

Managerial Entrenchment and the Market for Talent*

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Abstract

This paper studies how the nature of managerial skills affects firms' governance decisions. As required skills shift from firm specific toward more general abilities, replacing an underperforming CEO with an outside hire becomes more profitable for shareholders. Therefore, firms adopt stronger governance arrangements to limit the entrenchment of incumbent CEOs and exploit the improved opportunities offered by the market for talent. The analysis rationalizes the observed trend toward stronger corporate governance and offers novel empirical predictions concerning the relationship between managerial entrenchment, firm size, and the nature of managerial skills. (*JEL* D83, D86, G34)

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Corporate governance practices have been evolving over time, especially in the direction of increased board independence from the CEO and reduced managerial entrenchment (e.g., Hermalin 2005; Linck, Netter, and Yang 2008; Graham, Kim, and Leary 2020). To some extent, these changes have been promoted by investors and regulators, especially after major governance scandals, but it is not clear whether they also reflect changing economic conditions. Given the prominent role of governance arrangements in the functioning of firms, it is important to better understand what is behind these trends. Do they simply reflect increased awareness of governance problems? Or have the trade-offs involved in governance choices changed over time? This paper proposes a simple model that explains stronger corporate governance as a consequence of managerial skills becoming less firm specific and more transferable across firms, in a setup where private governance choices are efficient.

In general terms, corporate governance refers to how investors in a business protect their interests. In this respect, weak governance results from management-friendly arrangements that make managers more powerful and less accountable. This paper emphasizes a key aspect of governance, namely, the replacement of incumbent CEOs when shareholders' value may increase under an alternative leadership. Weak governance therefore refers here to any arrangement that fails to prevent managerial entrenchment and makes managerial turnover difficult and costly.¹

While certainly undesirable ex post, some degree of managerial entrenchment can nonetheless be beneficial ex ante. For example, managerial entrenchment can avoid short-termism in decision making (Stein 1988), can contribute to building trust in the boardroom and improve the advisory role of directors (Adams and Ferreira 2007; Harris and Raviv 2008), or can help reduce managerial incentive pay (Almazan and Suarez 2007). The benefits of weak

¹Incumbent managers can pursue entrenchment in many ways. For example, they may seek to gain control of the board by limiting the presence of independent directors, or by combining the role of CEO with that of chairperson (e.g., Graham, Kim, and Leary 2020). Also, they may discourage hostile takeovers by adopting antitakeover provisions, such as a staggered boards structure (e.g., Karakaş and Mohseni 2021), or they may invest in assets whose value highly depends on their tenure (e.g., Shleifer and Vishny 1989).

governance may simply consist in avoiding the monitoring costs associated with preventing managerial entrenchment (Burkart and Raff 2015; Ferreira, Ferreira, and Raposo 2011). To the extent that there is a trade-off in making governance decisions, I show that as required managerial skills become more general, failing to replace underperforming incumbents becomes more costly, thus tilting the governance trade-off in favor of less management-friendly arrangements.

The distinction between firm-specific and general managerial skills refers to the nature of top executives' human capital. Firm-specific skills are only valuable within a certain organization while general skills are valuable to multiple firms, possibly across industries. Some authors have argued that required human capital has become more general in recent decades (Murphy and Zábajník 2004, 2007; Frydman 2019), and have linked this trend to a number of reasons, such as (a) the development of business-related academic disciplines of general applicability; (b) the role of modern IT systems, which make the acquisition of firm-specific information easier and quicker; and (c) the increased importance of communication skills in interacting with external constituencies. Consistent with managerial skills having become more general, the frequency of external hires has increased over time (Huson, Parrino, and Starks 2001; Jenter and Kanaan 2015; Jenter and Lewellen 2021; Kaplan and Minton 2012), and firms concerned with retaining valuable managerial talent are increasingly benchmarking CEO pay to competitors (Bizjak, Lemmon, and Naveen 2008).

The contribution of this paper is to clarify with a simple model how the nature of managerial skills affects firms' governance choices. When a firm with weak governance fails to replace an underperforming CEO, it also gives up the increase in shareholder value that can be achieved under a new management. This is an important opportunity cost of managerial entrenchment that firms take into account in their governance decisions. As required managerial skills become more general, the value of an external replacement of the incumbent CEO rises, and therefore so does the opportunity cost of managerial entrenchment. As a con-

sequence, more general managerial skills are conducive to stronger governance arrangements and less entrenchment of incumbent CEOs.

I formalize these intuitions in a model where firms make governance choices and have access to a market for talent that provides possible replacements for incumbent CEOs. A feature of the model is that governance choices and the outcome on the market for CEOs are jointly determined and depend on the nature of managerial skills. The model consists of an economy populated by a set of firms. At the beginning, each firm is managed by an incumbent CEO of unknown talent, whose ability is assessed on the job.² Firms choose their corporate governance, which can either be strong or weak, before observing managerial talents. Weak governance entrenches the incumbent by making managerial turnover costly. However, weak governance also entails benefits, which are represented in reduced form as an increase in profits. After the choice of governance, firms observe managerial talents and decide whether to fire the incumbent or make a take-it-or-leave-it retention offer. Whenever needed, replacement CEOs can be hired internally or on the market. Following a recent literature on CEO pay (Gabaix and Landier 2008; Terviö 2008), the market for talent is represented as an assignment model, where firms of different sizes compete for managers with different skills. CEO talent and firm size are complements (i.e., talented managers are more valuable in larger firms), but managerial skills have both firm-specific and general components. Even though firm-specific skills are lost during managerial turnover, some mobility of CEOs still may be desirable as it allows the allocation of general skills to their most productive use.

The market for managers interacts with governance choices in this setup. On the one hand, managerial entrenchment limits firms' ability to replace their incumbents, thus affecting their demand for external replacements. In turn, the characteristics of CEO candidates

²In an Internet Appendix, I endogenize the initial assignment of managers by allowing firms to compete at the beginning for candidate CEOs with heterogeneous observable characteristics that correlate with talent. Results are robust to this extension.

available on the market shape the opportunity cost of entrenching the incumbent. In equilibrium, the market for talent clears given firms' governance choices, which in turn are optimal given market conditions. Moreover, despite the mutual interactions between governance choices and the market for talent, the equilibrium outcome is efficient.

Having characterized equilibrium behavior, the analysis proceeds to show that as managerial skills become more general, and therefore external hires more valuable, the equilibrium pay for talent increases. This effect has already been described by Murphy and Zábojník (2004) in a related model, and relies on firms' higher willingness to pay for an external hire. I show here that the main intuition in Murphy and Zábojník (2004) is robust to endogenous governance decisions. As an additional and novel contribution, I show that because the opportunity cost of managerial entrenchment increases too, a larger set of firms adopt strong governance in order to facilitate managerial turnover.

This argument proposes a novel interpretation of the observed trend toward stronger governance, and relates it to the changing nature of required managerial skills. The model also suggests additional determinants of firms' governance choices, and has several empirical implications. For example, weak governance and managerial entrenchment should be less likely when the dispersion of firm size is higher, and any association between firm size and measures of managerial entrenchment should be more pronounced when (or where) required skills are more general.

The paper is related to a recent theoretical literature that analyzes the connections between corporate governance and the CEO job. Higher managerial turnover and higher pay have been explained as a consequence of increased board diligence in monitoring the CEO (Hermalin 2005), or greater corporate disclosure (Hermalin and Weisbach 2012). In contrast, I emphasize the role of governance arrangements in limiting managerial entrenchment, and stress the role of the generality of managerial skills in explaining the concurrent evolution of governance decisions, CEO turnover and pay. Acharya and Volpin (2010) and Dicks (2012)

study a setup with perfect information about managerial talents, where firms compete for managers and strong governance substitutes for managerial incentive pay to address a moral hazard problem. In this case, there is no managerial turnover in equilibrium and competition for talent introduces an element of strategic interaction among firms that results in inefficient outcomes. I instead consider a setup with imperfect information and learning about managerial talent, where strong governance limits managerial entrenchment. The equilibrium features managerial turnover in this case, and is efficient despite the interactions between governance choices and the market for CEOs. I therefore focus on the positive rather than the normative implications of the model by linking corporate governance decisions to the nature of required managerial skills. In Almazan and Suarez (2007), weak governance allows incumbent CEOs to veto their replacement, therefore making managerial turnover costly. However, some combination of managerial entrenchment and severance pay may be a profitable alternative to performance-based compensation to motivate managerial effort. Almazan and Suarez (2007) show that weak governance and managerial entrenchment can be beneficial for shareholders in a setup in which both the reservation wage of the incumbent CEO and the probability that a profitable replacement appears are exogenous. I instead take the costs and benefits of weak governance as exogenous and study the decisions of multiple firms interacting on a managerial labor market, where both reservation wages and the possible replacements of incumbent CEOs emerge endogenously and depend on governance choices.

The paper is also related to the literature studying the role played by managerial skills in the evolution of the market for CEOs (Murphy and Zábajník 2004, 2007; Custódio, Ferreira, and Matos 2013; Frydman 2019), but is the first attempt to establish a link between the nature of managerial human capital and corporate governance decisions.

An assignment model is a relatively uncommon setup to study managerial turnover. A notable exception is Eisfeldt and Kuhnen (2013), who use this approach to rationalize

the evidence that forced managerial turnover is more likely in case of poor performance relative to the industry average, but also in case of a generalized decline in the industry profitability. Differently from Eisfeldt and Kuhnen (2013), I focus on the trend toward increased managerial turnover overall, and endogenize turnover costs by relating them to the adoption of weak governance.

1 The Model

1.1 Setup

In a few lines, the model features a set of firms operated for one period. At the beginning, each firm has an incumbent CEO of unknown talent, makes governance decisions, and invests in a project. Later on, managerial talents are discovered, and incumbent CEOs may be fired, retained, or reallocated through a competitive labor market. Finally, the end-of-period cash flow of the project depends on the firm's governance decisions, on the possible replacement of the initial CEO, and on the talent of the CEO in place. Let's now consider the structure of the model in detail.

The set of firms has a measure one, and there is only one good (money). Each firm at the beginning invests an amount s in a project that produces a cash flow $s \times (1 + R)$ at the end of the period. In what follows, s is referred to as the size of the firm and R as the profit rate of the firm's investment project or simply as the firm's profitability.

Firm size is heterogeneous and follows a continuous distribution F with density f . For simplicity $f(s)$ is assumed to be strictly positive for all $s > 0$. While the distribution of firm size is exogenous, the profit rate of a firm's project depends on corporate governance choices, on whether or not the incumbent CEO is replaced, and on the talent of the CEO in place at the end of the period. Notice that the assumption of heterogeneous firms creates an assignment problem in the ex post market for CEOs. Besides being common in recent

analysis of the managerial labor market, this assumption also ensures that a firm that hires or retains a talented CEO is able to capture part of the surplus generated by managerial talent. This feature ensures that managerial turnover is relevant to firms and makes the model interesting.

Managers can be of two types $\tau \in \{0, 1\}$, where $\tau = 1$ and $\tau = 0$ denote talented and untalented managers, respectively. Talented incumbents add $\theta > 0$ to the profitability of their initial firm if retained, or $\alpha \in (0, \theta]$ to the profitability of a new employer in case of turnover. Untalented managers are instead unable to increase the profitability of any firm. Notice that α captures to what extent managerial skills are general and portable across firms rather than firm specific, with the extreme case of $\alpha = \theta$ representing fully general skills. Notice also that, consistently with much of the literature on assignment models of the CEO market, managerial skills and firm size are complements, in that the impact of managerial talent on firm value (namely, the end-of-period cash flow) is larger in larger firms.

Managerial types are initially unknown, even to managers themselves, but are publicly observed while they are on the job. Let $\lambda \in (0, 1)$ be the fraction of talented managers in the population of incumbents and assume that the initial distribution of types is independent of size.³ Moreover, λ also denotes the probability of the incumbent being of type $\tau = 1$ at any given firm, that is $\Pr(\tau = 1) = \lambda$ and $\Pr(\tau = 0) = 1 - \lambda$, independent of size.

Before observing managerial types, firms choose their corporate governance, which can either be “strong” or “weak.” Weak governance refers to management-friendly arrangements that make managerial turnover costly. In particular, if a firm with weak governance (a weak firm) replaces an incumbent of type τ , its profitability drops by $c_\tau \geq 0$. For this reason, the incumbent of a weak firm is said to be entrenched. In a sense, weak governance and managerial entrenchment are equivalent in the model in that both refer to managerial turnover being costly.

³The initial assignment of talent is endogenized in an Internet Appendix.

To capture the trade-offs in governance choices, I also assume that weak governance entails some benefits. In particular, by adopting weak governance, the profitability of a firm's project increases by $v > 0$. Of course, the net effect of weak governance ultimately depends on whether or not the incumbent is replaced and, in case of turnover, also on the incumbent's type.⁴

The choice of strong governance instead prevents managerial entrenchment and allows firms to replace their incumbent CEOs at no cost. Strong firms, however, also give up the benefits of weak governance.⁵

The corporate governance trade-offs are here presented in reduced form and may arise for several reasons (e.g., Stein 1988; Adams and Ferreira 2007; Almazan and Suarez 2007; Harris and Raviv 2008). For the sake of concreteness, let's consider the dual role of the board of directors as a monitor and as an advisor of senior management. Monitoring reduces agency costs, but offering advice (e.g., in defining strategic objectives or during a crisis) also contributes to creating value for shareholders. As it turns out, strong governance emphasizes the monitoring role of boards but may impair directors' advisory capabilities (Holmström 2005; Adams 2009; Field, Lowry, and Mkrtychyan 2013). In terms of the model, choosing strong governance corresponds to setting up a monitoring board that prevents managerial entrenchment but is unable to offer advice. On the other hand, the choice of weak governance corresponds to appointing a board that does offer valuable advice to the CEO, but fails to prevent managerial entrenchment. Notice also that, consistently with the idea that corporate governance affects high-level decision making that reverberate throughout the entire organization, the impact of governance decisions on a firm's cash flow is proportional to

⁴Because governance choices are made before observing managerial talents and firms are risk neutral, the assumption that v is independent of τ is without loss of generality. In this case, in fact, if v_τ represents the benefits of entrenchment of an incumbent of unknown type τ , what matters for a firm's governance choice is the expected benefit $\lambda v_1 + (1 - \lambda)v_0$.

⁵An ex ante benefit of weak governance is formally equivalent to an ex ante cost of strong governance. That is, one could alternatively interpret v as an ex ante monitoring cost associated with strong governance, which is avoided in weak firms.

