated profit equals $pY_q - \overline{u}_q$.

If instead the CEO's reservation utility is low ($\overline{u}_q < B$), the individual rationality constraint is redundant and the incentive pay is set to meet the incentive compatibility constraint ($w_C = B/p$). The associated profit equals $pY_q - B$, which is greater than 0 by Assumption (3).[3]

B.2.4 Incentive Contract with Separation of Chairman and CEO

Consider next the case in which there is separation.

In such case, shareholders have to decide whether they want the Chairman to monitor or not.

The shareholders' problem is to maximize:

$$\max_{(w_C, w_R)} p\left(Y_q - w_C - w_R\right) \tag{B.2}$$

subject to a set of IC and IR constraints that depend on whether they want the Chairman to monitor the CEO.

[3]This observation combined with the fact that action M leads to 0 profits implies that inducing the CEO to choose action S is optimal for shareholders.

If they do not want the Chairman to monitor the CEO, problem (B.2) must satisfy the IC condition for the CEO ($pw_C \geq B$), the IR constraint of the CEO ($pw_C \geq \overline{u}_q$), and the IR constraint of the Chairman ($pw_R \geq \overline{u}_R$).

If they want the Chairman to monitor the CEO, problem (B.2) must satisfy the IC condition for the CEO ($pw_C \geq B(1-\mu)$), the IR constraint of the CEO ($pw_C \geq \overline{u}_q$), and the IR constraint of the Chairman ($pw_R - c \geq \overline{u}_R$). The IC constraint for the Chairman ($pw_R \geq c$) is redundant, as it is implied by her IR constraint.

Our first result is that having a Chairman who does not monitor is dominated. To see this, notice that shareholders would have to satisfy the same identical IC and IR constraints for the CEO as in problem (B.1) with the added IR constraint of the Chairman ($pw_R \geq \overline{u}_R$). The latter constraint will be binding (as $\overline{u}_R > 0$) and thus the associated shareholder profits would be strictly lower than in Lemma 3.

The optimal incentive contracts for the CEO and the Chairman are as follows:

Proposition 2 (Optimal contract with separation) *The optimal contract for a CEO of type q is:*

$$w_C = \max\{B(1-\mu), \overline{u}_q\}/p;$$

the optimal contract for the Chairman is

$$w_R = (\overline{u}_R + c)/p;$$

and shareholders' payoff is

$$pY_q - \max\{B(1-\mu), \overline{u}_q\} - (\overline{u}_R + c) \equiv \Pi_q^S.$$

Intuitively, the shareholders' payoff is higher than in the case of duality only if the manager's reservation utility is relatively low: i.e., only if $\overline{u}_q < B$. In other words, a necessary condition for firms to have separation is that the CEO has a relatively low outside option.

B.3 Market for CEOs

As a benchmark, let's consider first what happens in the absence of competition, i.e. if $\overline{u}_q = 0$. In such case, the choice of governance structure would simply be a comparison between $pY_q - B$ and $pY_q - B(1-\mu) - (\overline{u}_R + c)$. By Assumption (1), the optimal choice of governance would be separation independently of the CEO type, since $\mu B > \overline{u}_R + c$.

Proposition 3 (Governance without competition for CEOs) *In the absence of competition for CEOs, the choice of duality or separation is independent of CEO ability: all firms should have separation between CEO and Chairman.*

In the presence of competition for CEOs, the choice of governance is strictly connected with the competition for managers. The equilibrium in the market for managers is a follows:

Proposition 4 (Governance with competition for CEOs) *A mass m_H of firms hire a type-H CEO and give them duality. The remaining $n - m_H$ hire a type-L CEO and choose separation. The CEO compensation for a CEO of type q is*

$$w_C = \begin{cases} \Delta + [B(1-\mu) + \overline{u}_R + c]/p \equiv w_H & \text{if } q = H \\ B(1-\mu)/p \equiv w_L & \text{if } q = L \end{cases}$$

Proof. To prove the proposition, we need to established three preliminary results. First, in equilibrium, firms must obtain the same profits hiring the H-type or the L-type CEO. The reasoning is as follows. Given $m_H < n$, $m_L > n$, in any equilibrium, all H-type managers are employed and some firms employ L-type managers. Suppose there is an equilibrium in which firm j employs an H- type at a wage w_H^j and obtains higher profits than firms employing an L-type. This cannot be an equilibrium because a firm employing an L-type would profitably offer a wage $w_H^j + \varepsilon$, with ε close enough to zero, hiring the H-type manager previously employed by firm j for sure and increasing profits. On the contrary, suppose there is an equilibrium in which firm k employs an H-type paying w_H^k and obtains lower profits than firm j, that is employing an L-type CEO. Then, firm k would always find it profitable to employ an L-type manager, who are in excess supply, offering the same contract as firm j.

