

Performance Pay, CEO Dismissal, and the Dual Role of Takeovers*

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August, 2013

Abstract

We propose that an active takeover market provides incentives by offering acquisition opportunities to successful managers. This allows firms to reduce performance-based compensation and can rationalize loss-making acquisitions. At the same time, takeovers remain a substitute for board dismissal in the replacement of poorly performing managers. When choosing its acquisition policy and the quality of its board, each firm ignores the adverse effect on other firms' acquisition opportunities and takeover threat. As a result, the takeover market is not sufficiently liquid and too few takeovers occur. Furthermore, the liquidity in the takeover and managerial labour markets are inversely related. When poaching successful managers becomes more profitable, firms invest more in their internal governance which in turn reduces the incidence of takeovers.

JEL Classification: G34

Keywords: Takeover, board interference, CEO turnover, compensation.

*We would like to thank Catherine Casamatta, Brandon Chen, Nicola Gennaioli, Denis Gromb, Alexander Guembel, Camelia Kuhnen, Matthew Rafferty, Andrei Simonov, Per Strömberg, and seminar and conference participants at the Edwards Symposium on Corporate Governance 2010, the 2010 EFA Meeting, the 2010 ESSFM, the 2010 FIRS Conference, the Fourth CEPR-Bank of Italy conference, the 2010 ECCCS workshop in Lille, the Research Institute of Industrial Economics (IFN), the Stockholm School of Economics and the Toulouse School of Economics for helpful comments and suggestions. Financial support from the Jan Wallander and Tom Hedelius foundations is gratefully acknowledged.

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1 Introduction

An active takeover market is commonly considered to create value by redeploying corporate assets. A plethora of empirical studies documents that target shareholders as well as target and acquiring shareholders taken together benefit from takeovers (Andrade et al., 2001). Moreover, an active market for corporate control also affects managerial behaviour. In particular, the threat of a takeover is seen to discipline incumbent managers, thereby reducing agency costs (Jensen, 1988; Scharfstein, 1988).¹

This paper takes a new look at the incentive implications of takeovers. While extant theoretical and empirical work emphasizes the risk of being a target, we draw attention to the flip side, namely, the prospect of acquiring another firm. We posit that the market for corporate control shapes managerial incentives through two channels: the takeover threat and the acquisition opportunity. Taking both these sides into account, we derive the optimal acquisition policy and internal governance in a single-firm setting. We also analyse how the firms' governance choices interact with the liquidity in both the takeover and managerial labor markets.

Specifically, we consider a simple two-period moral hazard model in which a firm hires a manager whose ability is unknown to all parties. First-period performance is a function of both managerial effort and ability. Second-period performance depends only on ability, and dismissing an incompetent manager increases expected second-period profits. A manager deemed competent retains her job for the second period and may, in addition, have the opportunity to acquire another firm. Managers are induced to exert effort explicitly through performance-based compensation and implicitly through future private benefits. Since managers enjoy more private benefits from running larger firms, acquisition opportunities provide (additional) incentives. This, in turn, mitigates moral hazard and the need to offer performance-based compensation. Thus, the market for corporate control can benefit shareholders even in the absence of disciplinary takeovers, that is, even if incompetent managers are never retained.

This insight has implications for firms' acquisition policies. When shareholders, or the board of directors, on their behalf, decide on an acquisition budget, they face a trade-off: On the one hand, more funds enable the manager to undertake an unprofitable, or more unprofitable, takeover. On the other hand, a larger budget increases the chance of making an acquisition and therefore provides more incentives. Due to the latter effect, the optimal acquisition budget never permits only profitable acquisitions but always allows for some unprofitable takeovers as well. Contrary to the literature on empire building (Jensen 1986), in the present paper acquisitions are a remedy rather than a source of incentive problems. Since our model assumes that shareholders can limit the acquisition

¹However, the literature also points out potential inefficiencies of takeover threats. For instance, Stein (1988) and Shleifer and Summers (1988) argue that takeover pressure can lead to distorted investment decisions.

budget, takeovers against their best interest do not occur in equilibrium. Our model predicts an inverse relation between (managerial discretion over) the acquisition budget and (performance-based) CEO pay, and worse acquisition performances for firms with larger budgets.²

For the sake of clarity, we derive the acquisition opportunity effect in a simplified setting in which disciplinary takeovers play no role since incompetent managers are always dismissed by the board. To provide a more comprehensive analysis we extend the framework in two ways: First, we let the firm choose the quality of its internal governance, modelled as the probability that an incompetent manager is dismissed by the board. Second, a firm can be a potential acquirer or target, depending on its first-period performance. The takeover market then plays a dual role in reducing moral hazard, rewarding successful managers with acquisition opportunities and disciplining underperforming ones. We also explore the interaction between takeover market and board quality. In our model, takeovers and boards are substitutes with respect to dismissing poorly-performing managers and jointly determine managerial turnover. More takeover pressure crowds out costly internal governance, possibly even to the extent that it reduces overall turnover risk for managers.

Next, we show how governance externalities can arise through interactions in the takeover market. To this end, we consider a large number of ex ante identical firms whose role in the takeover market depends on their first-period cash flows. Poorly performing firms become potential targets and well-performing firms are potential acquirers. In equilibrium, firms choose too much board interference (quality) and too small acquisition budgets. On the one hand, each firm fails to internalize the fact that improvements in board quality reduce the acquisition opportunities for other firms. On the other hand, each firm does not take into account that a larger budget would strengthen the takeover threat to other firms and discipline their managers.

In the last part of the paper we introduce a market for scarce managerial talent. After the first period, a firm may poach a competent manager from another firm instead of hiring a random replacement. Importantly, only well-governed firms can compete for managerial talent since poorly governed firms do not dismiss their manager. The possibility of poaching encourages board interference because it increases the returns from dismissing an incompetent manager. While this raises the demand for managerial talent, it also reduces the supply of targets in the takeover market. Hence, the liquidity in the takeover and managerial labour markets move in opposite directions. Finally, we show that competition for managerial talent may lead to overinvestment in board quality and reduce aggregate shareholder welfare. From a social planner's perspective poaching is a zero sum game since competent managers are equally productive in all firms.

²Harford (1999) finds that high-cash firms make more acquisitions than other firms and that those acquisitions have lower announcement returns.

Our paper is related to theoretical work on takeovers, boards of directors, and governance spillovers. While takeovers are but a threat to incumbent managers in existing takeover models, we argue that they are also opportunities that offer implicit incentives. The importance of implicit incentives was first recognized by Fama (1980) and Holmström (1982). Rather than analysing CEO incentives driven by career concerns, we explore the incentive effect of acquisition opportunities (and takeover threat). To fully exploit the implicit incentives of acquisitions in our model, the manager must be given the discretion to also undertake some loss-making acquisitions. This builds on the idea that managerial autonomy comes with both costs and benefits, as in Almazan and Suarez (2003), Burkart et al. (1997), and Pagano and Roell (1998). In these studies, discretion increases managerial rents ex post, which in turn provide incentives ex ante. We employ the same trade-off and implement managerial discretion through the budget policy. In contrast, Burkart et al. (1997) and Pagano and Roell (1998) ensure managerial discretion through partial ownership dispersion, whereas Almazan and Suarez (2003) rely on weak boards to commit to a lenient firing policy.³ In our model, a weak board exacerbates the agency conflict within the firm but creates an acquisition opportunity, thereby mitigating agency problems in other firms.

Ferreira et al. (2011) also allow the takeover market to remove an incompetent manager if the board fails to intervene; however, a takeover occurs in their model only if the stock price is informative. This creates a link between stock price informativeness and board monitoring which is the focus of their analysis. We abstract from information revealed through stock prices. Our study further differs from that of Ferreira et al. (2011) by exploring the dual role of takeovers, the joint impact of board dismissal and takeovers on managerial turnover, and the interaction between takeover and managerial labour markets.