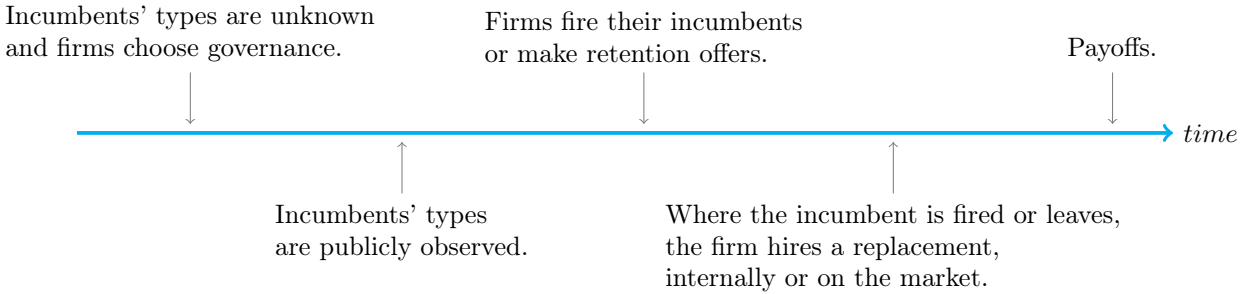


Figure 1
Timeline

This figure shows the development of events along a timeline. At the beginning, firms are exogenously matched with incumbent managers of unknown ability and make governance decisions. Once managerial types are publicly observed, firms may fire their incumbents or make a take-it-or-leave-it retention offer. A firm that fires or is unable to retain its incumbent either appoints an internal candidate, or hires an external replacement on the market. Finally, firms realize their cash flows and managers receive their compensation.

its size.⁶

Figure 1 illustrates how events unfold. At the beginning, firms have incumbent CEOs of unknown talent and choose their corporate governance simultaneously and independently. After governance choices have been made, all managerial types are publicly observed. Each firm then decides whether to fire the incumbent and look for a replacement, or make a take-it-or-leave-it nonnegative wage offer for retention. Incumbents who have received a retention offer can accept or can leave their initial firms, while those who have been fired are forced to leave. All managers have a reservation wage normalized to zero in some alternative occupation. Moreover, managers of type $\tau = 1$ also have the opportunity to participate into a market for CEOs and be hired by another firm. On the other hand, the firms that fired or were unable to retain their incumbent have access to an internal pool of untalented managers that can assume the CEO role at a wage that is also normalized to zero. Alternatively, they can hire a talented manager on the market, possibly at a positive wage. At this point the

⁶In line with this assumption, Taylor (2011) estimates that, because of managerial entrenchment, the replacement of the CEO costs on average 5.9% of firm assets to shareholders. In practice, the cost and benefits of weak governance may include a fixed component, which is disregarded here for simplicity.

profitability of a strong firm is $R = \tau\theta$ if it retains an incumbent of type τ , is $R = \alpha$ if it hires a talented replacement on the market, and is zero if it hires an untalented internal replacement. The profitability of a weak firm is instead $R = v + \tau\theta$ if it retains an incumbent of type τ , is $R = v + \alpha - c_\tau$ if a talented market hire replaces an incumbent of type τ , and is $R = v - c_\tau$ if an untalented internal hire replaces an incumbent of type τ . Managers are risk neutral and maximize their expected wage, while firms maximize their expected cash flow net of managerial pay. Table 1 summarizes firms' end-of-period profitability under different scenarios.

A remark is useful at this point. The costs and benefits of weak governance capture in reduced form a typical conflict of interest between shareholders and managers. On the one hand, managers that are unsure about their talent, and therefore about their tenure as CEOs, have an incentive to adopt entrenchment strategies that make their replacement costly. On the other hand, shareholders dislike managerial entrenchment exactly because of the cost it induces in case of turnover. This is a moral hazard problem that I assume can be solved by setting up a strong board, which prevents the CEO from taking actions that result in entrenchment at the cost of giving up the benefits of directors' advice. In this sense, the model belongs to the literature in which a central issue for corporate governance is how firms deal with new information about managerial talent (for a review, see, e.g. Hermalin and Weisbach 2017).

1.2 Managerial pay: Negotiations and market

The model described above captures in a simple way the mutual interactions between the market for managers, where firms hire external, talented candidates, and the internal negotiations between firms and their incumbents. The market for managers affects firms internal negotiations because it represents an outside opportunity for both talented managers and

Table 1
Firms' end-of-period profitability, R

	Incumbent of type τ is retained	Incumbent of type τ is replaced by a new CEO with type τ'
Strong firm	$\tau\theta$	$\tau'\alpha$
Weak firm	$v + \tau\theta$	$v - c_\tau + \tau'\alpha$

This table describes firm's end-of-period profitability, which depends on (a) initial governance choices, (b) whether or not the incumbent manager is retained, and (c) the type of manager in place after the reallocation phase.

firms. On the other hand, firms internal negotiations also affect the market for CEOs. In fact, market conditions are clearly affected by who the market participants are, which in turn depends on the outcomes of firm-level negotiations. In what follows, I characterize agents optimal choices assuming that the market for CEOs is perfectly competitive, in the sense that all agents take the market wage for a talented manager as given.

1.2.1 The hiring decision.

The analysis proceeds backward, starting from the problem faced by the firms whose incumbents have left, which consists in choosing whether to hire an untalented internal candidate at the reservation wage, or a talented manager on the market. Let $w \geq 0$ denote the market wage for a good manager. w is taken as given by firms and managers, and later on will be endogenized through a market-clearing condition. Given that any cost and benefit of governance choices are sunk at this stage, a firm of size s hires on the market if and only if $s\alpha > w$, or equivalently $s > w/\alpha$. Intuitively, given the complementarity between firm size and managerial talent, the larger a firm, the stronger its willingness to pay for talent.

1.2.2 Negotiating with the incumbent.

Let's now turn to the negotiations between a firm and its incumbent taking place after the observation of the incumbent's type. What matters in these negotiations is of course the

observed type, but also the size of the firm and the governance arrangement in place.

Consider a generic firm of size s whose incumbent is of type $\tau = 1$, and let's identify in which cases the retention of the talented incumbent is in the firm's interest. Notice that the smallest wage offer needed to retain the incumbent is w , which is the outside option offered by the market, and there is no reason to offer a larger wage for retention. Any smaller offer is instead equivalent to letting the incumbent go. As in Murphy and Zábojník (2004), only general managerial skills are priced in the competitive labor market, whereas firm-specific skills are not.

It follows that strong firms retain talent if $s \geq w/\theta$ and weak firms do the same if $s \geq w/(\theta + c_1)$. Strong and weak firms of size below the corresponding retention thresholds prefer an internal, untalented replacement rather than retaining a talented incumbent.⁷ Notice that $\alpha < \theta$ implies $w/\theta < w/\alpha$, meaning that as long as managerial skills are not fully general, some strong firms that would not be interested in hiring a talented manager on the market, nevertheless retain talented incumbents who, differently from market hires, are endowed with some valuable firm-specific human capital. Moreover, if $c_1 > 0$ then $w/(\theta + c_1) < w/\theta$. Intuitively, if replacing a talented incumbent is costly with weak governance, weak firms are even more willing than strong firms to retain talented incumbents. Accordingly, the retention threshold for weak firms is below the one for strong firms. Lemma 1 summarizes the optimal retention decisions just described.

Lemma 1. *Consider a firm of size s with an incumbent of type $\tau = 1$ and let $w \geq 0$ be given. If the firm is strong, the incumbent is replaced with an internal hire if $s < w/\theta$ and is retained if $s \geq w/\theta$. If instead the firm is weak, the incumbent is replaced with an internal hire if $s < w/(\theta + c_1)$ and is retained if $s \geq w/(\theta + c_1)$.*

Let's now study the incentive to replace an untalented incumbent with a talented market

⁷Clearly, replacing a talented incumbent with a talented market hire is not profitable, independently of the initial governance choice.

hire.⁸ Strong firms of size s have an incentive to fire an untalented incumbent if hiring a market replacement is profitable, that is, if $s > w/\alpha$. As for weak firms of size s , if $\alpha \leq c_0$ untalented incumbents are retained independent of s , whereas if $\alpha > c_0$ managerial turnover is optimal whenever $s > w/(\alpha - c_0)$. Clearly, the incentive to fire the untalented incumbent is smaller in weak firms, which incur a turnover cost, than in strong firms, which do not. If managerial skills are not general enough, such incentive is completely muted and weak firms of any size retain untalented incumbents. Sufficiently general managerial skills instead induce even weak firms to fire untalented incumbents, provided that they are large enough. The firing threshold, however, is larger than the one for strong firms. Lemma 2 summarizes this discussion.

Lemma 2. *Consider a firm of size s with an incumbent of type $\tau = 0$ and let $w \geq 0$ be given. If the firm is strong, the incumbent is replaced with a talented external hire if $s > w/\alpha$ and is retained if $s \leq w/\alpha$. If instead the firm is weak and $\alpha > c_0$, the incumbent is replaced with a talented external hire if $s > w/(\alpha - c_0)$ and is retained if $s \leq w/(\alpha - c_0)$. Finally, if the firm is weak and $\alpha \leq c_0$, the incumbent is retained independent of s .*

Let's now turn to the analysis of optimal governance choices, starting from the case when w is given and then endogenizing w so as to clear the market for talent.

1.3 Governance choices and equilibrium

1.3.1 Optimal governance choices.

Firms make governance choices before observing the type of their incumbents. However, they correctly anticipate the optimal retention and replacement decisions implied by strong and weak governance, as summarized in Lemma 1 and Lemma 2. The optimal choice of a firm

⁸Notice that replacing an untalented incumbent with an internal candidate of the same type is never optimal. Indeed, the decision is irrelevant in strong firms and costly in weak firms.

can therefore be obtained by comparing the firm's beginning-of-period expected profits with strong and weak governance, taking into account any possible ensuing managerial turnover.

Before characterizing optimal governance choices, it is useful to define

$$c_\tau^* = \min\{c_\tau, v/\Pr(\tau)\}, \quad (1)$$

which can be interpreted as the effective, ex post cost of replacing an incumbent of type τ . To justify this interpretation, notice that managerial turnover produces an ex post cost c_τ at a weak firm. On the other hand, strong governance eliminates c_τ , but has an ex ante opportunity cost v , namely, the benefits of weak governance that are given up. This is equivalent to an ex post cost $v/\Pr(\tau)$ when the incumbent is of type τ . Optimal governance choices minimize the effective cost of any anticipated managerial turnover. So, replacing the incumbent in fact costs c_τ^* to a firm that makes rational decisions. This intuition is formalized in Proposition 1, which more generally describes firms' optimal governance choices taking the market wage for talent as given.

Proposition 1. *Assume that $w \geq 0$ is given and that firms make optimal governance decisions. Define $r(w) = w/(\theta + c_1^*)$ and if $\alpha > c_0^*$ also define $e(w) = w/(\alpha - c_0^*)$. It follows that:*

1. *Firms of size $s < r(w)$ are weak if $c_1^* = c_1$ and are strong otherwise. Moreover, if $\alpha \leq c_0^*$, all firms of size $s \geq r(w)$ are weak, and if $\alpha > c_0^*$, firms of size $s \in [r(w), e(w)]$ are weak whereas firms of size $s > e(w)$ are weak if $c_0^* = c_0$ and strong otherwise.*
2. *Firms of size $s \geq r(w)$ retain a talented incumbent and smaller firms do not. Moreover, if $\alpha \leq c_1^*$, all firms retain an untalented incumbent, and if $\alpha > c_1^*$, firms of size $s \leq e(w)$ retain an untalented incumbent whereas larger firms hire a talented replacement on the market.*

All the proofs are in the appendix. According to Proposition 1, strong governance is

optimal if (a) managerial turnover is a possible outcome after the observation of τ and (b) the benefits of weak governance are not enough to compensate for the expected cost of replacing an entrenched manager. To gain further intuition, let's look to Figure 2, which separates two cases, represented in panels A and B.

Panel A describes optimal choices when $\alpha \leq c_0^*$. In this case, no firm has an incentive to replace an untalented incumbent with a market hire, because the corresponding turnover cost is not worth the value of an external replacement. Managerial skills are mostly firm specific in this case, so firms either find talent in house or prefer to keep an untalented incumbent. Large firms, namely, those with size above $r(w)$, also retain talented incumbents because they find it worth paying w . Not so smaller firms, for which the wage for talent is too high. It follows that when $s \geq r(w)$, the incumbent is retained independent of τ . Weak governance is certainly optimal in this case because entrenching the incumbent has no cost if managerial turnover never occurs. Firms of size $s < r(w)$ instead replace talented incumbents, so weak governance is optimal if $c_1^* = c_1$, that is, if incurring the ex post turnover cost is cheaper than giving up the ex ante benefits of weak governance.

Panel B instead describes optimal choices when $\alpha > c_0^*$. Required managerial skills are now sufficiently general so as to induce large firms, namely, those with size $s > e(w)$, to fire untalented incumbents and hire talented market replacements. Clearly, in this size range, firms also retain talent if found in house. Hence, managerial turnover takes place when the incumbent is untalented if $s > e(w)$, in which case weak governance is optimal if $c_0^* = c_0$, that is, if incurring c_0 ex post is cheaper than giving up v ex ante. Nothing changes with respect to panel A for firms of size $s \leq e(w)$, that are weak because anticipate no managerial turnover when $s \geq r(w)$, and are instead unwilling to retain talent, and are therefore weak if $c_1^* = c_1$ and strong if $c_1^* = v/\lambda$, when $s < r(w)$.