Second, there can be only three types of equilibria: (i) both types are offered duality; (ii) both types are offered separation; and (iii) type-H CEOs have duality while type-L CEOs have separation. To see that there cannot be a case in which type-L CEOs have duality and type-H CEOs have separation, notice that the difference in expected utility between duality and separation is $G(\overline{u}_q) = (\overline{u}_R + c) + \max\{B(1-\mu), \overline{u}_q\} - \max\{B, \overline{u}_q\}$, which is weakly decreasing in $\overline{u}_q$. Since $\Delta > 0$, $\overline{u}_H > \overline{u}_L$

Third, in equilibrium $\overline{u}_L < (1-\mu)B$ and $\overline{u}_H \geq (1-\mu)B$. The first inequality follows from the fact that there there is an excess of L-type CEOs. As B is the highest rent that L-type CEOs would receive and only a fraction $(n - m_H)/m_L < 1$ of them are hired in equilibrium, it follows that $\overline{u}_L \leq B(n - m_H)/m_L < (1-\mu)B$, by assumption (2). The second inequality follows from the fact that $B(1-\mu)$ is the lowest rent that can offered to H-type managers. As all of them are hired in equilibrium, $\overline{u}_H \geq (1-\mu)B$.

Now consider case (i). Both types are offered duality if $G(\overline{u}_L) \geq 0$, that is $\mu B < \overline{u}_R + c$. To equate the expected profits from hiring H or L types, $\overline{u}_H = B + p\Delta$. Given the availability of L-type managers, $\overline{u}_L = B(n - m_H)/m_L$ so the IR constraint for the L-type CEO is irrelevant. This (relatively uninteresting) case where both types are offered duality is ruled out by assumption (1).

Consider next case (ii). Both types are offered separation if $G(\overline{u}_H) < 0$. To equate the expected profits from hiring H or L types, $\overline{u}_H = B(1-\mu) + p\Delta$. Replacing the expression for $\overline{u}_H = B(1-\mu) + p\Delta$ into $G(\overline{u}_H)$, we obtain $\mu B > p\Delta + \overline{u}_R + c$.

For intermediate values of the parameters, $\mu B \in (\overline{u}_R + c, p\Delta + \overline{u}_R + c]$, the equilibrium is as in case (iii). The type-H CEO has duality; while type-L CEOs have separation. This happens when $G(\overline{u}_L) < 0$ and $G(\overline{u}_H) \geq 0$. The first condition requires $\mu B > \overline{u}_R + c$ (given that $\overline{u}_L = B(1-\mu)(n-m_H)/m_L < B(1-\mu)$). To equate the expected profits from hiring H or L types, $\overline{u}_H = B(1-\mu) + p\Delta + \overline{u}_R + c$. Finally, firms indeed implement duality for the H type managers if $p\Delta + \overline{u}_R + c \geq \mu B$. ■

This is the key result of the model. Because there is a scarcity of type-H CEOs, in equilibrium, competition among firms will drive up the rent awarded to type-H CEOs ($\overline{u}_H$) so as to make firms indifferent between hiring type-H or L managers. If hiring a type H leads to higher profits than hiring a type L, then a firm can marginally increase the compensation to H, attracting one of them for sure, increasing profit. If instead hiring a type L leads to a higher profit, all firms would hire a type L and thus type H would be willing to work for less.

Since firms take type-H CEOs' rents ($\overline{u}_H$) as given and separation of the roles of chairman of the board and CEO is used by firms to reduce managerial rents, firms hiring type-H CEOs find duality optimal. 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 corporate governance regime, namely separation.

Without competition, as shown in Proposition (3), it would be efficient to separate the roles of Chairman and CEO independently of the CEO type. However, competition for type-H CEOs forces firms to offer higher compensation and duality to type-H CEOs. If they could coordinate, firms would prefer to separate the two roles so as to reduce as much as possible the rents that type H enjoys. 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 monitoring by the Chairman, 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.

Table B.1: **Payoffs**

＼ Chair: CEO: ＼	No Monitoring	Monitoring
Action M	CEO: B Chair: 0 Shs: 0	CEO: $B(1-\mu)$ Chair: $-c$ Shs: 0
Action S	CEO: pw_C Chair: pw_R Shs: $p(Y_q - w_C - w_R)$	CEO: pw_C Chair: $pw_R - c$ Shs: $p(Y_q - w_C - w_R)$