Finally, some recent papers study the interaction between firms' choices of corporate governance. Acharya and Volpin (2010) and Dicks (2012) identify an externality that operates through the managerial labour market. All firms, irrespective of the quality of their governance, compete for scarce managerial talent at the initial hiring stage. To incentivize managers, firms with weaker governance offer more generous compensation packages. To remain attractive employers, other firms also must pay high(er) salaries. In equilibrium, firms underinvest in corporate governance because they ignore the negative effect of weak governance on other firms' profits. In our model, only well-governed firms can compete for managerial talent. The possibility of poaching increases the private returns from board interference. But poaching has no social value since it is a zero sum game. On the contrary, by encouraging board interference, competition for managerial

³Adams and Ferreira (2007) provide an alternative argument in favour of weak boards. In their model, the board performs the dual role of monitoring and advising the CEO. Close board monitoring may not be desirable, because it makes the manager reluctant to share private information, thereby compromising the board's advisory role.

talent reduces the liquidity of the takeover market and diminishes acquisition opportunities. Hence, in equilibrium firms overinvest in corporate governance. Cheng (2011) explores governance spillovers in a setting where relative performance evaluation provides incentives for managers to manipulate earnings. Our model differs from his, since governance externality operates through the takeover and the managerial labour markets rather than through relative performance evaluation.

The remainder of this paper is organized as follows. Section 2 presents the basic model. Section 3 develops the acquisition opportunity effect. Section 4 analyses the interactions between takeovers and board interference and their implications for CEO turnover and compensation. Section 5 studies the link between firm governance arrangements and takeover market outcome. The interaction between takeovers and managerial labour market is explored in Section 6. Concluding remarks are presented in Section 7. All mathematical proofs are in the Appendix.

2 Model

We consider a moral hazard problem with two periods of production. A firm hires a manager who is either competent or incompetent. As in Holmström (1982) or Gibbons and Murphy (1992), the manager's type $\theta \in \{\underline{\theta}, \bar{\theta}\}$ is initially unknown, even to her. All parties hold the common prior $p \in (0, 1)$ that the manager is competent ($\theta = \bar{\theta}$). Everyone is risk neutral and there is no discounting.

Once hired, the manager chooses an unobservable effort $e \in \{e_l, e_h\}$. She enjoys private benefits Z_1 if she exerts low effort ($e = e_l$). At the end of the first period, a cash flow $X_1 \in \{0, X_1^H\}$ is realized that is contractible and depends on both managerial ability and effort. Let $q_i(\theta) = \Pr[X_1 = X_1^H \mid e_i, \theta]$ denote the probability of a high cash flow given managerial ability θ and effort e_i .

Assumption 1 $q_l(\underline{\theta}) = q_h(\underline{\theta}) = q_l(\bar{\theta}) = 0$

A manager generates a high cash flow only if she works and is competent. A richer technology where sometimes a competent manager fails despite high effort or an incompetent manager succeeds would not qualitatively change our results. Shareholders receive the cash flow X_1 net of any wage paid to the manager.

If the manager is retained after the first period, she receives private benefits $Z_2 > 0$ and produces a second-period cash flow $X_2 \in \{0, X_2^H\}$, which only depends on her ability. A competent manager produces $X_2 = X_2^H$, whereas an incompetent manager produces 0. A retained manager finds a potential takeover target with probability χ , which she can acquire if she has sufficient funds. (The parameter χ is for the time exogenous but will be endogenized in Section 5.) The acquisition budget is part of the contract that

the manager accepts at the outset (see below). Following a successful bid, the manager enjoys additional private benefits $\Delta Z_2 > 0$ from running a larger firm in the second period. Such private benefits can come in many guises. For instance, managers are able to foster their prestige and influence through acquisitions. Avery et al. (1998) find that managers who undertake acquisitions are more likely to become board members in other firms. Meneghetti and Williams (2012) show that firms which are close to inclusion in the *Fortune 500* ranking are significantly more likely to make acquisitions. Their interpretation is that managers increase the size of their firms to enjoy the prestige of being a *Fortune 500* firm.

Let $X_2^a \in \{0, X_2^H\}$ be the gross return to acquiring shareholders from a successful takeover that is determined by the ability of their manager: If she is competent ($\theta = \bar{\theta}$), the gross return is X_2^H . If she is incompetent ($\theta = \underline{\theta}$), the second-period cash flow is zero. Hence, the firm simply doubles its scale with an acquisition. For simplicity, we abstract from incentive or coordination problems in the acquisition process and assume a (for now exogenous) purchase price $P^a \leq X_2^H$. Besides the price, a successful transaction imposes a takeover (or retooling) cost c . The cost c is random and drawn from a commonly known uniform distribution function $F(c)$ on $[0, \bar{c}]$; its realization is publicly observed prior to the takeover bid. The purpose of the random cost is to introduce uncertainty about takeover profitability, which is more convenient than letting the target cash flow be random for a given managerial ability.

If the manager is dismissed at the end of the first period, a new manager of unknown ability is hired and the expected second-period cash flow is pX_2^H . For simplicity, a newly hired manager cannot undertake an acquisition. This assumption can be relaxed without qualitatively affecting our results.

Throughout the paper, we assume that the board makes decisions on behalf of the shareholders and does so in their best interest. At the hiring stage, the board offers the manager a contract comprising a compensation scheme and an acquisition budget. The compensation scheme stipulates payments to the manager contingent on the firm's cash flow. Since the manager takes no actions in the second period, there is no role for second-period wage payments. Let (w_H, w_L) denote the payments in case of first-period success or failure, neither of which can be negative.

The manager has complete discretion over the budget when attempting a takeover. The budget is contingent on first-period performance. Let (L_H, L_L) be the non-negative budgets in case of first-period success or failure, respectively. The manager can only carry out a takeover if the budget covers the total acquisition cost $c + P^a$.⁴ Suggestive evidence for the deliberate design of acquisition budgets is presented in Almazan et al.

⁴From the condition $L \geq c + P^a$, it is clear that contracting on an acquisition budget is equivalent to contracting on a cut-off rule for the cost c . More generally, we can allow the parties to contract on all variables except for the effort choice.

(2010), who study the influence of acquisition opportunities on financial policies. Using firm location as a measure of acquisition prospects, the authors find that firms located in industry clusters maintain more financial slack.⁵

To sum up, the timing of the game is as follows: (i) The parties sign a contract (w_H, w_L, L_H, L_L) and the manager chooses an unobservable effort level $e \in \{e_l, e_h\}$. (ii) First-period cash flow $X_1 \in \{0, X_1^H\}$ is realized and publicly observed. (iii) The board decides to retain or dismiss the manager. (iv) If retained, the manager finds a potential takeover target with probability χ , in which case (c, P^a) is publicly observed. (v) A takeover may or may not occur and second-period cash flow is realized.

Finally, we want to ensure that shareholders always find it optimal to induce high effort.

Assumption 2 $p [X_1^H + (1 - p)X_2^H] \geq Z_1$.

High effort is surely in the shareholders' interest if the disutility of the effort is smaller than its expected benefits. A high effort not only is a prerequisite for a high cash flow in the first period, but also may allow to infer the manager's ability (whereas nothing is learned if the manager exerts low effort). Hence, high effort increases the expected payoff in the second-period by $(1 - p)X_2^H$. The assumption is stricter than necessary, since it abstracts from the manager's future private benefits and the potential gains from an acquisition.

Reflecting the increased importance of transferable managerial skills, as opposed to firm-specific human capital (Murphy and Zabojnik, 2007), competence in our model refers to general skills. If a manager proved her competence in one firm, she can also successfully manage a target firm. This modelling choice has two implications. First, it makes takeovers a more effective incentive device, compared to a setting where managerial competence is firm-specific. Second, competent managers with transferable skills are attractive to all firms that are currently run by incompetent managers. In Section 6 we introduce a managerial labour market in which firms can compete for competent managers.

3 Acquisitions and CEO Incentives

This section analyses the optimal compensation scheme and acquisition policy for a given purchase price and probability of finding a potential target. To start with, suppose the

⁵Anecdotal evidence further supports the idea that firms choose to leave financial slack to management for future acquisitions. In its 2012 annual report Cisco System, Inc. writes: "We expect to make future acquisitions. (...) We believe that our strong cash and cash equivalents and investment position allows us to use cash resources (...) for acquisitions."

manager's incentive compatibility constraint is satisfied. Given that the manager exerts high effort, the first-period cash flow perfectly reveals her ability. Hence, the posterior belief that the manager is competent $p(X_1)$ equals one following good performance and zero following poor performance.