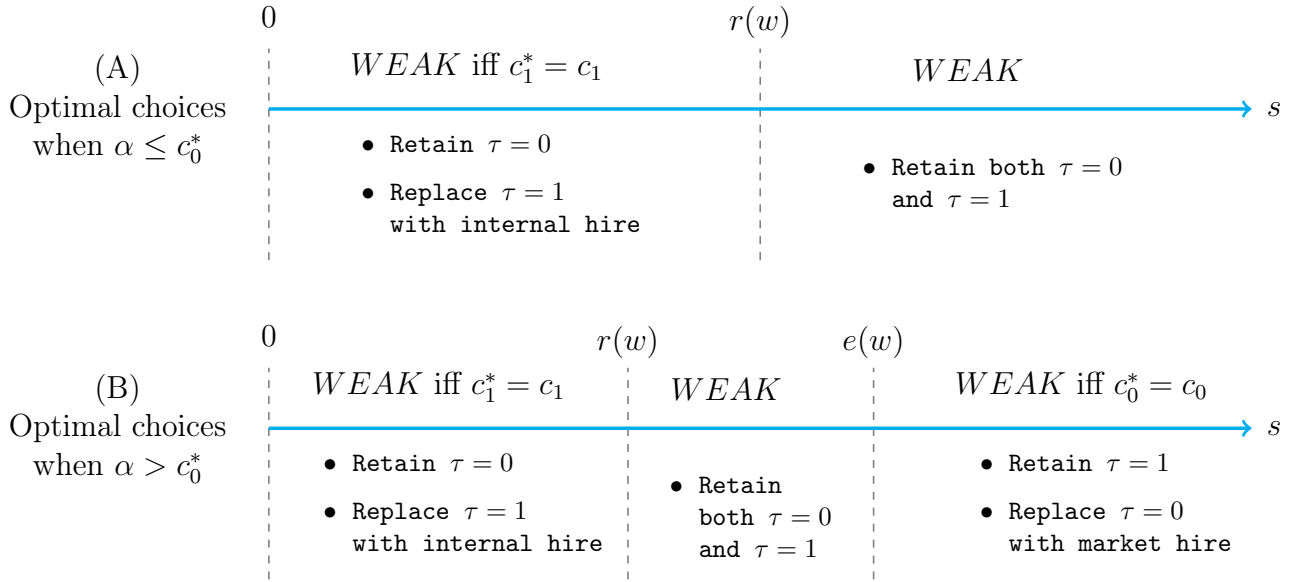


Figure 2

Optimal governance choices

Panel A illustrates optimal governance choices when $\alpha \leq c_0^*$, that is, when required managerial skills are mostly firm specific. In this case, firms never fire an untalented incumbent to hire a market replacement, and managerial turnover only happens if the incumbent is talented but too expensive to retain. Because strong governance is motivated by the prospects of managerial turnover, it can only be optimal for firms of size $s < r(w)$, which indeed are unwilling to pay w to retain talent. Firms in this size range in fact adopt strong governance if giving up the ex ante benefits of weak governance is cheaper than incurring the ex post turnover cost, which is the case if $c_1^* < c_1$. If however $c_1^* = c_1$, also the firms in this size range adopt weak governance. When $\alpha > c_0^*$, as shown in panel B, the same intuition applies to firms of size $s \leq e(w)$. However, as long as $s > e(w)$, required managerial skills are now general enough to justify firing an untalented incumbent to hire a market replacement. Therefore, firms in this size range adopt strong governance if $c_0^* < c_0$, that is, if giving up the ex ante benefits of weak governance is cheaper than incurring the ex post turnover cost, and adopt weak governance if instead $c_0^* = c_0$.

1.3.2 Clearing the market for talent.

Proposition 1 highlights how governance choices depend on the market for talent. On the other hand, point 2 of the proposition allows us to identify the market demand and supply, which in turn depend on firms' governance decisions. As for the supply of talent, it comes from talented incumbents who leave their initial firms and seek a new appointment somewhere else. So, given w , point 2 of Proposition 1 implies that the talented managers on the market are those initially employed at firms of size $s \leq r(w)$. Therefore, the supply of talent is $\lambda F(r(w))$ and is strictly increasing and continuous in w . On the other side, the demand for talent comes from the firms that fire untalented CEOs. According to point 2 of Proposition 1, this never happens if $\alpha \leq c_0^*$, in which case the demand for talent is zero, independent of w . It follows that in this case the market can only be in equilibrium if w drops to zero, so as to make the retention of talent profitable for firms of all size. If, however, $\alpha > c_0^*$, point 2 of Proposition 1 implies that the demand for talent comes from the firms of size $s > e(w)$ with untalented incumbents, and is therefore $(1 - \lambda)(1 - F(e(w)))$, a strictly decreasing and continuous function of w . In this case the market for talent clears when

$$\lambda F(r(w)) = (1 - \lambda)(1 - F(e(w))). \quad (2)$$

Market clearing now requires a strictly positive wage because there is an excess demand with $w = 0$ that eventually turns into an excess supply as w increases. Given the continuity and monotonicity properties of demand and supply, the market clearing wage is also unique. The following proposition summarizes these findings.

Proposition 2. *If $\alpha \leq c_0^*$, the market for talent dries up, all firms are weak and the unique market clearing wage for talent is $w = 0$. If instead $\alpha > c_0^*$, there exists a unique market clearing wage for talent $w > 0$ solving (2).*

1.3.3 Equilibrium and efficiency.

In equilibrium, firms governance and retention decisions are optimal as described in Proposition 1, and the wage for talent clears the market for CEOs as described in Proposition 2.

Notice how the mutual interactions between governance choices and the market for talent result in a pecuniary externality: governance choices affect equilibrium wage but are made by firms that take it as given. This raises concerns about equilibrium efficiency.

Also notice that not all managers are assigned to their most productive jobs. For example, if $\alpha > c_0^*$ and $w > 0$ is the equilibrium wage, it is possible to check that $\theta r(w) < \alpha e(w)$, as long as $c_\tau^* > 0$ for some τ . This means that the talented incumbents that are retained by firms of size $r(w)$ (or slightly above this threshold) would be more productive at firms of size $e(w)$ (or slightly smaller), some of which have untalented managers. Similarly, if $\alpha \leq c_0^*$, all firms are weak and the market for talent dries up. In this case all managers are left at their initial firms, which is not necessarily their most productive allocation, as long as $\alpha > 0$.

From a first-best perspective, that is, ignoring the turnover cost c_τ , the reallocation of managers should maximize firms' total profits.⁹ In a second-best world, however, turnover costs make some of the otherwise profitable reallocations not desirable. Still, entrenching the incumbent can be efficient because of the benefits of weak governance. In other words, second-best governance choices optimally trade off the benefits of weak governance with the resultant distortion in the allocation of talent.

I show in an Internet Appendix that the equilibrium outcome is second-best efficient. This happens because the equilibrium wage for managers of type $\tau = 1$ matches the social

⁹Notice that, to the extent that $\alpha < \theta$, managerial turnover also involves the loss of some firm-specific human capital, which certainly represents an additional turnover cost incurred independent of governance choices. α and θ , however, should be interpreted as *technological* parameters, linking a productive factor (managerial skills) to the output of firms. In this sense, and differently from c_τ , the loss of firm-specific human capital is an inevitable turnover cost that affects the first-best allocation. As for c_τ , it should instead be thought of as a deadweight loss resulting from some kinds of frictions that are avoidable in the first best. For example, replacing an entrenched incumbent that controls the board may require waging a proxy fight. This can be a lengthy and costly process, of course, but only matters for second-best efficiency.

value of talent, hence firms internalize the pecuniary externality of governance choices.¹⁰ Moreover, more general managerial skills increase aggregate profits net of turnover costs, and are therefore beneficial. Intuitively, if managerial mobility is less costly in terms of lost firm-specific human capital, the overall profitability of talented managers is less sensitive to the idiosyncrasies affecting their early placements.

2 Comparative Statics

2.1 The changing nature of managerial skills

The nature of required managerial skills have changed over time, shifting from firm specific toward more general abilities (Murphy and Zábojník 2004, 2007; Custódio, Ferreira, and Matos 2013; Frydman 2019). This change corresponds to an increase in α in the model. Let's therefore look at the model implications of an increase in α on equilibrium governance and retention decisions.

Propositions 1 and 2 already offer some insights. According to these results, if α is below the critical threshold c_0^* , all firms are weak and retain incumbents of both types. The market for talent essentially dries up in this case. This means that managerial turnover and strong governance requires that α is above the critical threshold. When this happens, large firms are willing to fire untalented incumbents and replace them with talented market hires, thus creating a demand for talent. On the other hand, small firms do not retain talented incumbents, who leave their initial jobs and creates a supply of talent. In this case, the expectation of managerial turnover may induce firms to adopt strong governance to minimize the cost of replacing the incumbent.

¹⁰To see this point, notice that w reflects the value of talent at the largest firms that are unwilling to hire a talented CEO on the market. Indeed, at the market wage w , firms of size $e(w)$ are indifferent between retaining an untalented incumbent and hiring a market replacement. On the other hand, the socially optimal allocation of any additional small mass of talent is to assign it where it is most productive, namely, to the largest firms currently managed by untalented managers. Hence, the social value of talent matches the value it has for these marginal firms and therefore its market remuneration.

The following two results are the key findings of the paper, and show that, under general conditions, if the nature of managerial skills shifts toward more general abilities, that is, α increases, the fraction of strong firms increases. The results rely on how the thresholds $r(w)$ and $e(w)$ defined in Proposition 1 change in equilibrium when α increases. Notice that α affects both thresholds indirectly through its effect on w . However, $e(w)$ also depends directly on α and it is useful to explicitly write $e(w, \alpha)$ to state the first result.

Lemma 3. *Consider $\alpha' > \alpha > c_0^*$, and let w' and w be the corresponding equilibrium wages on the market for talent, which are both strictly positive and unique. Then $w' > w$. Moreover, $r(w') > r(w)$ and $e(w', \alpha') < e(w, \alpha)$.*

Similarly to what was found by Murphy and Zábajník (2004, 2007), the lemma shows that if managerial skills become more general, the equilibrium wage for talent increases. This is an intuitive result: α measures the value of a market replacement of the incumbent. Hence firms' willingness to pay for talent increases with α and produces a demand pressure on the market for external hires, eventually resulting in higher pay in equilibrium. With respect to Murphy and Zábajník (2004, 2007), Lemma 3 shows that this intuition is robust to endogenous governance choices.

The increased activity on the market for talent implies that both demand and supply increase. First, $e(w)$ decreases, meaning that more firms fire untalented incumbents to hire a market replacement. This corresponds to a larger demand for talent. In this case, the increase in α directly increases firms' willingness to pay for a market hire, whose profitability is now larger. As a consequence, the demand for talent increases for any given level of wage, thus creating a demand pressure that rises w . Second, $r(w)$ increases, meaning that a larger mass of firms is unwilling to retain talented incumbents. This effect corresponds to a larger supply of talent, and is a direct consequence of the larger wage needed to retain an incumbent of type $\tau = 1$. That required managerial skills are more general is immaterial for the retention decision so the change in w is all that matters.

Now, unless the ex ante benefits of weak governance are so large that all firms prefer to entrench their incumbents independent of any other consideration, higher managerial turnover will translate into a larger fraction of firms adopting strong governance. This result, which is a consequence of Lemma 3 and Proposition 1, can be stated as follows.

Proposition 3. *If either $c_0^* < c_0$ or $c_1^* < c_1$, and $\alpha' > \alpha > c_0^*$, the fraction of firms adopting strong governance in equilibrium is larger with α' than with α .*

The assumption that either $c_0^* < c_0$ or $c_1^* < c_1$ rules out the uninteresting case in which weak governance is optimal for all firms also when $\alpha > c_0^*$. Notice that, if $c_0^* < c_0$, firms of size $s > e(w)$ adopt strong governance in anticipation of managerial turnover when the incumbent is untalented. On the other hand, if $c_1^* < c_1$, firms of size $s < r(w)$ adopt strong governance in anticipation of managerial turnover when the incumbent is talented. Therefore, any reduction in $e(w)$ or increase in $r(w)$ result in a larger fraction of firms adopting strong governance.

Proposition 3 ties together the observed trend toward stronger corporate governance with the shift of required managerial skills toward more general abilities. This result is novel in the literature and uncovers new and potentially important determinants of corporate governance (see Section 3 for a discussion of empirical implications).

Taken together, Lemma 3 and Proposition 3 also shed some new light on why managerial pay can increase at the same time that firms adopt stronger governance. This finding is counterintuitive if one thinks of managers as rent seekers (e.g., through excessive pay) and corporate governance as a way of curbing managerial rent-seeking behavior. It is also counterintuitive if strong governance is thought of as a substitute for performance-based pay in addressing a moral hazard problem. Existing explanations rely on the idea that managers dislike strong governance, so strong firms need to offer higher pay to attract and retain talent (Hermalin 2005; Hermalin and Weisbach 2012). What I propose here is that both the increase in managerial pay and the trend toward stronger governance may be due to the

changing nature of required managerial skills, which has shifted from firm specific toward more general abilities in recent decades.

2.1.1 An example with Pareto-distributed firm size.

To conclude this discussion, let's illustrate the results in the simple case in which firm size follows a Pareto distribution with shape parameter equal to one. In this case, if the minimum size of a firm is denoted with $s_m > 0$, we have $F(s) = 1 - s_m/s$ for $s \geq s_m$. To simplify even further, let's set $c_1 = 0$. The assumption that the support of F is bounded away from zero doesn't affect relevant results. The main consequence is that w can be different from zero when there is no activity on the reallocation market. More precisely, when $\alpha \leq c_0^*$, any $w \leq \theta s_m$ is compatible with no activity on the reallocation market, because any possible firm size is above the corresponding retention threshold in this case (i.e., $w \leq \theta s_m$ implies $s \geq r(w)$ for all $s \geq s_m$). When instead $\alpha > c_0^*$, and taking into account the definition of the cutoffs r and e given in Proposition 1, the market clearing condition (2) can be solved in closed form and yields

$$w = \left(\theta + \frac{(\alpha - c_0^*)(1 - \lambda)}{\lambda} \right) s_m. \quad (3)$$

In turn, plugging (3) back into r and e yields

$$r = \left(1 + \frac{\alpha - c_0^*}{\lambda \theta} \right) s_m, \quad (4)$$

$$e = \left(\frac{1 - \lambda}{\lambda} + \frac{\theta}{\alpha - c_0^*} \right) s_m. \quad (5)$$

Notice in particular how both w and r increase, in this case linearly, with α , while e goes down. From Proposition 1 we know that because $c_1^* = c_1 = 0$, firms with size below r are weak. Firms with size between r and e are weak too, whereas if $c_0^* < c_0$ those with size above e are strong. Hence, the mass of strong firms increases in α as long as $c_0^* < c_0$.

2.2 Changing the size distribution of firms

It is well known that the distribution of firm size is an important determinant of managerial pay. In an influential article, Gabaix and Landier (2008) show that the size of large firms can explain many observed characteristics of CEO compensation. However, to the best of my knowledge, the literature has so far overlooked the role of the distribution of firm size for corporate governance decisions. The results that follow offer some insights into this issue.