The firing decision after the first period influences firm value in two ways. It determines the ability of the manager in the second period and thus X_2 (ex post effect). In addition, it affects the manager's incentive to exert effort, because she receives private benefits if retained (ex ante effect). It is straightforward to see that the optimal firing policy is to dismiss the manager unless $X_1 = X_1^H$. An incompetent manager never produces positive profits in the second period, whereas hiring a new manager generates expected cash flow of pX_2^H .⁶ Furthermore, it is also optimal to punish poor performance from an ex ante perspective. Given that poor performance triggers dismissal, the choice of the corresponding budget L_L is immaterial and is subsequently ignored. The only caveat against retaining a successful manager is the risk that she will subsequently incur excessive losses in an acquisition. Indeed, a manager always favours an acquisition because of the additional private benefits ΔZ_2 . However, the board, on behalf of shareholders, can avoid (very) poor acquisitions through a tight(er) acquisition budget.

A retained manager finds a target with probability χ . Provided that the acquisition budget exceeds the total cost ($L_H \geq c + P^a$), she purchases the target and gets additional private benefits ΔZ_2 . Let $\rho^a(L_H) \equiv \chi F(L_H - P^a)$ denote the probability that the manager makes a successful acquisition and $\pi^a \equiv E[X_2^H - c - P^a]$ denote the shareholders' expected net profit from a takeover, given that the manager has found a target and has sufficient funds.

Having established the optimal firing policy, we can derive the contract offered at the outset of the game. By Assumption 2, shareholders find it optimal to induce high effort. Since it is never beneficial to reward poor performance, wages are set to zero in case of a low first-period cash flow ($w_L = 0$). Hence, the shareholders' expected payoff simplifies to

$$p [X_1^H - w_H + X_2^H + \rho^a(L_H)\pi^a] + (1 - p)pX_2^H.$$

With probability p , the manager turns out to be competent and produces a first-period profit of X_1^H net of her wage plus X_2^H in the second period. In addition, shareholders receive an expected acquisition return $\rho^a(L_H)\pi^a$. With probability $(1 - p)$, the manager is incompetent and the expected second-period cash flow under the newly hired manager is pX_2^H . The manager's incentive compatibility constraint is

$$p [w_H + Z_2 + \rho^a(L_H)\Delta Z_2] \geq Z_1.$$

⁶Cornelli et al. (2013) find that boards fire CEOs once they come to view them as incompetent.

If the manager works and turns out to be competent, she receives expected private benefits $Z_2 + \rho^a(L_H)\Delta Z_2$ in addition to her (non-negative) wage w_H . Recall that the manager does not know her own type when choosing her effort.

We assume that the manager has a reservation utility equal to zero. Together with the assumption of a positive wage, this allows us to ignore her participation constraint. A more general setting would allow for risk aversion and a positive outside option, which may lead to a binding participation constraint. In this case, the optimal compensation scheme would include a fixed payment in addition to the performance-based reward w_H . While we assume throughout that the participation constraint is slack, we henceforth interpret the wage w_H as the performance-based component of the compensation scheme rather than the overall level.

Since the shareholders' objective function is decreasing in w_H , the above incentive constraint determines the optimal wage unless the constraint $w_H \geq 0$ is binding. To focus on the case where the incentive constraint is binding, we impose the following assumption:

Assumption 3 $Z_1 > p(1 + \Delta)Z_2$.

Given that monetary incentives are necessary to ensure effort provision, the following result holds.

Lemma 1. *The optimal performance-based wage is*

$$\tilde{w}_H = \frac{Z_1}{p} - \left[1 + \rho^a(\tilde{L}_H)\Delta\right] Z_2 \quad \text{and} \quad \tilde{w}_L = 0,$$

and the optimal acquisition budget for a successful manager is

$$\tilde{L}_H = X_2^H + \Delta Z_2.$$

Shareholders have two “currencies” to compensate the manager, money and future private benefits. The wage is increasing in private benefits from shirking, whereas future private benefits (ΔZ_2) serve as an implicit incentive to exert effort. In particular, the takeover market provides incentives by offering additional private benefits with probability $\rho^a(\tilde{L}_H)$ and thereby allows to lower the wage. This positive incentive effect arises because first-period success is a prerequisite for an acquisition. The optimal acquisition budget corresponds to the shareholders' maximum willingness to pay for a target. It equals the sum of the shareholders' gross return and the manager's private benefits. From the shareholders' perspective, the private benefits are a free by-product of an acquisition that can be used to lower compensation. Hence, their willingness to pay for an acquisition increases one-for-one with ΔZ_2 . If private benefits were random rather than deterministic, the shareholders' willingness to pay for a target would still exceed their

gross return X_2^H .

The above simple contract is not the unique way of eliciting effort, but there is no other contract which implements effort at a lower expected cost. Even if we allowed for more elaborate contracts, the wage \tilde{w}_H remains optimal. For example, shareholders could induce high effort at the same expected cost by combining the wage w_H with an acquisition bonus or a second-period wage. However, shareholders cannot do better with such a contract. Importantly, the optimal acquisition policy \tilde{L}_H is unique and part of any optimal contract irrespective of the compensation scheme. The intuition is that any optimal contract fully exploits the fact that acquisitions create private benefits as a by-product and thus incentivize the manager.⁷

Proposition 1. *The market for corporate control provides managerial incentives even in the absence of disciplinary takeovers.*

The common view of takeovers emphasizes the benefits of contestability. For instance, Jensen (1988) argues that (the prospects of) disciplinary takeovers reduce agency conflicts and improve performance. In the above setting, there is no need for an external disciplinary mechanism since an incompetent manager is always dismissed by the board. Still, the market for corporate control benefits shareholders by reducing agency costs through acquisition opportunities. Compensation is decreasing in the acquisition probability $\rho^a(\tilde{L}_H)$ and in the private benefits from running a larger firm ΔZ_2 . Hence, \tilde{w}_H is lower if a manager has more financial resources under her control.

The acquisition opportunity effect also arises in more general settings with possibly binding outside options, since it relaxes both the incentive constraint *and* the participation constraint. Note that this does not hold for the disciplinary effect of takeovers. While a stronger takeover threat provides additional incentives, it may violate the manager's participation constraint by reducing expected private benefits. Furthermore, the acquisition opportunity effect is also more broadly applicable. The prospect of undertaking other types of investments, such as green field or research and development, also provides incentives as long as these investments are associated with private benefits.

Identifying empirically the acquisition opportunity effect is difficult, since it usually operates jointly with the takeover threat effect. For instance, changes in state antitakeover regulation affect both acquisition opportunities and takeover threat. Consequently, observed changes in, say CEO pay, cannot easily be attributed to one or the other effect. One fruitful way to disentangle the two effects may be to exploit geographical concentration of industries in different states. If an industry is concentrated in a state that passes

⁷If the wage would be contingent on performance and acquisition, the budget $X_2^H + \Delta Z_2$ would also from the shareholders' perspective be ex post optimal. With such a compensation scheme the manager's wage is reduced by ΔZ_2 whenever an acquisition is made, and an acquisition is ex post profitable as long as $X_2^H + \Delta Z_2 \geq P^a + c$. Note, however, that such a compensation scheme entails - rather unrealistically - an acquisition malus.

an antitakeover law, acquisition opportunities are reduced for all firms, but especially so for industry peers. Another approach to identifying the acquisition opportunity effect is to study how CEO pay reacts when potential target firms adopt anti takeover provisions.⁸ An alternative to using antitakeover measures may be to follow the approach of Bertrand and Schoar (2003) who classify CEOs by different management styles. Among others, they identify managers with high levels of acquisition activity. Our model would predict that such managers should receive lower performance-based compensation in the early stages of their career relative to other groups. Finally, an alternative is to explore settings other than the takeover market where the "more general" acquisition opportunity effect may operate such as, for instance, changed prospects for foreign direct investment due to deregulation in host countries.