Lemma 4. *Assume that $\alpha > c_0^*$ and consider a continuous distribution $\tilde{F}(s)$ with a strictly positive density for all $s > 0$, and with the property that $\tilde{F}(s) < F(s)$ for all $s > 0$. Let \tilde{w} and w be the corresponding equilibrium wages on the market for talent, which are both strictly positive and unique. Then $\tilde{w} > w$. Moreover, $r(\tilde{w}) > r(w)$ and $e(\tilde{w}) > e(w)$.*

Firms tend to be larger when their size is distributed according to \tilde{F} rather than F , as their mass is shifted towards larger values of s . The lemma shows that a generalized increase in firm size along these lines results in higher equilibrium pay for talent. This result is quite intuitive given the complementarity between managerial talent and firm size. The lemma also shows that both r and e increase as a result. However, given that the entire distribution of size changes, the effect on the mass of firms above and below each threshold, and therefore on the activity in the market for talent and on ex ante governance choices is in general ambiguous.

The point is that a generalized increase in firm size does not necessarily result in more managerial turnover, the anticipation of which is the ultimate reason to adopt strong governance in the model. What turns out to be relevant is instead the dispersion of firm size. In fact, as the distribution of firm size becomes more dispersed, the uncertainty in the “quality” of initial CEO-firm matches increases. Namely, a larger dispersion of firms’ size translates into a higher probability that a CEO-firm mismatch is serious enough to require managerial turnover ex post, thus possibly calling for strong governance ex ante.

To capture this intuition in a simple way, let's compare the equilibrium when the size distribution is F with the equilibrium that arises if all firms of size s are transformed into firms of size $s\varphi(s)$, where $\varphi : \mathbb{R}_+ \rightarrow \mathbb{R}_+$ is a strictly positive and continuous function. φ can be interpreted as a size-dependent growth factor, so that $\varphi(s) > 1$ means that firms of size s grows, whereas $\varphi(s) < 1$ means that they shrink. To simplify, consider the case in which $s\varphi(s)$ is a strictly increasing function of s , so the transformation does not alter the size ordering of firms. In this case, a simple way of increasing the dispersion of firm size is to choose an increasing transformation φ .¹¹

Let F^φ be the distribution of firm size resulting from the transformation. Notice that $F^\varphi(s\varphi(s)) = F(s)$ for all s , and this property uniquely defines F^φ .¹² We now have the following result.

Lemma 5. *Assume that $\alpha > c_0^*$ and consider a function $\varphi : \mathbb{R}_+ \rightarrow \mathbb{R}_+$ with the property that $s\varphi(s)$ is strictly increasing in s . Let F^φ be uniquely defined by $F^\varphi(s\varphi(s)) = F(s)$, and let w^φ and w denote the corresponding unique and strictly positive equilibrium wages on the market for talent when the size distribution of firms are F^φ and F , respectively. It follows that*

$$\min \{\varphi(r(w)), \varphi(e(w))\} \leq \frac{w^\varphi}{w} \leq \max \{\varphi(r(w)), \varphi(e(w))\}, \quad (6)$$

and both inequalities are strict if $\varphi(r(w)) \neq \varphi(e(w))$.

Lemma 5 gives upper and lower bounds for the growth rate of equilibrium pay in terms of the growth rate of r and e .¹³ An immediate consequence is that if the firms of size $r(w)$ and

¹¹What matters is a “unit-free” increase in dispersion, for example, as reflected in an increase in the coefficient of variation (i.e., the ratio of the standard deviation to the absolute value of the mean). A simple rescaling of firm size is irrelevant for governance choices. Notice that rescaling firm size corresponds to choosing a constant ρ . The dispersion of size clearly doesn't change in this case (though the standard deviation of size increases if $\varphi > 1$ and decreases if $\varphi < 1$), and governance choices do not change either (see Proposition 4).

¹²In fact, the quantity $F^\varphi(s\varphi(s))$ represents the mass of firms with size below $s\varphi(s)$ after the transformation, which is given by the mass of firms with size below s before the transformation, which is $F(s)$. I assume that φ is such that the resultant distribution F^φ has the same properties as F , namely, is continuous and has a strictly positive density for all $s > 0$.

¹³The reason only the growth rates of $r(w)$ and $e(w)$ matter is that the transformation of sizes do not

those of size $e(w)$ are growing at the same rate, so is equilibrium pay for talent. This result resembles what found by Gabaix and Landier (2008), who attribute the sixfold increase of U.S. CEO pay between 1980 and 2003 to the sixfold increase in the size of large firms during the same period. The lemma suggests that the main finding in Gabaix and Landier (2008) is robust to endogenous entrenchment levels.

The next result shows what happens to governance decisions. Notice that because φ does not alter the size ordering of firms, $\varphi(r(w)) = \varphi(e(w))$ implies that firms that are below $r(w)$, between $r(w)$ and $e(w)$, and above $e(w)$ when size is distributed according to F , are, respectively, below $r(w^\varphi)$, between $r(w^\varphi)$ and $e(w^\varphi)$, and above $e(w^\varphi)$ after the transformation. No firm therefore changes its governance choice in this case, and the activity on the market for talent is not affected. This happens, for example, if all firms grow at the same rate. When instead firms grow at different rates, what matters for aggregate corporate governance choices are the growth rates in different size ranges.

Proposition 4. *Assume that $\alpha > c_0^*$ and let $(\varphi, F^\varphi, w, w^\varphi)$ be defined as in Lemma 5. If $\varphi(r(w)) = \varphi(e(w))$, the transformation φ does not affect the fraction of strong firms in equilibrium. If instead $\varphi(r(w)) < (>)\varphi(e(w))$, and either $c_0^* < c_0$ or $c_1^* < c_1$, the fraction of firms adopting strong governance in equilibrium is larger (smaller) with F^φ than with F .*

Because $r < e$, a sufficient condition for the transformation in the distribution of size to result in a larger fraction of strong firms is that φ be an increasing function. In this case, F^φ tends to have higher dispersion than F , because larger firms grow at larger rates, or shrink at smaller rates. Higher size dispersion boost managerial turnover and is indeed the key element behind Proposition 4. Figure 3 further illustrates the point with a numerical example. Here, the size of firms follows a lognormal distribution with mean equal to 1.5. The figure shows how increasing the dispersion of firm size (by increasing its standard deviation while keeping the mean constant) results in a larger percentage of firms adopting strong

alter the size ordering, that is, $s \leq s'$ implies $s\varphi(s) \leq s'\varphi(s')$.

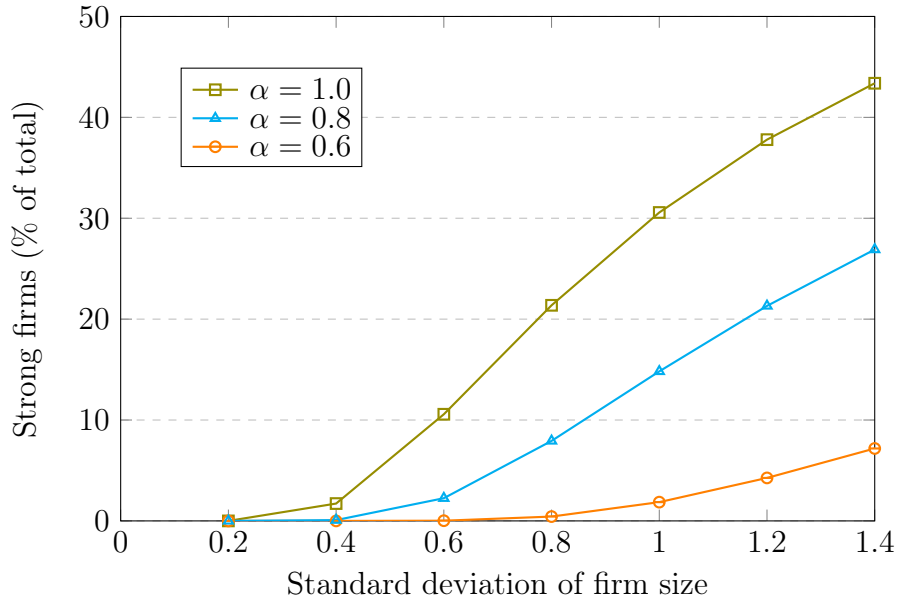


Figure 3
Increasing dispersion of firm size

This figure illustrates numerically the positive relationship between the percentage of strong firms and the dispersion of firm size. The example assumes a lognormal size distribution with mean equal to 1.5. Remaining parameters are $\theta = 1$, $\lambda = 0.4$, $v = 0.3$, and $c_0 = c_1 = 1$.

governance.¹⁴ It is also interesting to notice that the equilibrium wage (not displayed in the figure) slightly declines as the dispersion of firm size increases. The effect however seems marginal: for example, with $\alpha = 0.8$, w drops from 1.07 to 0.88 as the standard deviation of firm size increases from 0.4 to 1.4, a decline of approximately 18% against a 250% increase in dispersion. This is intuitive because while higher dispersion of firm size results in more activity in the market for talent, it is not clear whether it creates any demand or supply pressure. The effect on governance decisions is instead quite pronounced and seems complementary to that resulting from the changing nature of managerial skills.

¹⁴Other parameters are as follows: $\theta = 1$, $\lambda = 0.4$, $v = 0.3$, and $c_0 = c_1 = 1$. This parameter configuration implies that $c_0^* = 0.5$, so the values of α considered in the example are all above the critical value that guarantees the existence of the threshold e . It is also possible to check that $c_\tau^* < c_\tau$ for $\tau \in \{0, 1\}$, meaning that strong governance is optimal for both $s < r$ and $s > e$.

Notice that several studies have documented the evolution toward a more dispersed size distribution of firms in the U.S. economy over the last few decades (Poschke 2018; Bonfiglioli, Crinó, and Garcia 2018; Autor et al. 2017).¹⁵ Proposition 4 therefore links the evolution toward stronger corporate governance practices with the documented increase in the dispersion of firm size. Figure 3 illustrates this effect and also suggests that the increased size dispersion of firms may have reinforced the effect on governance choices of the shift from firm specific toward general managerial skills.

3 Discussion

3.1 Empirical implications

The model has several implications that are relevant for the empirical literature on corporate governance. Proposition 3 offers the main insight by linking the trend toward stronger corporate governance to the shift from firm-specific toward general managerial skills. Proposition 4 and Figure 3 then highlight that the effect on governance of the changing nature of managerial skills is stronger if firm size is more dispersed. Actually, the shift toward more general managerial skills and the increased dispersion of firm size, both documented in recent decades in the U.S. economy, may have reinforced each other in pushing firms toward stronger governance arrangements.

The above implications stem from a time-series interpretation of the comparative statics results in Section 2. A cross-section view of the same results may help obtain implications that are relevant for empirical studies at the sector level. In fact, the nature of required managerial skills is likely to be a time-varying but industry-specific attribute.¹⁶ As additional

¹⁵In a cross-country comparison, Poschke (2018) also documents higher dispersion of the size distribution of firms in richer countries, and interprets the finding as the natural result of a process of development with skill-biased access to new technologies.

¹⁶For example, Parrino (1997) argues that the percentage of departing CEOs replaced by company outsiders is a good measure of the homogeneity of firms within a sector. This is a good candidate for an empirical

implications of Propositions 3 and 4 we therefore have that corporate governance should be stronger, and managerial entrenchment lower, in sectors in which (a) required managerial skills appear to be more general and (b) the dispersion of firm size is higher, with a positive interaction between (a) and (b).

More implications relate to managerial turnover. The model features two kinds of replacements of the initial CEO. First, untalented managers that are fired in large firms to be replaced with external hires and, second, talented managers at small firms that leave their jobs to move to bigger firms. If we think of the former as forced turnover and the latter as voluntary, Proposition 1 implies that turnover events are voluntary and with inside replacements in small firms, and are forced events with external replacements in large firms. This is consistent with the empirical findings of Eisfeldt and Kuhnen (2013).

To explore further implications, notice that if managerial turnover is forced when the incumbent is untalented and is instead voluntary when the incumbent is talented, it seems plausible to assume that $c_0 \geq c_1$. In fact, this means that the cost of replacing the incumbent in a weak firm is higher in case of forced turnover. If we add the observation that managerial talent tends to be scarce (i.e., $\lambda < 1/2$), it makes sense to assume

$$\lambda c_1 < (1 - \lambda)c_0, \tag{7}$$

namely, that also the ex ante expected cost of replacing the incumbent in a weak firm is higher in case of forced turnover.

Now, if (7) holds, Proposition 1 implies that strong governance is optimal in large firms, that anticipate a possible need of forcing managerial turnover, but not in small firms, where any possible managerial turnover is instead voluntary. Consistently with this prediction,

proxy for α , and indeed Cremers and Grinstein (2014) relate it to the development of the market for talent. Using a different approach, Custódio, Ferreira, and Matos (2013) measure the generality of managerial skills at the CEO level, by constructing an index based on executives' career paths. They show that the average value of the index has increased over time and is positively associated with CEO pay, but they also document important differences across sectors.

several empirical studies (e.g., Boone et al. 2007; Linck, Netter, and Yang 2008) have documented a positive association between firm size and board independence. The typical interpretation of this finding hinges on larger firms being more complex organizations, possibly affected by more severe agency problems, which are therefore likely to benefit more from external monitoring. This paper offers an alternative interpretation of the association between firm size and board independence, and suggests that a similar relationship should also exist between size and other (inverse) measures of managerial entrenchment.¹⁷ Even more importantly, a further and specific implication of the model is that the relationship between firm size and governance choices should be more pronounced in sectors where required managerial skills are more general.

The results in Section 2 have further empirical implications. In particular, Proposition 4 suggests that the incentive to adopt strong governance depends on the entire distribution of firm size. Similarly to what found by Gabaix and Landier (2008) for CEO pay, also a firm's corporate governance should therefore depend on the size of a reference firm (e.g., the size of the median firm), which would proxy for the entire distribution of firm size. The effect on governance choices is however more nuanced and is mediated by pay levels. Notice that according to Proposition 4, a shift to the right of the size distribution corresponds to a larger reference firm and to higher pay levels on the market for talent. It follows that fixed the size of a firm, the cost of retaining talent goes up, thus increasing the profitability of strong governance to facilitate voluntary managerial turnover. On the other hand, the cost of attracting talent goes up too, thus reducing the profitability of strong governance to facilitate forced managerial turnover. While the sum of these two effects is in general ambiguous, if the cost of replacing an entrenched managers is negligible when turnover is voluntary (i.e., $c_1 \approx 0$), only the second effect is relevant. In this case, controlling for firm

¹⁷Here, strong governance refers to any arrangement that limits managerial entrenchment and is captured, for example, by the percentage of nonexecutive directors sitting on the board, or by the governance index developed by Gompers, Ishii, and Metrick (2003), and subsequently refined by Bebchuk, Cohen, and Ferrell (2009), both based on the number of antitakeover provisions in place.

size we should expect a negative association between the size of the reference firm and the adoption of strong governance arrangements.

3.2 Ex ante heterogeneous managers

In an Internet Appendix, I develop a version of the model with ex ante heterogeneous managers to stress the robustness of the results. This extension endogenizes the initial assignment of managers by letting firms compete at the beginning for “perceived talent,” assessed based on an ex ante observable characteristic that correlates with managerial type. An interesting feature of this extension is that because talent can be partially sorted out at the beginning, ex post managerial turnover and the fraction of strong firms are both lower than in the case of ex ante homogeneous managers. This happens because the initial assignment of CEOs to firms is more accurate and less vulnerable to ex post managerial turnover.¹⁸

More importantly, key results are robust to this extension. In particular, the fraction of strong firms increases as required managerial skills shifts from firm specific toward more general abilities, and in environments in which the dispersion of firm size is higher.

Interestingly, equilibrium pay in the ex ante competition for talent is however lower when managerial skills are more general. This happens because initial pay reflects the value of firm-specific skills. In fact, by attracting talent at an early stage, firms make sure that talented managers are able to develop potentially valuable firm-specific skills over their career. Firms’ initial willingness to pay for promising executives therefore increases with the relevance of firm-specific skills versus more general abilities. On the other hand, equilibrium pay in the ex-post market for talent still reflects the relevance of general abilities. An interesting consequence is that the inequality of pay between junior and senior managerial positions is larger in environments where general abilities are more relevant.

¹⁸For example, if a fraction of the talented managers could be recognized as such from the beginning, their hiring would involve no uncertainty. So, large firms could initially hire the already established talented CEOs and adopt weak governance, without any risk of ending up in a wrong match.

Finally, the extension suggests that governance choices are likely to depend on any managerial characteristics that may help assess the unknown talent of a CEO candidate (or the quality of the firm-CEO match). In practice, an important characteristic that help infer managerial talent is past performance, possibly at other firms, which the model therefore predicts to be a potentially important determinant of governance choices.¹⁹

4 Conclusions

Recruiting, retaining and, if needed, firing the CEO are among the most important responsibilities of boards of directors and a fundamental aspect of corporate governance. This paper focuses on these elements of governance and postulates the existences of both costs and benefits of management-friendly arrangements. The analysis shows that as the nature of required managerial skills shifts from firm specific toward more general abilities, the opportunity cost of managerial entrenchment rises, thus making strong governance more profitable. The result ties together the trend toward less management-friendly governance and higher managerial turnover observed in recent decades with the changing nature of required managerial skills, and offers a number of novel empirical implications.

A general idea that is stressed in the paper is that strong governance is motivated by the need of ensuring a smooth replacement of the CEO. Indeed, while managerial turnover is typically triggered by uncertain events (e.g., poor performance or an external job offer for the current CEO), an important aspect of governance is to setup *ex ante* the conditions under which managerial turnover will take place *ex post*. In this regard, a simple and general insight is that governance choices are based on a comparison between the cost of

¹⁹The importance of past performance in corporate governance decisions has already been postulated by Hermalin and Weisbach (1998). They argue that good performance increases a CEO's bargaining power in appointing management-friendly directors on the board. Here, I suggest a different argument: a firm's performance signals the likelihood that the incumbent is the right match and will not require replacement. Clearly, the better a firm-CEO match, the higher the profitability of allowing managerial entrenchment and harvest the corresponding benefits.

retaining an incumbent with the wrong set of skills with the benefits of hiring a more aligned replacement. This simple idea may find other applications. For example, we should expect less managerial entrenchment in a fast-changing market environment (e.g., frequently hit by technological or regulatory shocks) or when competition is tight so that a firm-CEO mismatch may even threaten the survival of the firm. On the other hand, any mechanism that reduces the uncertainties in the selection process of an appropriate CEO, may be conducive to management-friendly governance arrangements. Professional headhunters, for example, may be promoting managerial entrenchment, while promoting better firm-CEO matches that last for longer.

Appendix: Proofs

Proof of Proposition 1. Let's give a detailed proof assuming

$$\lambda c_1 < v < (1 - \lambda)c_0. \tag{A1}$$

The argument used in this case can be easily adapted to other parameter configurations so as to show the general result. Notice that if (A1) holds, then $c_0^* = v/(1 - \lambda) < c_0$ and $c_1^* = c_1$ and Statement 1 of the proposition simplifies to

A.1. *Firms of size $s < r(w)$ are weak. Moreover, if $\alpha \leq v/(1 - \lambda)$, all firms of size $s \geq r(w)$ are weak too, and if $\alpha > v/(1 - \lambda)$, firms of size $s \in [r(w), e(w)]$ are weak whereas firms of size $s > e(w)$ are strong.*

Let's show Statement A.1. Define $r(w) = w/(\theta + c_1)$ and consider $s < r(w)$. For the firms in this range, and independent of initial governance decisions, it is optimal to retain an untalented incumbent (Lemma 2) and to replace a talented incumbent with an internal hire (Lemma 1). This means that strong governance results in an expected value of zero at the

beginning, whereas weak governance yields $s(v - \lambda c_1) > 0$, where the inequality follows from (A1). So, weak governance is the optimal choice when $s < r(w)$.

Let's now consider firms of size $s \geq r(w)$. Lemma 1 implies that, in this range, talented incumbents are retained independent of the initial governance choice. Therefore, strong governance results in a beginning-of-period expected value of

$$\lambda(s\theta - w) + (1 - \lambda) \max\{s\alpha - w, 0\}, \quad (\text{A2})$$

whereas weak governance yields

$$sv + \lambda(s\theta - w) + (1 - \lambda) \max\{s(\alpha - c_0) - w, 0\}. \quad (\text{A3})$$

Both the second term in (A2) and the third in (A3) reflect the possible replacement of an untalented incumbent with a market hire. As for weak firms, if $\alpha \leq v/(1 - \lambda)$, (A1) implies that $\alpha < c_0$. So, weak firms retain an untalented incumbent independent of size in this case (Lemma 2). Hence, (A3) boils down to $sv + \lambda(s\theta - w)$, which is (weakly) above (A2) for all $s \geq r(w)$ as long as $\alpha \leq v/(1 - \lambda)$ and $w \geq 0$. This shows that if $\alpha \leq v/(1 - \lambda)$, weak governance is the optimal choice also when $s \geq r(w)$.

Finally, assume that $\alpha > v/(1 - \lambda)$ and define $e(w) = w/(\alpha - v/(1 - \lambda))$. Clearly, $e(w) \geq r(w)$ and the inequality is strict unless $w = 0$. In this case, if $\alpha \leq c_0$, Lemma 2 implies that an untalented incumbent is retained independently of firms size. So (A3) boils down to $sv + \lambda(s\theta - w)$ which is now (weakly) above (A2) if $s \leq e(w)$, and strictly below (A2) if $s > e(w)$. If instead $\alpha > c_0$, (A1) implies that $e(w) \leq w/(\alpha - c_0)$. Lemma 2 now ensures that (A3) boils down to $sv + \lambda(s\theta - w)$ for all $s \leq w/(\alpha - c_0)$, which is (weakly) above (A2) for all $s \leq e(w)$, and strictly below (A2) if $e(w) < s \leq w/(\alpha - c_0)$. It remains to check that when $\alpha > c_0$, strong governance is the optimal choice for firms of size $s > w/(\alpha - c_0)$, which replace an untalented incumbent with a market hire also with weak governance (Lemma 2).

It is however easy to verify that Assumption (A1) guarantees that (A2) is (strictly) above (A3) in this case. This completes the proof of Statement, A.1, namely, of Statement 1 of the proposition when (A1) holds. As for Statement 2, it follows from Lemma 1 and Lemma 2, given optimal governance choices.

The general result in Proposition 1 can be shown by adapting the proof to remaining parameter configurations, while taking

$$r(w) = \frac{w}{\theta + c_1^*} \quad (\text{A4})$$

and, when $\alpha > c_0^*$,

$$e(w) = \frac{w}{\alpha - c_0^*}. \quad (\text{A5})$$

□

Proof of Lemma 3. To show that the equilibrium wage for talent is strictly larger with α' than with $\alpha < \alpha'$, assume by contradiction that $w' \leq w$. Remember that both r and e strictly increase with w , and e strictly decreases with α . The assumption by contradiction then implies that $r(w') \leq r(w)$ and $e(w', \alpha') < e(w, \alpha)$. Now, because F is a strictly increasing function and w clears the market for talent with α , it follows that

$$\lambda F(r(w')) \leq \lambda F(r(w)) = (1 - \lambda)(1 - F(e(w, \alpha))) < (1 - \lambda)(1 - F(e(w', \alpha'))),$$

which contradicts that w' is the market clearing wage with α' . This shows that $w' > w$, which in turn implies that $r(w') > r(w)$. Now, because the equilibrium supply of talent is larger with α' than with α , namely, $\lambda F(r(w')) > \lambda F(r(w))$, market clearing with α' requires that also the demand for talent increases, namely, $(1 - \lambda)(1 - F(e(w', \alpha'))) > (1 - \lambda)(1 - F(e(w, \alpha)))$, which in turn requires $e(w', \alpha') < e(w, \alpha)$. □

Proof of Lemma 4. To show that $\tilde{w} > w$, notice that if firm size is distributed according to

\tilde{F} , at the market wage w there is an excess demand on the market, that is,

$$\lambda\tilde{F}(r(w)) < \lambda F(r(w)) = (1 - \lambda)(1 - F(e(w))) < (1 - \lambda)(1 - \tilde{F}(e(w))).$$

This means that \tilde{w} must be above w because otherwise the excess demand could not be eliminated. On the other hand, $r(\tilde{w}) > r(w)$ and $e(\tilde{w}) > e(w)$ immediately follow from $\tilde{w} > w$. □

Proof of Lemma 5. Consider the case in which $\varphi(r(w))$ and $\varphi(e(w))$ are different. To show that $w^\varphi/w < \max\{\varphi(r(w)), \varphi(e(w))\}$, let us proceed by contradiction and assume that $w^\varphi/w \geq \max\{\varphi(r(w)), \varphi(e(w))\}$. It follows that

$$r(w^\varphi) = \frac{w^\varphi}{\theta + c_0^*} \geq \frac{w}{\theta + c_0^*} \max\{\varphi(r(w)), \varphi(e(w))\} \geq \frac{w}{\theta + c_0^*} \varphi(r(w)) = r(w)\varphi(r(w)),$$

which given the definition of F^φ implies

$$F^\varphi(r(w^\varphi)) \geq F^\varphi(r(w)\varphi(r(w))) = F(r(w)). \tag{A6}$$

Similarly, the assumption by contradiction implies

$$F^\varphi(e(w^\varphi)) \geq F(e(w)). \tag{A7}$$

Because $\varphi(r(w))$ and $\varphi(e(w))$ are different, either (A6) or (A7) must be strict. Now, (A6) and (A7) together with w being the market clearing wage when firm size is distributed according to F , imply

$$\lambda F^\varphi(r(w^\varphi)) \geq \lambda F(r(w)) = (1 - \lambda)(1 - F(e(w))) \geq (1 - \lambda)(1 - F^\varphi(e(w^\varphi))),$$

where one of the two inequality must be strict. This contradicts that w^φ is the market

clearing wage when the size distribution is F^φ . It is now possible to proceed similarly to show that $w^\varphi/w > \min \{\varphi(r(w)), \varphi(e(w))\}$ when $\varphi(r(w))$ and $\varphi(e(w))$ are different, and that $w^\varphi/w = \varphi(r(w)) = \varphi(e(w))$ when $\varphi(r(w)) = \varphi(e(w))$. \square

Proof of Proposition 4. Let's show the result when $\varphi(r(w)) < \varphi(e(w))$, in which case Lemma 5 implies that $w^\varphi > w\varphi(r(w))$. We now have

$$\begin{aligned} F^\varphi(r(w^\varphi)) &> F^\varphi(r(w\varphi(r(w)))) = \\ &= F^\varphi(w\varphi(r(w))/(\theta + c_1^*)) = F^\varphi(r(w)\varphi(r(w))) = F(r(w)). \end{aligned}$$

The initial inequality follows from the monotonicity of r and subsequent equalities follow from the definitions of r and F^φ . Market clearing with both F and F^φ now imply that

$$F^\varphi(e(w^\varphi)) < F(e(w)).$$

Because either $c_0^* \neq c_0$ or $c_1^* \neq c_1$, point 1 of Proposition 1 implies that strong governance is adopted either by the firms with a size above e or by those with a size below r . In either case, the inequalities obtained above guarantee that the mass of strong firms is larger with F^φ than with F . The argument can be easily adapted to show the result when $\varphi(r(w)) \geq \varphi(e(w))$. \square

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INTERNET APPENDIX

Managerial Entrenchment and the Market for Talent

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This Internet Appendix is organized in two sections. Section A discusses the efficiency of the equilibrium allocation that arises in the model described in the paper and shows that private governance choices are second-best efficient. Section B analyzes a version of the model where firms compete ex ante for heterogeneous managers and shows how the results obtained in the paper with ex ante homogeneous managers are robust to this extension.

A Equilibrium efficiency

The allocation problem in the economy described in Section 1 of the paper consists in assigning weak or strong governance to firms, and then reallocating managers after the observation of managerial types. Turnover costs due to managerial entrenchment must be taken into account in the second-best as long as they corresponds to deadweight losses rather than transfers. Let us consider allocations where a firm is allowed to retain a talented incumbent if and only if its size is not below a certain threshold r , and is assigned a talented replacement of an untalented incumbent if and only if its size is above a certain threshold $e \geq r$. An allocation is second-best efficient if it maximizes aggregate profits net of total turnover

costs.¹

To simplify the exposition, let's discuss equilibrium efficiency assuming that

$$\lambda c_1 < v < (1 - \lambda)c_0, \tag{A.1}$$

in which case $c_0^* = v/(1 - \lambda) < c_0$ and $c_1^* = c_1$. Similar arguments would apply to other parameter configurations.