From the shareholders' perspective, the ex post optimal budget equals X_2^H and only allows for profitable acquisitions. However, a more generous budget is in the shareholders' best interest.

Proposition 2. *The optimal acquisition budget also allows for ex post loss-making acquisitions ($\tilde{L}_H > X_2^H$).*

The optimal budget policy trades off the cost of a loss-making acquisition with the benefit of lower incentive pay. Since both effects are proportional to the acquisition probability $\rho^a(L_H)$, \tilde{L}_H does not depend on the acquisition probability. By taking future control benefits into account, the model provides a novel rationale for loss-making acquisitions.⁹ Such losses are partly compensated by lower CEO pay. Rather than being a symptom of weak corporate governance, acquisition losses are part of the optimal incentive scheme. As the maximum possible acquisition loss is ΔZ_2 , Proposition 2 is meant to apply to those acquisitions that result in relatively moderate losses to acquiring firms. It does not aim to explain deals that entail significant losses, or "wealth destruction on a massive scale" (Moeller et al., 2005). At the same time, losses are not an inevitable consequence of the budget policy. They only occur ex post if the realized total cost $c + P^a$ is larger than X_2^H and lower than \tilde{L}_H .

It ought to be pointed out that loss-making acquisitions are not a necessary condition for the acquisition opportunity effect (Proposition 1) to arise. Even if shareholders were to only allow for ex post profitable acquisitions ($\tilde{L}_H = X_2^H$), the market for corporate control still reduces agency conflicts through acquisition opportunities. However, such a policy would not allow shareholders to fully exploit the ex ante gains from acquisitions.

Proposition 2 implies that expected acquisition returns and performance-based compensation move in the same direction. An increase in ΔZ_2 lowers the wage and expected

⁸Admittedly, the adoption of anti takeover provisions is likely to affect not only the acquisition opportunities of other firms but also their risk of becoming a target (John and Kadyrzhanova, 2010).

⁹Alternative explanations include empire building (Marris, 1963), managerial overconfidence (Roll, 1986), and envy (Goel and Thakor, 2010).

acquisition returns. The latter follows because larger private benefits ΔZ_2 increase the probability of a loss-making acquisition as well as the loss acceptable to shareholders. Supportive evidence for these predictions is provided by two studies: Datta et al. (2001) find a positive relation between acquiring managers' equity-based compensation and the stock price reaction to acquisition announcements. Yang et al. (2011) document that banks whose CEOs have higher pay-for-performance sensitivity are less likely to undertake value-reducing acquisitions.¹⁰ To the extent that more performance-based compensation is also associated with a higher level of compensation, the prediction regarding losses is also consistent with Falato (2007), who documents a negative relation between the level of compensation and acquisition losses.

The career concerns literature argues that future private benefits are positively correlated with the manager's career horizon (Gibbons and Murphy, 1992). The larger future private benefits of young managers imply in our model that their salary is lower which is consistent with evidence reported by Gibbons and Murphy (1992). In addition, larger private benefits also translate into larger budgets for young managers, which in turn raises their chances of acquiring another firm. Yim (2010) documents that firms' acquisition propensity decreases with the age of the CEO.¹¹

Once effort has been exerted, the board would not want to provide funds in excess of X_2^H for an acquisition. Hence, a "wait-and-see" approach where the firm arranges acquisition financing ex post fails to implement the optimal acquisition policy. To guarantee that the manager can also undertake loss-making acquisitions, the board has to give her ex ante full discretion over sufficient resources. This is accomplished through the budget which serves as a commitment device. Note that the budget \tilde{L}_H is renegotiation proof in the sense that the manager cannot be bribed into accepting a lower acquisition budget ex post. Since a takeover occurs if and only if $X_2^H + \Delta Z_2 \geq P^a + c$, the budget maximizes the joint payoff of manager and (acquiring) shareholders. Hence, there is no scope for renegotiation.

The optimal budget policy can be implemented through the firm's financial structure. The firm always has sufficient funding or debt capacity to finance the acquisition budget \tilde{L}_H . Indeed, the total pledgeable income with an acquisition is $2X_2^H + X_1^H$ and the budget is $\tilde{L}_H = X_2^H + \Delta Z_2$. From Assumptions 2 and 3 it follows that $X_1^H + X_2^H$ is larger than ΔZ_2 which in turn ensures that $2X_2^H + X_1^H$ is larger than $X_2^H + \Delta Z_2$. There are different ways to implement the budget \tilde{L}_H . If the intermediate income is low ($X_1^H - \tilde{w}_H < \tilde{L}_H$), implementation requires additional funds beyond those generated internally. For example, at the hiring stage the firm can obtain a non-revocable credit line, amounting

¹⁰An alternative interpretation of their finding is that CEO pay is linked to long-run performance and thus depends on how well their acquisitions perform.

¹¹According to Yim (2010), the documented age effect cannot be explained by the selection of young CEOs by acquisition-prone firms, or by the effect of time-invariant CEO characteristics that may be cross-sectionally correlated with age.

to $\tilde{L}_H - X_1^H$, in combination with a commitment to leave the intermediate income in the firm. Indeed, chief financial officers consider funding certainty for acquisitions one of the main purposes of credit lines (Lins et al., 2010). Instead of using a credit line, the board can ex ante endow the manager with cash reserves or other liquid assets of the same amount. Conversely, if the intermediate income is larger than the optimal budget ($\tilde{L}_H < X_1^H - \tilde{w}_H$), funds must be pumped out of the firm to prevent the manager from incurring excessive acquisition losses. For instance, short-term debt of $X_1^H - \tilde{L}_H - w_H$ can reduce the resources under the manager's control.

4 Board Interference, Takeovers and CEO Turnover

This section extends the model in two ways to allow for the possibility of both internal governance failure and disciplinary takeovers. First, the firm now chooses the quality of its internal governance. Only if the firm is well governed, will the board dismiss a poorly performing manager. Second, disciplinary takeovers may step in when internal governance fails and remove a poorly performing manager. Thus, disciplinary takeovers and board interference are substitutes but do not operate simultaneously. The same qualitative results obtain if we were to allow well-governed firms to be takeover targets as well.

Like Ferreira et al. (2011), we model internal governance as choosing the probability that the board is able to dismiss the manager or not. Let $\tau \in [0, 1]$ be the probability that the firm is well governed, in which case the board can replace the manager at the interim date. Internal governance breaks down with probability $(1 - \tau)$, in which case board dismissal never occurs. The state or quality of governance is realized and becomes observable at the end of the first period. Before hiring the manager, shareholders choose the probability τ at a cost $K(\tau) = \frac{1}{2}k\tau^2$ with $k > 0$. To ensure an interior solution for the probability that the firm is well governed we impose a lower bound on the interference cost parameter.

Assumption 4 $k \geq pZ_2 + (1 - p)pX_2^H$.

The cost $K(\tau)$ can be interpreted literally as the resources spent on evaluating managerial performance (e.g., by installing a transparent accounting system). Strictly speaking, evaluating managerial performance is trivial in our setting because the simplifying Assumption 1 implies that first-period cash flow reveals in equilibrium managerial ability. However, our results also obtain in a richer framework where cash flow is a noisy signal, and performance evaluation would be non-trivial and costly. Alternatively, $K(\tau)$ can be understood as a measure of the conflict of interest between the board and shareholders. Failure to dismiss a poorly performing manager may be due to board members' lack of

independence, excessive workload, or simply the desire to avoid conflicts. A positive interference cost captures in reduced form the notion that board compensation and other incentive schemes cannot fully resolve the conflict of interest.

Clearly, the quality of the board only matters if the firm performs poorly. With probability $(1 - p)(1 - \tau)$ the firm is both poorly-performing and poorly-governed. In this case an acquirer shows up with probability ρ^t and offers to purchase the firm for a (for now exogenous) price P^t . We assume that this price is positive, implying that target shareholders always accept the offer. The target manager loses her position in the takeover.¹² With probability $(1 - p)\tau$ the firm is poorly-performing but well-governed. In this case the board dismisses the manager and a takeover never occurs. To highlight the incentive effects of takeovers, we also rule out the possibility that a firm with a high first-period cash flow can be acquired.¹³ Therefore, the outcome for well-performing firms remains unchanged: The manager is retained and makes an acquisition with probability $\rho^a(L_H)$. The extended model thus encompasses the base model as a special case with flawless internal governance ($k = 0$ and $\tau = 1$) and no takeover threat ($\rho^t = 0$).

We abstract from severance payments that are meant to induce incompetent managers to voluntarily leave.¹⁴ Introducing severance pay for voluntary departure would not qualitatively affect our results. Its primary impact would be to increase expected second-period cash flow whenever both governance mechanisms fail to remove an incompetent manager. However, severance pay would not affect managerial incentives to exert effort because it substitutes expected private benefits with expected cash payments. Furthermore, neither board interference nor disciplinary takeovers would be redundant as they reduce the need to offer costly severance pay.

We now solve for the optimal contract in the extended game. Since a poorly performing manager may escape dismissal, setting L_L equal to zero prevents her from making an acquisition. Given that it remains optimal to never reward failure ($w_L = 0$), the shareholders' maximization problem of the extended game is

$$\max_{w_H, L_H, \tau} p [X_1^H - w_H + X_2^H + \rho^a(L_H)\pi^a] + (1 - p)[\tau p X_2^H + (1 - \tau)\rho^t P^t] - \frac{1}{2}k\tau^2$$

subject to the incentive constraint

$$\begin{aligned} p [w_H + Z_2 + \rho^a(L_H)\Delta Z_2] + (1 - p)(1 - \tau)(1 - \rho^t)Z_2 \\ \geq Z_1 + (1 - \tau)(1 - \rho^t)Z_2 \end{aligned}$$

¹²Increased managerial turnover in target firms after the takeover has been documented by several studies (e.g., Kini et al., 2004; Martin and McConnell, 1991; Morck et al., 1989).

¹³Arguably, mergers among successful firms are likely to be (more) incentive neutral. Indeed, such mergers will not affect incentives in our model if each manager is equally likely to become CEO of the combined firm, implying a gain of ΔZ_2 , as to be demoted to divisional manager, implying a loss of $-\Delta Z_2$ private benefits.

¹⁴Severance pay in the case of forced departure would merely harden the manager's incentive compatibility constraint and accordingly reduce the shareholders' expected payoff.

and the constraints

$$w_H \geq 0 \quad \text{and} \quad \tau \in [0, 1].$$

The manager can now receive the private benefits Z_2 despite poor performance when both internal and external governance mechanisms fail (which happens with probability $(1 - \tau)(1 - \rho^t)$).

Lemma 2. *The optimal performance-based wage is*

$$w_H^* = \frac{Z_1}{p} - [\tau^* + \rho^t(1 - \tau^*) + \rho^a(L_H^*)\Delta] Z_2 \quad \text{and} \quad w_L^* = 0, \quad (1)$$

the optimal acquisition budget is

$$L_H^* = X_2^H + \Delta Z_2 \quad \text{and} \quad L_L^* = 0, \quad (2)$$

and the optimal board quality is

$$\tau^* = \frac{1}{k} \{p(1 - \rho^t)Z_2 + (1 - p)[pX_2^H - \rho^t P^t]\}. \quad (3)$$

The firm now has three means at its disposal to incentivize the manager. It can offer a monetary reward for good performance, provide funds for future acquisitions, and choose the quality of internal governance which translates into a dismissal threat following poor performance. Since the modifications only pertain to the contingency of poor performance, the optimal acquisition budget for competent managers remains unchanged. In contrast, internal governance failure now becomes a possibility due to the interference cost (Assumption 4). That is, the optimal board quality in equation (3) is strictly lower than one. Performance-based compensation is decreasing with the implicit incentives embedded in the acquisition opportunities and dismissal risk. The overall dismissal risk comprises the probability of being dismissed by the board, τ^* , and the risk of being taken over in case of internal governance failure, $\rho^t(1 - \tau^*)$. Thus, the takeover market plays now a dual role, rewarding performing managers with acquisition opportunities and disciplining the others. Both effects work in the same direction and lower performance-based pay.

Better board quality adds value by relaxing the incentive constraint. The expected pay reduction due to the threat of board dismissal is reflected in the term $p(1 - \rho^t)Z_2$ in equation (3). In addition, board dismissal of incompetent managers affects future cash flow. The effect is captured in the second term of equation (3): Upon poor performance, expected second-period cash flow is pX_2^H with board interference and $\rho^t P^t$ in case of an internal governance failure. Optimal board quality increases with the manager's private benefits Z_2 , since the dismissal threat becomes a more effective means for lowering

managerial pay. Higher future cash flow X_2^H and lower interference cost k also increase board quality. Higher board interference in turn reduces CEO compensation. Fahlenbrach (2009) finds that CEO performance-based pay in the United States is indeed lower in firms with higher board quality. In addition, Hallman et al. (2011) document that pay-for-performance sensitivity in real estate organizations is much higher for managers who face lower dismissal threats.

Rather intuitively, and as discussed in, for example, Hirshleifer and Thakor (1998), a more active takeover market discourages board interference.¹⁵ The takeover market weakens the incentive to exert board control for two reasons: First, the takeover threat relaxes the incentive constraint and thus obviates the board's disciplinary role. Second, the prospect of selling the firm reduces the ex post benefit from board interference.

Even though board interference and takeovers are substitutes, a greater takeover risk does not necessarily increase managerial turnover due to opposing effects: On the one hand, it makes it more likely that the manager is removed through a takeover when internal governance fails. On the other hand, greater takeover pressure discourages board interference, thereby indirectly lowering the dismissal threat. The relative strength of the two effects depends on the board quality. To distinguish between strong and weak boards we define the threshold level $\bar{k} = 2[pZ_2 + (1 - p)pX_2^H]$.

Proposition 3. *In firms with strong boards ($k \leq \bar{k}$), managerial turnover following poor performance is first decreasing and then increasing in the intensity of the takeover threat.*

If the board is strong and the takeover threat is low, internal governance failure is very unlikely. Hence, the (positive) direct effect of an increase in ρ^t on turnover risk is negligible and its (negative) effect on board incentives dominates. That is, overall turnover risk is decreasing in the takeover threat. Once the takeover threat is sufficiently large, the reverse holds. The negative effect on board incentives is of little consequence since the takeover market is likely to intercede.¹⁶ In the case of high interference costs ($k > \bar{k}$), board quality is low, irrespective of the intensity of the takeover threat. Therefore, an increase in the takeover threat always raises the overall dismissal risk because its adverse effect on board quality is smaller.

Proposition 3 is supported by Huang and Zhao (2009) who document that the sensitivity of CEO turnover to performance increases following the adoption of anti takeover legislation in firms with strong boards. Similarly, Huson et al. (2001) find increased frequencies of forced turnovers in the 1990s relative to the 1980s, despite the decline in hostile takeover activity.

¹⁵Gillan et al. (2006) find that firms with strong boards are more likely to have corporate charter provisions that impede takeovers. Kini et al. (1995) also provide evidence of the substitutability between takeovers and internal governance. The authors find that takeovers increase the dismissal risk for poor performance only in firms with weak (insider-dominated) boards.

¹⁶From the optimal wage equation (1) it follows that if turnover is non-monotonic in takeover pressure, so is performance-based compensation.

5 Market Outcome and Externality

This section goes beyond the single-firm partial equilibrium analysis and explores how firms' governance choices affect the outcome in the takeover market. We consider a continuum of ex ante identical firms with unit mass and a sufficiently large pool of managers who all play the game of the previous section. That is, firms simultaneously choose the quality of their board and then agree with a manager on performance-based pay and an acquisition budget. The probability of hiring a competent manager is p and independent across firms. After the managers' effort choices, first-period cash flows realize, board (non-)interference takes place, and the takeover market opens. As before, only poorly-performing firms with failed governance are, by assumption, potential targets, whereas $L_L = 0$ ensures that incompetent managers who escape being replaced cannot undertake an acquisition. Therefore, the proportions of potential acquirers and targets in equilibrium are p and $(1 - p)(1 - \tau)$, respectively.