If (A.1) holds, second-best (or constrained) efficiency requires that a firm should be assigned strong governance if and only if an untalented incumbent is going to be replaced with a talented manager. In this case, efficient allocations can be described by a couple (r, e) with the understanding that the corporate governance assigned to a firm of size s is weak if $s \leq e$ and is strong if $s > e$. Indeed, given (A.1), strong governance is the best option for firms that may need to replace an untalented incumbent. These are precisely those with size above e . It is now possible to check that the aggregate profits of firms net of turnover costs corresponding to an assigned allocation (r, e) is given by

$$\int_0^\infty s(v\mathbb{1}_{s \leq e} + \lambda(\theta\mathbb{1}_{s \geq r} - c_1\mathbb{1}_{s < r}) + (1 - \lambda)\alpha\mathbb{1}_{s > e})dF(s), \tag{A.2}$$

which takes into account that talented incumbents are removed from firms of size $s < r$ to be replaced with untalented internal candidates, whereas untalented incumbents are removed from firms of size $s > e$ to be replaced with talented outsiders. A constrained-efficient allocation maximizes the aggregate value of firms in the economy, net of turnover costs, subject to the feasibility of planned managerial turnover. Formally, a constrained-efficient

¹Abstracting from the possibility of replacing a talented incumbent with a talented outsider, which clearly is inefficient, a more general allocation would specify the firms that are allowed to retain a talented incumbent and those that are assigned a talented manager if their incumbent is of type $\tau = 0$. However, an efficient allocation must necessarily be of the kind described in the text. In fact, it is intuitive that if a certain firm is left with a good incumbent, efficiency requires that so are larger firms. Similarly, it cannot be efficient to assign a good manager to a certain firm if larger firms are left with untalented incumbents. Notice that the latter observation implies that $e < r$ cannot be efficient either.

allocation maximizes (A.2) subject to

$$\lambda F(r) \geq (1 - \lambda)(1 - F(e)), \quad (\text{A.3})$$

which ensures that the mass of firms that are assigned talented managers after the removal of untalented incumbents does not exceed the mass of talented managers removed from their initial firms. Let (r_{SB}, e_{SB}) be a solution to the above problem. It is now possible to show that the constrained-efficient allocation is achieved in the decentralized economy, where firms privately make governance as well as hiring and firing decisions, and the assignment of managers to firms emerges in a competitive market for talent.

Proposition A.1. *If $\alpha \leq c_0^* = v/(1 - \lambda)$, it is second-best efficient to assign weak governance to firms of any size and always leave firms with their incumbents. If $\alpha > c_0^* = v/(1 - \lambda)$ and $w > 0$ is the corresponding unique market clearing wage for talent in the decentralized economy, then $e(w) = e_{SB}$ and $r(w) = r_{SB}$. Moreover, in this case the aggregate value of firms net of turnover costs increases with α .*

Proof. Let $V(r, e)$ denote the aggregate profits of firms net of turnover costs induced by the allocation (r, e) . Notice that the function $V(r, e)$ is well defined also if r or e is ∞ and can be written as

$$\int_0^e v s f(s) ds + \lambda \left\{ \int_r^\infty \theta s f(s) ds - \int_0^r c_1 s f(s) ds \right\} + (1 - \lambda) \int_e^\infty \alpha s f(s) ds. \quad (\text{A.4})$$

The problem characterizing the constrained-efficient allocation consists in identifying the couple (r, e) that maximizes $V(r, e)$ subject to (A.3). Notice that, by extending the definition of F to include $F(\infty) = 1$, the allocation $(0, \infty)$ is feasible, involves no managerial turnover,

and yields an aggregate value of firms equal to

$$V(0, \infty) = \int_0^{\infty} (v + \lambda\theta)sf(s)ds.$$

Essentially, the allocation $(0, \infty)$ consists in assigning weak governance to all firms and never replace any incumbent. Now, it is possible to check that

$$V(r, e) - V(0, \infty) = (1 - \lambda) \int_e^{\infty} (\alpha - v/(1 - \lambda))sf(s)ds - \lambda \int_0^r (c_1 + \theta/\lambda)sf(s)ds.$$

If $\alpha \leq c_0^* = v/(1 - \lambda)$, the above expression cannot be positive if $r > 0$ or $e < \infty$, which shows that in this case the feasible allocation $(0, \infty)$ is indeed constrained-efficient, as claimed in the first part of the proposition. Assume now that $\alpha > c_0^* = v/(1 - \lambda)$ and let $\mu \geq 0$ be the multiplier for (A.3). After some simplifications, the first order conditions with respect to r and e yield

$$r = \frac{\mu}{\theta + c_1}, \tag{A.5}$$

$$e = \frac{\mu}{\alpha - v/(1 - \lambda)}. \tag{A.6}$$

Notice that $\mu = 0$ is impossible because given (A.5) and (A.6), (A.3) could not hold. Now, it is clear that conditions (A.5) and (A.6), together with the binding feasibility constraint (A.3), are equivalent to the conditions identifying the outcome in the decentralized economy. Finally, that the aggregate value of firms, net of turnover costs, increases with α is a straightforward application of the Envelope Theorem applied to the maximization of (A.4) subject to (A.3). □

To complete the discussion, let's consider the properties of the first-best allocation, which differs from the second-best if turnover costs arise because of some kind of information prob-

lem.² In this case, the assignment of governance is trivial in the first-best because all firms can obtain the increased profitability that is made possible by management-friendly governance arrangements, while avoiding the turnover costs generated by managerial entrenchment. Hence, the aggregate profits of firms corresponding to an assignment (r, e) is

$$\int_0^\infty vsf(s)ds + \lambda \int_r^\infty \theta sf(s)ds + (1 - \lambda) \int_e^\infty \alpha sf(s)ds, \quad (\text{A.7})$$

and the first-best allocation (r_{FB}, e_{SB}) maximizes (A.7) subject to the feasibility constraint (A.3). It is now possible to check that the first-best allocation always involves more managerial turnover than the constrained-efficient allocation. In particular, some turnover occurs in the first-best also when $\alpha \leq c_0^* = v/(1 - \lambda)$, whereas there is none in the second-best, and if $\alpha > c_0^* = v/(1 - \lambda)$, then $r_{FB} > r_{SB}$ and $e_{FB} < e_{SB}$. The proof is omitted but is straightforward: it simply relies on the absence of turnover costs in the first-best.

B Ex ante heterogeneous managers

This Section discusses the robustness of the results obtained in the paper to the existence of ex ante heterogeneous managers. For this purpose, let's assume that initially managers can be of two observable types $\lambda \in \{\lambda_l, \lambda_h\}$, where λ is the probability of being talented, and $\lambda_h > \lambda_l \geq 0$. There is a mass $\rho < 1$ of managers of type λ_h , and a large mass (specifically, larger than $1 - \rho$) of managers of type λ_l . This implies that there is a shortage of managers of type λ_h but not of managers of type λ_l . At the beginning, firms choose their governance, which can either be weak or strong, and compete on a market for *perceived* talent to hire an initial manager, who becomes the incumbent. A firm's governance choice is denoted with $g \in \{0, 1\}$, where $g = 0$ and $g = 1$ represent weak and strong governance, respectively. As in Section 1 of the paper, weak governance increases firm profitability by $v > 0$, but produces

²On this point, see the discussion at the end of Section 1 in the paper.

a turnover cost equal to c_τ if an incumbent of type τ is replaced. To simplify the analysis, I assume that $c_0 = +\infty$ and $c_1 = 0$, which essentially rules out that untalented managers can be removed from weak firms, while talented managers can leave their initial firm and move to a new employer at no cost.³ In this case, only the firms that anticipate the replacement of an untalented managers prefer strong governance.

Because $\rho < 1$, firms compete to hire managers of type λ_h . Let $w^{i,g}$ denote the initial market wage for a manager of type λ_h that is hired at a firm with governance g . This market wage is to be paid only to managers that are not fired and do not quit their initial job, so it can be interpreted as a compensation package that is forfeited in case of turnover. If instead the incumbent stays, the initial wage represents a commitment for the firm, but is subject to renegotiation after managerial talent is revealed. Managers that are not hired by any firm at the beginning cannot be hired at a later stage: they are instead employed in an alternative occupation with a reservation wage normalized to zero. Because managers of type λ_l are in excess supply, there is no loss of generality in assuming that they can be hired with an initial wage commitment of zero at both weak and strong firms. The managerial type initially hired by firms of size s , all of which are assumed to behave symmetrically, is denoted by the indicator function $h(s)$ that equals one if the type is λ_h , and zero if the type is λ_l . The schedules $g(s)$ and $h(s)$ are called a *governance profile* and, respectively, an *initial assignment*.

Figure B.1 shows the timing of events when managers are heterogeneous ex ante. At the beginning firms choose their governance g and hire a manager who becomes the incumbent. The initial managerial labor market is perfectly competitive in the sense that both firms and managers take $w^{i,g}$ as given. Managerial talent is then publicly observed. Firms with a

³In other words, strong board is costly to set up but has the option of replacing an untalented incumbent, an option that is instead not available to a cheap but weak board. This simplified representation of the tradeoffs involved in governance decisions is common in the literature (e.g., Burkart and Raff 2015; Ferreira, Ferreira, and Raposo 2011).

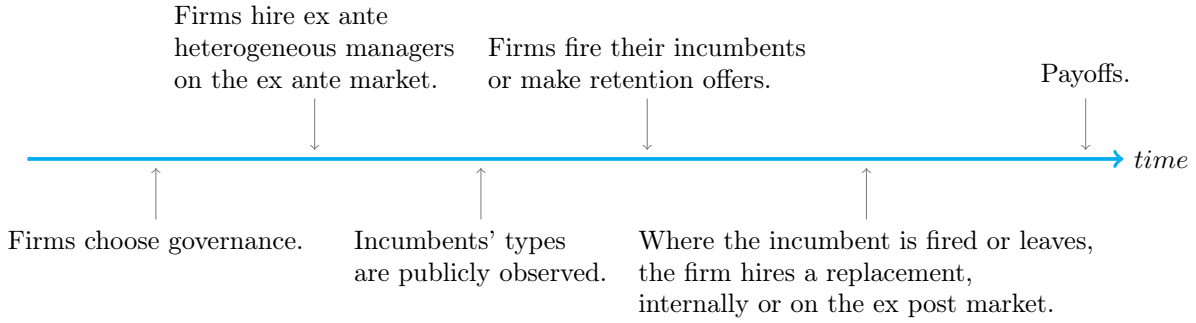


Figure B.1: Timeline with ex ante heterogeneous managers

talented incumbent make a take-it-or-leave-it retention offer not smaller than the initial wage commitment, which is equal to zero for managers of type λ_l , and is equal to $w^{i,g}$ for managers of type λ_h . If instead the initial manager is untalented, strong firms have the option to fire him or her and look for a replacement, while weak firms are unable to do so. In the latter case, an untalented manager keeps the initial job and receives the promised wage. Firms whose incumbent has left, either demand a talented manager on the ex post, reallocation market, or hire internally an untalented candidate. The market wage for a talented manager in this reallocation phase is denoted by w^r . Finally, firm profitability is determined as in the baseline case with ex ante homogeneous managers, and payoffs are realized. Preferences are as in the baseline case too.

In what follows, \mathbf{w} denotes the collection of market wages, that is $\mathbf{w} = (w^{i,0}, w^{i,1}, w^r)$. Notice that \mathbf{w} is nonnegative and is said to be feasible if in addition $w^{i,1} \geq w^r$. We can focus on feasible wages without loss of generality. In fact, any $w^{i,1} < w^r$ is equivalent to $w^{i,1} = w^r$, because it has to be renegotiated up to at least w^r in order to retain a talented incumbent, and does not have to be paid to an untalented incumbent, who can be fired in a strong firm at no cost.

B.1 Profit functions

To proceed with the analysis, let $\pi(g, \lambda | s, \mathbf{w})$ be the ex ante expected profit, net of managerial pay, of a firm of size s that chooses governance g and hires an initial manager of type λ , being \mathbf{w} the level of market wages and taking into account the outcome of the renegotiation phase that ensues after the observation of managerial talent. The notation emphasizes that firms take their size and market wages as given when they make the initial governance and hiring decision. To easy notation, in what follows $x \vee y$ denotes the maximum between x and y , and $x \vee 0$ is abbreviated as x^+ .

Similarly to the baseline case, the firms that lose their incumbent during the renegotiation phase hire a talented manager on the reallocation market if $s > w^r/\alpha$, and otherwise hire an untalented internal candidate if $s \leq w^r/\alpha$. Consider what happens in a firm that hires a manager of type λ_l at the beginning. In this case, if the incumbent is untalented, the firm is able to replace him or her only if governance is strong. If instead the incumbent is talented, the retention offer must be at least w^r or otherwise the manager will voluntarily leave. Independent of the initial governance choice, firms of size $s \geq r(\mathbf{w}) = w^r/\theta$ find it optimal to retain the talented incumbent, while smaller firms do not. Notice that $r(\mathbf{w})$ plays the same role here as the corresponding threshold defined in Proposition 1 in the paper. Now, taking into account the outcome of the renegotiation phase, the expected profit of a firm with governance g that hires λ_l is:

$$\pi(g, \lambda_l | s, \mathbf{w}) = (1 - g)vs + \lambda_l(\theta s - w^r)^+ + g(1 - \lambda_l)(\alpha s - w^r)^+. \quad (\text{B.1})$$

Before turning to the expected profit of a firm that hires a manager of type λ_h at the

beginning, let's define the following size threshold:

$$t(g, \mathbf{w}) = \begin{cases} \frac{w^{i,0} \vee w^r}{\theta} & \text{if } g = 0, \\ \frac{w^{i,1}}{\theta} \vee \frac{w^{i,1} - w^r}{\theta - \alpha} & \text{if } g = 1. \end{cases} \quad (\text{B.2})$$

Notice that $t(g, \mathbf{w}) \geq r(\mathbf{w})$ for any feasible \mathbf{w} and for both $g = 0$ and $g = 1$. It can now be checked that for a firm of size $s < t(g, \mathbf{w})$ that chooses governance g , a manager of type λ_l is at least as profitable a hire as a manager of type λ_h at the beginning. That is, $s < t(g, \mathbf{w})$ implies $\pi(g, \lambda_l | s, \mathbf{w}) \geq \pi(g, \lambda_h | s, \mathbf{w})$, for both $g = 0$ and $g = 1$.⁴ Notice also that for a firm of size $s \geq t(g, \mathbf{w})$ that chooses governance g and initially hires a manager of type λ_h , it is optimal to retain the incumbent when he or she turns out to be talented. So, if $s \geq t(g, \mathbf{w})$, and taking into account the outcome of the renegotiation phase, the expected profit of a firm with governance g that hires λ_h is:

$$\pi(g, \lambda_h | s, \mathbf{w}) = (1 - g)vs + \lambda_h(\theta s - w^{i,g} \vee w^r) + (1 - \lambda_h)(g(\alpha s - w^r)^+ - (1 - g)w^{i,g}). \quad (\text{B.3})$$

B.2 Equilibrium with ex ante competition for managers

Let's now define an equilibrium in this setup. To this end, let $P(\mathbf{w})$ denote the wage premium that a manager of type λ_h can expect to earn if he or she is hired by a weak firm rather than by a strong firm, that is,

$$P(\mathbf{w}) = \lambda_h((w^{i,0} \vee w^r) - w^{i,1}) + (1 - \lambda_h)w^{i,0}. \quad (\text{B.4})$$

⁴For a firm of size $s < t(0, \mathbf{w})$ that chooses $g = 0$, the retention of an incumbent of type λ_h produces a loss, independent of τ , so hiring λ_l is certainly more profitable. On the other hand, for a firm of size $s < t(1, \mathbf{w})$ that chooses $g = 1$, it cannot be optimal to pay $w^{i,1} \geq w^r$ to a talented incumbent because it is more profitable to fire him or her and hire a replacement, either internally or on the market. In this case, λ_l cannot be less profitable than λ_h , and it is strictly more profitable for firms of size $s > r(\mathbf{w})$ if $\lambda_l > 0$, $w^{i,1} > w^r$ and $\alpha < \theta$, in which case with positive probability an incumbent of type λ_l is talented, possesses valuable firm specific human capital, and can be retained with a salary equal to w^r .

Clearly, if $P(\mathbf{w}) > 0$ (< 0) no strong (weak) firm can attract λ_h at the beginning. Also notice that the supply of talent in the reallocation market, call it $S(\mathbf{w})$, is given by the measure of managers of type $\tau = 1$ that quit their initial jobs. The discussion above implies that, given an initial assignment $h(s)$ we have:

$$S(\mathbf{w}) = \int_{s < w^r/\theta} \lambda_l(1 - h(s))dF(s). \quad (\text{B.5})$$

The demand for talent in the reallocation market, $D(\mathbf{w})$, instead comes from the firms that have lost their incumbent and demand a talented replacement. So, given a governance profile $g(s)$ and an initial assignment $h(s)$, we have:

$$D(\mathbf{w}) = \int_{s > w^r/\alpha} g(s)((1 - \lambda_l)(1 - h(s)) + (1 - \lambda_h)h(s))dF(s). \quad (\text{B.6})$$

Now, an equilibrium is a governance profile $g(s)$, an initial assignment $h(s)$ and a vector of wages \mathbf{w} , such that:

$$\text{for each } s, (g(s), h(s)) \in \arg \max_{(g', h')} \pi(g', h' \lambda_h + (1 - h') \lambda_l \mid s, \mathbf{w}); \quad (\text{B.7})$$

$$\text{if } h(s)(1 - g(s)) > 0 \text{ for some } s, \text{ then } P(\mathbf{w}) \geq 0; \quad (\text{B.8})$$

$$\text{if } h(s)g(s) > 0 \text{ for some } s, \text{ then } P(\mathbf{w}) \leq 0; \quad (\text{B.9})$$

$$\int_{s > 0} h(s)dF(s) = \rho; \quad (\text{B.10})$$

$$S(\mathbf{w}) = D(\mathbf{w}). \quad (\text{B.11})$$

Condition (B.7) ensures that all firms maximize ex ante expected profits net of managerial pay. On the other hand, (B.8) and (B.9) require that managers of type λ_h can only be hired ex ante by those firms that offer the highest expected wage. These are weak firms if $P(\mathbf{w}) \geq 0$ or strong firms if $P(\mathbf{w}) \leq 0$. Finally, the last two conditions require that the market for talent clears both initially, (B.10), and in the reallocation phase, (B.11).

Proposition B.1. *Define the quantity*

$$e(\lambda, \mathbf{w}) = \frac{w^r - P(\mathbf{w})\mathbb{1}_{\lambda=\lambda_h}}{\alpha - v/(1-\lambda)}, \quad (\text{B.12})$$

whenever $\alpha > v/(1-\lambda)$. In equilibrium, if $\alpha \leq v/(1-\lambda)$, all firms hiring a manager of type λ choose $g = 0$. If instead $\alpha > v/(1-\lambda)$, a firm of size s hiring a manager of type λ chooses $g = 0$ if $s \leq e(\lambda, \mathbf{w})$ and $g = 1$ otherwise. Moreover, if $\alpha > v/(1-\lambda_h)$, then $e(\lambda_l, \mathbf{w}) < e(\lambda_h, \mathbf{w})$.

The proof is at the end of the section. Notice that (B.12) plays here the role of the corresponding threshold defined in Proposition 1 in the paper. We can now see how Proposition B.1 extends part of the contents of Proposition 1 in the paper, under the assumption that $c_0^* < c_0$ and $c_1^* = c_1$. Remember that in this case, and provided that required managerial skills are sufficiently general, only large firms, namely, those with size above $e(w)$, are strong: they retain the incumbent if talented but otherwise prefer to replace him or her with a market hire. Proposition B.1 shows that, the same result emerges here: conditional on the incumbent being of type λ , strong governance is adopted at large firms, namely at firms with size above $e(\lambda, \mathbf{w})$. The intuition is also the same: large firms suffer more from a misallocation of talent and are therefore more willing to give up the benefits of weak governance to maintain the option of replacing an untalented incumbent.

The next result, whose proof is also at the end of the section, shows that the initial assignment of managers to firms displays positive assortative matching in equilibrium, meaning that managers of type λ_h are hired by large firms, with either strong or weak governance.

Proposition B.2. *In equilibrium, the initial assignment $h(s)$ displays positive assortative matching, namely, $h(s)$ equals one for all $s > \bar{s}$ and is otherwise equal to zero, where \bar{s} is the unique solution to*

$$1 - F(\bar{s}) = \rho. \quad (\text{B.13})$$

Given the complementarity between managerial skills and firm size, the initial allocation of managers described in Proposition B.2 is first-best efficient. As for the reallocation phase, the tradeoffs between the benefits of weak governance and the distortion in the allocation of talent is essentially the same as in Section 1 of the paper, and a similar argument could be used to establish that, overall, the equilibrium allocation is second-best efficient also in this case.

Having established the initial assignment of managers in Proposition B.2, it is now possible to obtain the governance profile and the level of wages in equilibrium by using Proposition B.1. Similarly to what happens with ex ante homogeneous managers, where only large firms are strong when $c_0^* < c_0$ and $c_1^* = c_1$, Proposition B.1 implies that the governance profile is still monotonic (namely, firms are strong when their size is above some threshold), conditional of the initial CEO's perceived talent.

To further analyze the equilibrium and stress the robustness of the comparative statics results of Section 2 of the paper, let's restrict to the simple situation where $\lambda_h = 1$.⁵ In this case, Proposition B.1 implies that all firms hiring λ_h , i.e., those of size $s > \bar{s}$, adopt weak governance, and they do so because they hire the right CEO at the beginning, i.e., a talented manager, and there is therefore no reason for them to give up the benefits of weak governance.⁶ It is now important to distinguish two cases, depending on the value of α .

Consider first the case where $\alpha \leq v/(1 - \lambda_l)$. Proposition B.1 implies that, in this case, also the firms hiring λ_l , namely, those of size below \bar{s} , adopt weak governance. Intuitively, the option of firing an untalented incumbent is not valuable because managerial skills are mostly firm specific, so it is preferable not to give up the benefits of weak governance. The

⁵The choice of this case is made for the purpose of presentation. The procedure to identify the equilibrium governance profile as well as market clearing wages on the initial and the reallocation market for talent is essentially the same in other cases, and so are comparative statics results with respect to α and the distribution of firm size.

⁶In general, the measure of talented managers is $\rho\lambda_h + (1 - \rho)\lambda_l$ and they should be matched to the largest firms in the first-best allocation. Notice that when $\lambda_h = 1$ the measure of talented managers is surely larger than ρ , which means that, in this case, all firms of size above \bar{s} , whose measure is exactly ρ , are hiring the kind of manager they should have in the first-best allocation. In this sense, they are hiring the right CEO at the beginning, and do not have to worry about managerial turnover.

market for talent in the reallocation phase is inactive in this case, so $w^r = 0$ in equilibrium. On the other hand, the initial competition for talent determines the equilibrium values of $w^{i,g}$. In particular, the largest firm hiring λ_l must be of size \bar{s} , which is therefore required to be indifferent between the two types of managers. This means that $\pi(0, \lambda_l | \bar{s}, \mathbf{w}) = \pi(0, \lambda_h | \bar{s}, \mathbf{w})$ in equilibrium, which in turn implies

$$w^{i,0} = (1 - \lambda_l)\theta\bar{s}. \quad (\text{B.14})$$

Notice that there is no active market for perceived talent involving strong firms at the beginning. For this to be optimal in equilibrium, $w^{i,1}$ must indeed discourage both managers of type λ_h and firms of size above \bar{s} to participate in the market. Namely, given equilibrium values of w^r and $w^{i,0}$, $w^{i,1}$ must be such that $P(\mathbf{w}) \geq 0$ and $\pi(0, \lambda_h | s, \mathbf{w}) \geq \pi(1, \lambda_h | s, \mathbf{w})$ for all $s > \bar{s}$. It can be checked that these conditions boil down to

$$w^{i,0} - v\bar{s} \leq w^{i,1} \leq w^{i,0}. \quad (\text{B.15})$$

The equilibrium wage $w^{i,1}$ is therefore not unique in this case, but both the governance profile as well as $w^{i,0}$ and w^r are uniquely characterized by equilibrium conditions.

Let's consider now the situation where $\alpha > v/(1 - \lambda_l)$. In this case, if a firm of size $s > e(\lambda_l, \mathbf{w})$ hires a manager of type λ_l at the beginning, it must also adopt strong governance. Therefore there is some activity on the reallocation market for talent. Notice that, as long as $e(\lambda_l, \mathbf{w}) < \bar{s}$, the market clearing condition in the reallocation phase, i.e., (B.11), can be written as

$$\lambda_l F(r(\mathbf{w})) = (1 - \lambda_l)(1 - \rho - F(e(\lambda_l, \mathbf{w}))). \quad (\text{B.16})$$

This condition closely resembles condition (2) in the paper, which holds when managers are ex ante homogeneous, and similarly determines the market clearing value of w^r , which must be strictly positive and unique. It can also be checked that if $F(s) > 0$ for all $s > 0$, then

the solution to (B.16) is such that $e(\lambda_l, \mathbf{w}) < \bar{s}$, so that there indeed exists a set of firms hiring λ_l with strong governance in equilibrium.⁷

After having obtained the equilibrium value of w^r and the corresponding equilibrium governance profile, according to which firms of size between $e(\lambda_l, \mathbf{w})$ and \bar{s} are strong and any other firm is weak, it is also possible to obtain the equilibrium value of $w^{i,g}$. In particular, and similarly to the case where $\alpha \leq v/(1 - \lambda_l)$, $w^{i,0}$ can be obtained from $\pi(1, \lambda_l | \bar{s}, \mathbf{w}) = \pi(0, \lambda_h | \bar{s}, \mathbf{w})$, which now boils down to

$$w^{i,0} = w^r + (v + (\theta - \alpha)(1 - \lambda_l))\bar{s}, \quad (\text{B.17})$$

whereas $w^{i,1}$ must still discourage any activity involving strong firms in the initial market for perceived talent, so that (B.15) must hold also in this case. The following proposition reproduces the key results in Lemma 3 and Proposition 3.

Proposition B.3. *Assume that $\lambda_h = 1$ and consider $\hat{\alpha} > \alpha > v/(1 - \lambda_l)$. Let $\hat{\mathbf{w}} = (\hat{w}^{i,0}, \hat{w}^{i,1}, \hat{w}^r)$ and $\mathbf{w} = (w^{i,0}, w^{i,1}, w^r)$ be the corresponding equilibrium wages, so that \hat{w}^r and w are both strictly positive and unique. Then $\hat{w}^r > w^r$. Moreover, $r(\hat{\mathbf{w}}) > r(\mathbf{w})$; $e(\hat{\mathbf{w}}, \lambda_l, \hat{\alpha}) < e(\mathbf{w}, \lambda_l, \alpha)$ and the fraction of firms adopting strong governance in equilibrium is larger with $\hat{\alpha}$ than with α .*

The proof is omitted as it follows from the market clearing condition (B.16) and the definitions of $r(\mathbf{w})$ and $e(\mathbf{w}, \lambda_l, \alpha)$, all of which are straightforward extensions of their counterparts in the setup with ex ante homogeneous managers. The intuition is also the same: more general managerial skills increases firms' willingness to pay for talent and creates a demand pressure in the ex post reallocation market. This increases w^r in equilibrium and

⁷To see this point, notice that at the wage $w^r > 0$ such that $e(\lambda_l, \mathbf{w}) = \bar{s}$ there is an excess supply of talent. Notice also that this argument can no longer be used if the support of F is $[s_m, \infty)$ and $s_m > 0$. In this case, the condition $e(\lambda_l, \mathbf{w}) < \bar{s}$ might further restrict the range of α for which there is an active reallocation market for talent. This is exactly what happens if firm size follows a Pareto distribution, as discussed later on.

boosts managerial turnover. Because weak firms are unable to replace untalented incumbents, a larger fraction of firms now choose to be strong, thus reducing e . The effects of a change in the distribution of firm size are also similar to those derived with ex ante homogeneous managers, and are not restated here.

Finally, it is interesting to notice that the effect of an increase of α on $w^{i,0}$, and on the bounds for $w^{i,1}$, is ambiguous. In fact, (B.17) implies that $w^{i,0}$ contains a premium with respect to w^r . So, any increase in w^r induced by a larger α tends to be reflected in an equivalent increase in $w^{i,0}$. However, the premium decreases in α , so the overall effect is ambiguous. To gain intuition, notice that the premium reflects the value of the firm specific human capital that managers develop at the beginning (and lose in case of turnover). Therefore, as α increases, the relative value of firm specific skills goes down, and so does the corresponding equilibrium premium.