We assume that the takeover market is plagued by frictions such that both ρ^a and ρ^t are always smaller than one. Besides being plausible, this assumption allows us to work with formal expressions that are independent of which side of the market is the short one.¹⁷ To this end, we impose the following matching technology. Firms are uniformly distributed on a circle. After the first period, an acquirer can only bid for the neighbouring firm to its right, if that firm is a target, that is, both poorly performing and poorly governed. The transaction price corresponds to a takeover premium that is equal to a fraction $\lambda \in [0, 1]$ of the gross takeover surplus.¹⁸ That is, $P = \lambda X_2^H$.

A firm's takeover probabilities ρ^a and ρ^t now depend on the acquisition policies, governance choices and first-period performances of other firms. Let \widehat{L}_H and $\widehat{\tau}$ be the acquisition budget (following success) and interference intensity of the representative firm in the economy, respectively. Then the probability that a firm is taken over following poor performance and internal governance failure is

$$\rho^t(\widehat{L}_H) = pF(\widehat{L}_H - P). \quad (4)$$

It simply equals the probability that the neighbouring manager to the left turns out to be competent and has sufficient funds ($L_H > c + P$). Importantly, the probability of being taken over increases in the acquisition budget of the representative firm, \widehat{L}_H . The probability that a successful manager can acquire the rival firm is

$$\rho^a(\widehat{\tau}) = (1 - p)(1 - \widehat{\tau})F(L_H - P). \quad (5)$$

¹⁷Our qualitative results, notably market externalities, do not rely on frictions, provided that each target (acquirer) does not keep being matched with acquirers (targets) until a favourable takeover cost is realized.

¹⁸The same qualitative results obtain for alternative price functions, for instance a takeover premium based on the net rather than the gross surplus.

While the risk of being taken over depends on the other firms' acquisition budget, the chance of taking over another firm, ρ^a , depends on other firms' internal governance $\hat{\tau}$. The probability of making an acquisition is decreasing in $\hat{\tau}$. Thus, a successful manager is less likely to face a potential target if the economy-wide level of internal governance increases.

It can easily be checked that there exists a unique, symmetric equilibrium in which all firms choose the same wage, budget and governance quality. The equilibrium coincides with the solution to the single-firm problem in Lemma 2 with the one, crucial difference that the takeover probabilities are now endogenous. That is, $\rho^{t*}(L_H^*)$ and $\rho^{a*}(\tau^*)$ are given by equations (4) and (5).

The equilibrium acquisition budget is

$$L_H^* = X_2^H + \Delta Z_2. \quad (6)$$

As discussed earlier, the trade-off that determines the optimal budget is independent of the takeover probabilities and thus of the actions in other firms. In particular, a firm's budget is independent of the level of board interference in other firms. As in the single-firm case, the equilibrium budget allows for some loss-making acquisitions.

In equilibrium, all firms choose the same intensity of board interference:

$$\tau^* = \frac{1}{k} \{p(1 - \rho^{t*})Z_2 + (1 - p) [pX_2^H - \rho^{t*}P]\} \quad (7)$$

Note that a firm's choice of board quality is affected by the budget policy of the representative firm through ρ^t . A reduction in the takeover probability - due to higher expected takeover costs - increases the equilibrium level of board interference.

The equilibrium performance-based wage is

$$w_H^* = \frac{Z_1}{p} - [\tau^* + \rho^{t*}(1 - \tau^*) + \rho^{a*}\Delta] Z_2 \quad (8)$$

Compensation depends on both the budget policy and board quality in other firms through the takeover probabilities. If other firms have more financial slack, they pose a greater takeover threat which lowers compensation. Better board quality in other firms diminishes acquisition opportunities and thus necessitates higher performance-based pay. Moreover, the other firms' budget policy has an indirect effect on compensation since it also alters the optimal level of board interference. Larger acquisition budgets in other firms raise the takeover threat which discourages board interference and thereby drives up compensation.

We now turn to the socially optimal outcome. The social planner is assumed to choose wages, acquisition budget, and board quality to maximize shareholder wealth

while abstracting from managers' payoffs.¹⁹ Let $E[X_2^H - c]$ denote the expected net surplus conditional on the occurrence of a takeover.

Lemma 3. *The socially optimal performance-based wage is*

$$w_H^o = \frac{Z_1}{p} - [\tau^o + \rho^{to}(1 - \tau^o) + \rho^{ao} \Delta] Z_2 \quad \text{and} \quad w_L^o = 0, \quad (9)$$

the socially optimal acquisition budget is

$$L_H^o = X_2^H + \Delta Z_2 + \frac{p}{1-p} Z_2 + P \quad \text{and} \quad L_L^o = 0, \quad (10)$$

and the socially optimal board quality is

$$\tau^o = \frac{1}{k} \left\{ p(1 - \rho^{to}) Z_2 + p \frac{\delta \rho^{ao}}{\delta \hat{\tau}} \Delta Z_2 + (1-p) [p X_2^H - \rho^{to} E[X_2^H - c]] \right\} \quad (11)$$

where ρ^{to} and ρ^{ao} are given by equations (5) and (6).

We discuss the solution to the social planner's optimization problem while comparing it to the equilibrium outcome in equations (6), (7), and (8). Since firms fail to internalize the impact of their budget and governance choices on other firms, the equilibrium outcome is not (constrained) efficient:

Proposition 4. *In equilibrium, acquisition budgets are too small ($L_H^* < L_H^o$) and there is excessive board interference ($\tau^o < \tau^*$).*

The difference between the socially optimal and the equilibrium acquisition budget is the third term in equation (10), $\frac{p}{1-p} Z_2 + P$. Equilibrium acquisition budgets are too low for two reasons: First, firms do not take into account the fact that (larger) budgets have a positive externality, since they increase the takeover threat for incompetent managers and thus reduce incentive pay in all firms. This externality is reflected in the term $\frac{p}{1-p} Z_2$. Second, acquiring firms appropriate only part of the takeover gains and therefore provide too little funding. That is, they ignore the payoff P that accrues to target shareholders. Only if all takeover gains accrue to the acquiring firm ($P = 0$) and the takeover threat plays no disciplinary role ($Z_2 = 0$), will the equilibrium budget in equation (6) coincide with the socially optimal one in equation (10). While equilibrium budgets also allow for some loss-making acquisition, acquisition policies are not permissive enough because firms ignore that higher budgets also discipline managers in other firms.

Firms choose in equilibrium too much board interference due to three effects: First, firms fail to internalize that board interference diminishes acquisition opportunities for

¹⁹If the welfare function included managerial rents, the social planner would be biased towards using compensation, since both board interference and takeovers engender a deadweight loss.

other firms. This effect is captured by the term $p\frac{\delta\rho^a}{\delta\tau}\Delta Z_2$ in equation (11). Second, equilibrium board quality compensates for the inefficiently low takeover threat, caused by too small acquisition budgets. Third, equilibrium board interference balances the stand-alone value pX_H^2 with the target's private return from a takeover P whereas the social planner considers the expected total net surplus $E[X_2^H - c]$.

The equilibrium wage may be larger or smaller than the wage associated with the socially optimal board quality and budget. While too small budgets increase the wage, excessive board interference can increase or decrease performance-based compensation relative to its socially optimal level. Board interference increases the dismissal threat while diminishing acquisition opportunities. Consequently, the overall effect is unclear.

Proposition 4 underlines the social value of a liquid takeover market. More generous budgets enhance the supply of acquiring firms. In turn, weak boards create a more liquid takeover market by increasing the supply of potential target firms. However, the liquidity of the takeover market is a public good and is therefore underprovided in equilibrium.

Corollary 1. *In equilibrium, the incidence of takeovers is too low from a social perspective.*

Shleifer and Summers (1988) propose that takeover activity may be too high because it can lead to a breach of implicit contracts between shareholders and different stakeholders whereby the former deprive the latter of their rents. This breach can limit contracting opportunities and decrease ex ante welfare. In contrast, firms are not acquisitive enough in our setting. Acquirers create a positive externality because the takeover threat mitigates moral hazard. The externality operates across rather than within firms. Bebchuk and Zingales (2000) provide an alternative argument for why there may be too few takeovers. They propose that a founder may choose an excessively dispersed ownership structure in order to extract a larger fraction of a future acquirer's surplus. Free-riding behaviour by small shareholders strengthens the bargaining position of the target. In our setting, target firms stifle takeover activity through excessive board quality rather than free-riding behaviour. The inefficiency is not driven by an attempt to extract surplus from the acquirer but due to the non-internalization of an externality on other managers' incentives.

The above reasoning provides a novel argument against takeover defences. The common criticism holds that anti takeover devices entrench incumbent managers, thereby exacerbating agency conflicts at target firms. In addition, these devices are seen to preclude value-enhancing takeovers. Our analysis suggests an additional cost: By reducing acquisition opportunities, takeover defences force firms to offer their managers more incentive pay.²⁰

²⁰For the same reason, the presence of leveraged buyout funds can be detrimental for public firms: They deprive managers of acquisition opportunities, though they also exert disciplinary pressure on managers of poorly performing firms.

6 Takeovers and Managerial Labour Market

In this section we introduce a market for scarce managerial talent. After firing her manager, a well-governed firm may now poach a manager from another firm instead of hiring a random replacement. All other features of the model remain the same. In particular, a manager of a poorly governed firm can only be removed through a takeover. Clearly, in equilibrium a firm would never poach a manager that performed poorly before. Only proven, competent managers receive outside offers. Also, a firm has no incentive to replace a manager that proved her competence through first-period success. Therefore, the fraction of firms demanding a new manager is $(1 - p)\hat{\tau}$ and the fraction of firms supplying the labour market is p .

To keep the analysis of takeover and managerial labour markets tractable, we consider the following matching technology. As in Section 5, all firms are uniformly distributed along a circle, and a firm can only bid for the neighbouring firm to its right. In addition, a firm can now try to hire the manager of the neighbouring firm to its left. A poorly performing firm is therefore either a potential takeover target or a potential poacher, but is never simultaneously in both markets. The dichotomy between the takeover and labour market simplifies the analysis as it rules out the possibility that a target poaches the manager of her acquirer.

Consider firm i and its left-sided neighbour firm j at the interim date and suppose that firm i performed poorly in the first period. If neighbouring manager j performed successfully, there are two mutually exclusive possibilities, depending on firm i 's governance quality. On the one hand, if firm i experiences a governance failure, it might be acquired by firm j . On the other hand, if firm i is well governed, it may try to poach manager j . It does so by offering a wage \hat{w}^P to the manager. With probability $1 - \mu$ poaching is successful and the net return to shareholders of firm i in the second period is $X_2^H - \hat{w}^P$. Like the newly hired manager in Sections 4 and 5, the poached manager cannot undertake an acquisition. Firm j replaces its lost competent manager with a new manager of unknown quality. With probability μ poaching fails. In this case, manager j stays with her initial firm and receives a second-period wage \hat{w} in addition to the private benefits. Firm i randomly hires a new manager of unknown quality. We do not pin down the wages \hat{w}^P and \hat{w} but just assume that both satisfy the relevant participation constraints. Finally, if firm j is poorly-performing or firm i is well-performing, the two firms do not interact with one another, though they may interact with their respective other neighbour.

Lemma 4. *In equilibrium, the ex ante identical firms choose the performance-based wage*

$$w_H^{**} = \frac{Z_1}{p} - [\tau^{**} + \rho^{t**}(1 - \tau^{**}) + \rho^{a**} \Delta] Z_2 - (1 - p)\tau^{**}(\mu\hat{w} + (1 - \mu)\hat{w}^P) \quad \text{and} \quad w_L^{**} = 0, \quad (12)$$

the acquisition budget

$$L_H^{**} = X_2^H + \Delta Z_2 \text{ and } L_L^{**} = 0, \quad (13)$$

and the board quality

$$\tau^{**} = \frac{1}{k} \{p(1 - \rho^{t^{**}})Z_2 + (1 - p)[pX_2^H + p(1 - \mu)(X_2^H(1 - p) - \hat{w}^P) - \rho^{t^{**}}P]\}, \quad (14)$$

where $\rho^{t^{**}}$ and $\rho^{a^{**}}$ are given by equations (5) and (6).

The introduction of the managerial labour market mainly affects the intensity of board interference in equation (14). Board quality is higher with an active labour market due to the possibility of poaching a competent manager. The term $p(1 - \mu)(X_2^H(1 - p) - \hat{w}^P)$ on the right hand side in (14) captures this additional effect: With probability $p(1 - \mu)$ the neighbouring manager is competent and poaching is successful, which generates an additional return of $(X_2^H(1 - p) - \hat{w}^P)$ relative to a random outside hire.

The first-period wage in equation (12) is lower than the equilibrium wage in Section 5. The prospect of being poached incentivizes managers to exert effort and allows shareholders to reduce the performance-based pay w_H^{**} . The effect is captured by the term $(1 - p)\tau^{**}(\mu\hat{w} + (1 - \mu)\hat{w}^P)$ in equation (12): With probability $(1 - p)\tau^{**}$, a successful manager is poached by the neighbouring firm, in which case she receives an expected wage $(\mu\hat{w} + (1 - \mu)\hat{w}^P)$. Shareholders can fully offset this increase in future compensation by lowering the wage w_H^{**} , while maintaining incentive compatibility (because first-period success is a prerequisite for being poached). As a consequence, managers' expected total pay does not change with an active labour market.

It can easily be checked that the socially optimal outcome is unaffected by the introduction of a labour market and coincides with Lemma 3. The intuition is that competition for managers is a zero sum game: The supply of competent managers is fixed and the labour market reallocates a fraction $1 - \mu$ of talented managers without affecting aggregate cash flow. Given that equilibrium board interference in (14) increases compared to Section 5 while the socially optimal level remains the same, the overall effect is a reduction in shareholder wealth. We summarize the above discussion in:

Proposition 5. *Competition for managerial talent increases equilibrium board interference and reduces shareholder welfare.*

Acharya and Volpin (2010) also study the relationship between competition for managerial talent and corporate governance. Their setup differs from ours in two key respects. First, in the present paper only well-governed firms compete for scarce managerial talent, whereas in Acharya and Volpin all firms do, irrespective of the quality of their governance. Consequently, competition for talent does not increase the returns to board intervention. Second, talent is scarce at the initial hiring stage in Acharya and Volpin and the ex ante

wage is the outcome of a bargaining game. In contrast, firms in our model compete for talent only at the interim date and the ex ante wage is solely determined by the incentive compatibility constraint. That is, the prospect of being poached at the interim date raises the manager's future compensation but lowers his first-period wage.

Due to these differences in the setup, competition for managerial talent has opposing effects on the choice of governance and the equilibrium distortion. In Acharya and Volpin more competition for talent, i.e. more poaching, discourages board interference. It improves the bargaining position of the manager which limits the extent to which shareholders can lower her compensation through better governance. Moreover, firms underinvest in governance in equilibrium because they ignore a positive effect on other firms' profits: A manager's bargaining position depends on the compensation she can receive at other firms, which in turn depends on those firms' governance choices. As a consequence, stronger governance reduces compensation not only for the own manager but also for other managers due to diminished outside options. In contrast, more poaching encourages board interference in our model, since it increases the expected returns from dismissing an incompetent manager. However, there are no corresponding social returns. In equilibrium there is overinvestment in board quality because competent managers are equally productive in all firms.

Corollary 2. *In equilibrium, when poaching becomes more profitable, the liquidity in the takeover market decreases.*

Poaching becomes more profitable if the success probability $1 - \mu$ increases or if the poaching wage \hat{w}^P decreases. In either case, the returns to board interference increase which raises τ^{**} in equation (14). While higher board quality increases the demand for managerial talent, it reduces the supply of targets in the takeover market. Hence, the liquidity in the takeover and managerial labour markets are inversely related.