B.3 Pareto-distributed firm size

To illustrate with a simple example what happens with ex ante heterogeneous managers, let's assume that firm size follows a Pareto distribution with shape parameter equal to 1, that is $F(s) = 1 - s_m/s$ for all $s \geq s_m$, where $s_m > 0$ is the minimum possible size of a firm. In this case, (B.13) immediately implies that $\bar{s} = s_m/\rho$. We know from the example presented in Section 2 of the paper that a consequence of having the support of F bounded away from zero is that w^r can be positive also in the absence of managerial turnover. In this case, if $\alpha \leq v/(1 - \lambda_l)$, all firms are weak and any $w^r \leq \theta s_m$ can sustain an equilibrium with no market activity in the reallocation phase. As for the initial market for managers, it is now possible to obtain

$$w^{i,0} = \lambda_l w^r + (1 - \lambda_l) \theta \frac{s_m}{\rho}, \quad (\text{B.18})$$

while $w^{i,1}$ is restricted by (B.15) in the usual way.

With ex ante heterogeneous managers, the assumption that the support of F is bounded away from zero has another consequence, namely $\alpha > v/(1 - \lambda_l)$ is no longer sufficient to ensure some activity in the ex post market for talent. In this case, in fact, the condition $e(\lambda_l, \mathbf{w}) < \bar{s}$ imposes additional restrictions. In particular, we need to assume $\alpha > v/(1 - \lambda_l) + \rho\theta$ to make sure that not all firms are weak (see also Footnotes 7 and 8 on this point). So, the no-turnover equilibrium just described emerges more generally whenever $\alpha \leq v/(1 - \lambda_l) + \rho\theta$.

Let's consider now the case where $\alpha > v/(1 - \lambda_l) + \rho\theta$. Solving (B.17) yields

$$w^r = \left(\frac{\lambda_l \theta + \alpha(1 - \lambda_l) - v}{\lambda_l + (1 - \lambda_l)\rho} \right) s_m, \quad (\text{B.19})$$

and the retention and entrenchment thresholds become

$$r = \left(\frac{\lambda_l \theta + \alpha(1 - \lambda_l) - v}{\theta(\lambda_l + (1 - \lambda_l)\rho)} \right) s_m \quad (\text{B.20})$$

and, respectively,⁸

$$e = \left(\frac{\theta\lambda_l + (1 - \lambda_l)\alpha - v}{(\alpha - v/(1 - \lambda_l))(\lambda_l + (1 - \lambda_l)\rho)} \right) s_m. \quad (\text{B.21})$$

Similarly to what happens with ex ante homogeneous managers, expressions (B.19)-(B.21) illustrate in a simple way how w^r and r increase with α , while e goes down.⁹ To conclude, Figure B.2 contains a numerical example that compares the cases of ex ante homogeneous and ex ante heterogeneous managers. For the purpose of comparability, the total measure of talented managers is the same in the two cases, that is $\lambda = \rho + (1 - \rho)\lambda_l$. Moreover, the example assumes $s_m = v = 1$, $\theta = 5$, $\lambda_l = 0.4$, and $\rho = 0.3$, so the implied value of λ for the case of ex ante homogeneous managers is 0.58.

⁸Notice that, indeed, $e < s_m/\rho$ is equivalent to $\alpha > v/(1 - \lambda_l) + \rho\theta$, which confirms that all firms are weak whenever this condition is not satisfied.

⁹Notice that the expressions for w^r , e , and r obtained here, reduce to those obtained for the case of ex ante homogeneous managers if $\rho = 0$ and $\lambda_l = \lambda$.

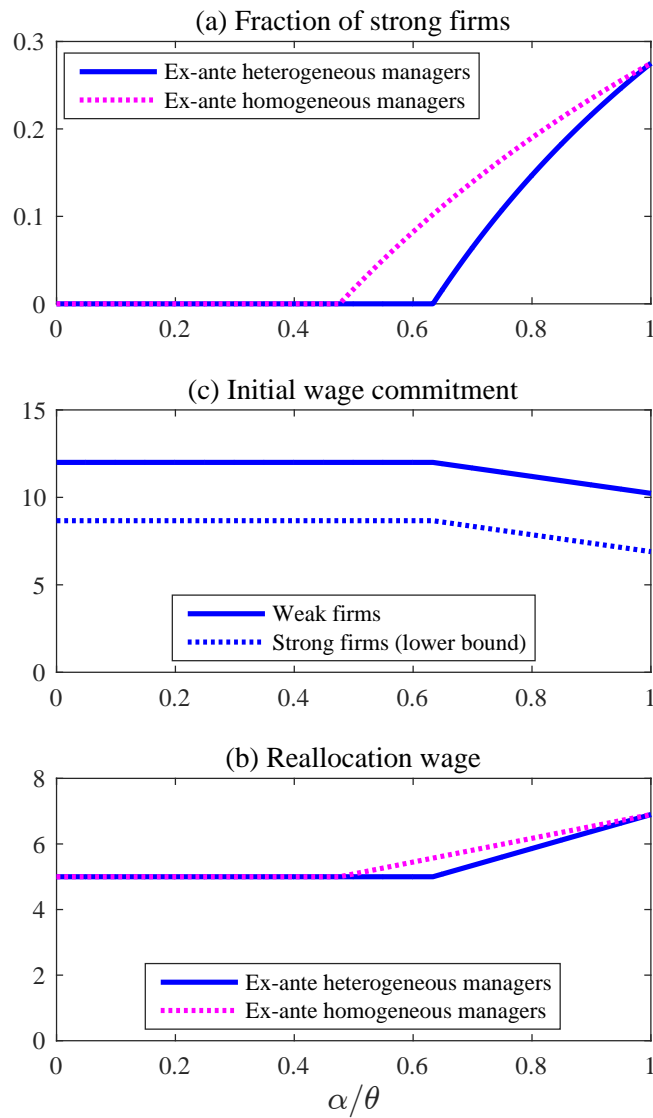


Figure B.2: Equilibrium with Pareto-distributed firm size.

Panel (a) of Figure B.2 shows the fraction of strong firms as α becomes a larger percentage of θ . All firms are weak for low value of α , but eventually the fraction of strong firms becomes positive and increasing in α . Notice that the fraction of strong firms is never larger with ex ante heterogeneous managers. To gain intuition, consider that the mass of talented managers is the same in the two scenarios, but talent is partially sorted out and properly assigned in the initial labor market when managers are ex ante heterogeneous. In this case, and differently from the situation where managers are initially indistinguishable, the firms that hire talented managers at the beginning do not need to invest in strong governance, so the resulting percentage of strong firms tend to be smaller.

On the other hand, the equilibrium wage in the reallocation market, shown in Panel (c), is never larger when managers can be partially sorted out at the beginning. In this case, in fact, only firms with a relatively smaller willingness to pay for general managerial skills (i.e., smaller firms) participate in the reallocation phase, so the equilibrium pay for talent is also smaller. In any case, however, the willingness to pay for outside talented hires increases with α , and so does the market clearing wage in the reallocation market. Finally, Panel (b) shows what happens to the initial wage for talented managers. The firms that hire a talented manager at the beginning are all weak, and the wage they pay eventually decreases in α , reflecting that the willingness to pay for firm specific human capital diminishes as the relative importance of general skills increases.

B.4 Remaining proofs

Proof of Proposition B.1. To show the first statement after the definition of (B.12), notice that we can write

$$\pi(1, \lambda | s, \mathbf{w}) - \pi(0, \lambda | s, \mathbf{w}) = P(\mathbf{w}) \mathbb{1}_{\lambda=\lambda_h} + (1 - \lambda)(\alpha s - w^r)^+ - v s. \quad (\text{B.22})$$

Consider first $\lambda = \lambda_l$. Clearly, (B.22) is nonpositive, independent of s and \mathbf{w} if $\alpha \leq v/(1-\lambda_l)$. It follows that choosing $g = 0$ is optimal for any firm hiring λ_l in this case. On the other hand, if there is a firm hiring λ_h that chooses $g = 1$ in equilibrium, (B.9) implies $P(\mathbf{w}) \leq 0$. Now, if $\alpha \leq v/(1-\lambda_h)$, then $\pi(1, \lambda_h | s, \mathbf{w}) < \pi(0, \lambda_h | s, \mathbf{w})$ for all s and \mathbf{w} . This is a contradiction showing that any firm hiring λ_h chooses $g = 0$ in this case. Consider now the second statement. If $\alpha > v/(1-\lambda)$ and conditional on hiring a manager of type λ , an inspection of (B.22) immediately reveals that the optimal choice of governance is $g = 0$ if $s \leq e(\lambda, \mathbf{w})$ and is instead $g = 1$ if $s > e(\lambda, \mathbf{w})$. Moreover, it can be checked that if $\alpha > v/(1-\lambda_h)$, then $\pi(1, \lambda_h | s, \mathbf{w}) > \pi(1, \lambda_l | s, \mathbf{w})$ for any firm whose size is above

$$\max \left\{ \max_{\lambda} e(\lambda, \mathbf{w}), \frac{\lambda_h w^{i,1} - \lambda_l w^r}{(\lambda_h - \lambda_l)(\theta - \alpha)} \right\},$$

which shows that hiring a manager of type λ_h with $g = 1$ is indeed the equilibrium choice for some firm. It follows from (B.9) that $P(\mathbf{w}) \leq 0$, which in turn implies $e(\lambda_l, \mathbf{w}) < e(\lambda_h, \mathbf{w})$. \square

Proof of Proposition B.2. This result can be proved by showing that if in equilibrium a firm of size s' prefers hiring a manager of type λ_h , so does any firm of size $s'' > s'$. To this end, let $g(\lambda, s)$ denote the optimal governance choice of a firm of size s hiring a manager of type λ , as described in Proposition B.1. $g(\lambda, s)$ also depends on \mathbf{w} but, to simplify notation, this dependence is not explicitly displayed. Define the profit differential

$$\Delta\pi(s, \mathbf{w}) = \pi(g(\lambda_h, s), \lambda_h | s, \mathbf{w}) - \pi(g(\lambda_l, s), \lambda_l | s, \mathbf{w}). \quad (\text{B.23})$$

Standard arguments ensure that (B.23) is continuous in s , for any feasible \mathbf{w} . Clearly, given \mathbf{w} , λ_h is a better initial hire than λ_l for a firm of size s if and only if $\Delta\pi(s, \mathbf{w}) > 0$. Notice that in any size range where $g(\lambda_h, s) = g(\lambda_l, s) = \hat{g}$, if (B.23) is positive for a certain s , then

its expression reduces to

$$(\lambda_h - \lambda_l)(\theta - \hat{g}\alpha)s + \kappa(\hat{g}, \mathbf{w}),$$

where $\kappa(\hat{g}, \mathbf{w})$ is a term that is independent of s . So if $\Delta\pi(s, \mathbf{w}) > 0$ for some s , it must also increase linearly for any larger s for which $g(\lambda_l, s) = g(\lambda_h, s) = \hat{g}$. On the other hand, Proposition B.1 implies that the only possibility for $g(\lambda_l, s)$ to be different from $g(\lambda_h, s)$ is that $g(\lambda_l, s) = 1$ and $g(\lambda_h, s) = 0$. This can only happen if $\alpha > v/(1 - \lambda_l)$, in which case it occurs for all $s > e(\lambda_l, \mathbf{w})$ if $\alpha \leq v/(1 - \lambda_h)$, and for s between $e(\lambda_l, \mathbf{w})$ and $e(\lambda_h, \mathbf{w})$ if $\alpha > v/(1 - \lambda_h)$. In any case, whenever $g(\lambda_l, s) \neq g(\lambda_h, s)$, if (B.23) is positive at a certain s , then its expression reduces to

$$(\theta(\lambda_h - \lambda_l) - (\alpha(1 - \lambda_l) - v))s - P(\mathbf{w}) + (1 - \lambda_h)w^r. \quad (\text{B.24})$$

Now, if (B.24) is nondecreasing in s , i.e., $\theta(\lambda_h - \lambda_l) \geq \alpha(1 - \lambda_l) - v$, the profit differential $\Delta\pi(s, \mathbf{w})$ (weakly) increases with s as soon as it turns positive, independent of whether or not $g(\lambda_l, s)$ is equal to $g(\lambda_h, s)$. This implies that if in equilibrium a firm of size s' prefers hiring λ_h , i.e., $\Delta\pi(s', \mathbf{w}) > 0$, so does any firm of size $s'' > s'$, i.e., $\Delta\pi(s'', \mathbf{w}) > 0$ too. Assume now that (B.24) decreases in s , and notice that this implies

$$v < \alpha(1 - \lambda_l) - \theta(\lambda_h - \lambda_l) < \alpha(1 - \lambda_h).$$

Proposition B.1 in turn implies that $g(\lambda_l, s) \neq g(\lambda_h, s)$ only occurs on the range of s between $e(\lambda_l, \mathbf{w})$ and $e(\lambda_h, \mathbf{w})$ in this case. Now, if only firms of size $s > e(\lambda_h, \mathbf{w})$ hires λ_h in equilibrium, Proposition B.1 implies that $g(\lambda_l, s) = g(\lambda_h, s) = 1$ for any $s > e(\lambda_h, \mathbf{w})$, so the profit differential $\Delta\pi(s, \mathbf{w})$ either is nonpositive or is increasing in s , which in turn implies positive assortative matching at the beginning. Assume instead that some firm of size $s \leq e(\lambda_h, \mathbf{w})$ hires a manager of type λ_h in equilibrium, and notice that λ_h is the optimal

initial hire also for firms of size $s > e(\lambda_h, \mathbf{w})$ that are larger than

$$\frac{\lambda_h w^{i,1} - \lambda_l w^r}{(\lambda_h - \lambda_l)(\theta - \alpha)}.$$

Hence, Proposition B.1 implies that there are both weak and strong firms hiring λ_h . It follows from (B.8) and (B.9) that $P(\mathbf{w}) = 0$, and in this case it is possible to check that (B.24) evaluated at $s = e(\lambda_h, \mathbf{w})$ has the same sign as $(\lambda_h - \lambda_l)(\theta - \alpha)$, and is therefore positive. Hence, (B.24) must be positive for all $s \in (e(\lambda_l, \mathbf{w}), e(\lambda_h, \mathbf{w}))$, because on this range it is assumed to be decreasing in s . This shows that the only possibility for $\Delta\pi(s, \mathbf{w})$ not to be increasing in s after having turned positive, is that it decreases in s on the range $(e(\lambda_l, \mathbf{w}), e(\lambda_h, \mathbf{w}))$, which must be bounded in this case. However, whenever this happens, $\Delta\pi(s, \mathbf{w})$ must be positive for all $s \in (e(\lambda_l, \mathbf{w}), e(\lambda_h, \mathbf{w}))$. This implies that if $\Delta\pi(s, \mathbf{w})$ is positive for some s , it will stay positive for any larger size. Hence, the initial assignment displays positive assortative matching in equilibrium and, as a result, the initial market clearing condition (B.10) boils down to (B.13). \square