7 Conclusion

Previous research on the incentive implications of takeovers has focussed on the threat of being taken over and its effect on managerial behaviour. We argue that the takeover market also mitigates agency conflicts by providing acquisition opportunities for successful managers. As a consequence, takeovers may benefit shareholders even if they do not play any disciplinary role or generate any synergies. At the same time, takeover pressure stifles a board's incentive to discipline management, possibly to the extent that it aggravates agency conflicts in target firms. A liquid takeover market with a sufficient supply of potential targets and acquirers constitutes a public good that provides implicit incentives to all managers in the economy. In equilibrium, externality in governance choices across firms arises. Board interference, which reduces the scope for acquisitions, is excessive and

acquisition budgets are too small. As a consequence, takeover activity is inefficiently low. Finally, a more active managerial labour market reduces activity in the takeover market. When poaching becomes more profitable, firms increase board quality. While this raises the demand for managerial talent, it also reduces the supply of targets in the takeover market.

8 Appendix

8.1 Proof of Lemma 1

Assumption 3 implies that the incentive compatibility constraint is binding which in turn determines \tilde{w}_H . Substituting \tilde{w}_H in the objective function yields the following simplified program

$$\max_{L_H} p [X_1^H - (Z_1/p - [1 + \rho^a(L_H)\Delta]Z_2) + X_2^H + \rho^a(L_H)\pi^a] + (1-p)pX_2^H$$

with the first order condition

$$p\chi f\Delta Z_2 + p\chi(X_2^H - L_H)f = 0 \quad \Leftrightarrow \quad \tilde{L}_H = X_2^H + \Delta Z_2. \quad \blacksquare$$

8.2 Proof of Lemma 2

As in Lemma 1, the incentive compatibility constraint determines the wage w_H^* . Substituting w_H^* in the objective function yields the following program

$$\begin{aligned} \max_{L_H, \tau} p [X_1^H - (Z_1/p - [\tau + (1-\tau)\rho^t + \rho^a(L_H)\Delta]Z_2) + X_2^H + \rho^a(L_H)\pi^a] \\ + (1-p) [\tau pX_2^H + (1-\tau)\rho^t P^t] - \frac{1}{2}k\tau^2 \end{aligned}$$

The first order conditions with respect to L_H and τ give equations (2) and (3). \blacksquare

8.3 Proof of Proposition 3

Let us define overall turnover risk conditional upon poor first-period performance as

$$\Gamma^* \equiv \tau^* + (1 - \tau^*)\rho^t$$

Differentiating the overall turnover risk Γ^* with respect to ρ^t yields

$$\frac{\partial \Gamma^*}{\partial \rho^t} = 1 - \tau^* + (1 - \rho^t) \frac{\partial \tau^*}{\partial \rho^t} = 1 - (1 - \rho^t) \frac{2}{k} [pZ_2 + (1 - p)pX_2^H]$$

Hence, for $k > \bar{k} = 2[pZ_2 + (1 - p)pX_2^H]$, $\partial \Gamma^* / \partial \rho^t > 0$ for all ρ^t . For $k \leq \bar{k}$, $\partial \Gamma^* / \partial \rho^t \geq 0$, provided that $\rho^t \geq \bar{\rho}^t(k) = 1 - k/2[pZ_2 + (1 - p)pX_2^H]$, and $\partial \Gamma^* / \partial \rho^t < 0$ otherwise ($\rho^t < \bar{\rho}^t$). \blacksquare

8.4 Proof of Lemma 3

The social planner solves the following program

$$\max_{w_H, \hat{\tau}, \hat{L}_H} p \left[X_1^H - w_H + X_2^H + (1-p)(1-\hat{\tau}) \int_0^{\hat{L}_H - P} (X_2^H - P - c) f(c) dc \right] \\ + (1-p) \left[\hat{\tau} p X_2^H + (1-\hat{\tau}) \rho^t (\hat{L}_H) P \right] - \frac{1}{2} k \hat{\tau}^2$$

subject to

$$w_H \geq \frac{Z_1}{p} - \left[\hat{\tau} + (1-\hat{\tau}) \rho^t (\hat{L}_H) + \Delta \rho^a (\hat{\tau}) \right] Z_2$$

and $w_H \geq 0$ and $\hat{\tau} \in [0, 1]$.

As in Lemmata 1 and 2, the binding incentive compatibility constraint determines w_H^o in equation (9). The first order condition with respect to $\hat{\tau}$ gives equation (11). The first order condition with respect to L_H is

$$-p \frac{\partial w_H^o}{\partial L_H} + p(1-p)(1-\hat{\tau})(X_2^H - L_H) f(c) + (1-p)p(1-\hat{\tau}) P f(c) = 0$$

$$\Leftrightarrow L_H^o = X_2^H + \Delta Z_2 + P + \frac{p}{1-p} Z_2$$

It can easily be verified that the optimization program is concave, that is, the Hessian matrix is negative semi-definite. ■

8.5 Proof of Proposition 4

The difference between the equilibrium acquisition budget in equation (6) and the socially optimal acquisition budget in equation (10) is

$$L_H^* - L_H^o = -\Delta Z_2 - P - \frac{p}{1-p} Z_2$$

which is negative. The difference between the equilibrium board quality in equation (7) and the socially optimal board quality in equation (11) is

$$\tau^* - \tau^o = \frac{1}{k} \left[p[\rho^{to} - \rho^{t*}] Z_2 - p \frac{\delta \rho^{ao}}{\delta \tau^o} \Delta Z_2 + (1-p)[\rho^{to} E[X_2^H - c] - \rho^{t*} P] \right]$$

The first term in squared brackets on the right hand side, $p[\rho^{to} - \rho^{t*}] Z_2$, is positive since $L_H^o > L_H^*$. The second term is negative because $\frac{\delta \rho^{ao}}{\delta \tau^o}$ is negative for all τ . Hence, it suffices to verify that the last term in brackets on the right hand side, $[\rho^{to} E[X_2^H - c] - \rho^{t*} P]$, is

positive. Recall that $E[X_2^H - c]$ is the expected surplus *conditional on the occurrence of a takeover*. We thus obtain

$$[\rho^{t^o} E[X_2^H - c] - \rho^{t^*} P] = p \left[\int_0^{L_H^* - P} (X_2^H - c) f(c) dc - F(L_H^* - P) P \right].$$

To sign the above expression, note that it is strictly decreasing in P and obtains a minimum when $P = \frac{1}{2} L_H^*$. It can easily be verified that the above expression is positive at $P = \frac{1}{2} L_H^*$ which implies that $\tau^* > \tau^o$. ■

8.6 Proof of Lemma 4

The shareholders' maximization problem is

$$\begin{aligned} \max_{w_H, L_H, \tau} p & \left[X_1^H - w_H + (1-p)\hat{\tau}[\mu(X_2^H - \hat{w}) + (1-\mu)(pX_2^H)] \right] \\ & + p \left[(1-p)(1-\hat{\tau}) \left[X_2^H + \int_0^{\hat{L}_H - P} (X_2^H - P - c) f(c) dc \right] \right] \\ & + (1-p) \left[\hat{\tau}(\mu p X_2^H + (1-\mu)(X_2^H - \hat{w}^P)) + (1-\hat{\tau})\rho^t(\hat{L}_H)P \right] - \frac{1}{2} k \hat{\tau}^2 \end{aligned}$$

subject to the incentive constraint

$$\begin{aligned} p \left[w_H + Z_2 + \rho^a(\hat{L}_H)\Delta Z_2 + (1-p)\hat{\tau}(\mu\hat{w} + (1-\mu)\hat{w}^P) \right] & + (1-p)(1-\hat{\tau})(1-\rho^t(\hat{L}_H))Z_2 \\ & \geq Z_1 + (1-\tau)(1-\rho^t(\hat{L}_H))Z_2 \end{aligned}$$

and the constraints

$$w_H \geq 0 \quad \text{and} \quad \hat{\tau} \in [0, 1].$$

As in Lemmata 1 to 3, the binding incentive compatibility constraint determines w_H^{**} . The first order conditions with respect to \hat{L}_H and $\hat{\tau}$ give equations (13) and (14). ■

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