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Abstract

We analyze how severance pay can alleviate the conflict between firing a manager and simultaneously providing him with the incentive to exert effort before being fired. Contrary to previous literature in our model severance pay is contingent on firm performance. We show that severance pay contingent on firm performance can solve the conflict by rewarding the manager only in case of investment success.

JEL classification: J33, M52

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1 Introduction

Severance pay may induce the desired level of turnover by increasing the cost of firing the incumbent manager, thus representing a credible commitment to reduce the firing probability (Almazan and Suarez 2003). Alternatively, it may induce the manager to resign if some conditions realize (Inderst and Mueller, 2010). Hence, severance pay may induce either the manager or the board to behave optimally. Critics however point out that severance pay, by insulating the manager from the consequences of poor performance, is simply a "reward for failure" that violates the pay-for-performance principle of agency theory (see for example Bebchuk and Fried 2004). To overcome this problem Cowen

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et al. (2016) suggest to include triggering conditions that specify minimum performance standards.

We consider a simple model where firm's profits derive from routine activity and an investment project. We show that severance pay contingent on returns may optimally obtain when a board hires a manager of unknown ability who has to exert unobservable effort to select the investment. If the manager is subsequently found to be low-ability, the board wants to replace him with a (possibly) high-ability manager. Profits depend both on manager's ability (hence on board's ability to detect it through monitoring) and on the investment project (hence on managerial effort). The firing threat interferes with the need to provide incentives for effort. Indeed, the board wants to give high incentives also to low ability managers that will later be fired. Our focus is on the tension between these two objectives: firing a low-ability manager and simultaneously give the manager appropriate incentives independently of his type. Severance pay alleviates this conflict: by compensating for the gains that the manager would enjoy if retained, it insulates him from the disadvantages of firing.

The rest of the paper is organized as follows. Section 2 presents the model. Section 3 analyzes monitoring, Section 4 illustrates managerial choice of effort. Section 5 presents the optimal contract. Section 6 concludes.

2 The model

Consider a board that needs to hire a manager (he) of unknown ability both to run routine activities and to undertake a risky project. Whether the ability of the manager is high (H) or low (L) depends on his matching with the firm. Consequently, the manager himself is not aware of his type when hired, so that no screening is possible. The probability that he ends up being high-ability is λ , with $0 < \lambda < 1$.

The firm's returns from routine activity depend on manager's type and are verifiable. Returns are $\pi > 0$ (0) if the manager is high-ability (low-ability), resulting in expected return $\lambda\pi$. In addition to "business as usual", a risky

investment project can be undertaken, but unobservable effort $e \in [0, 1]$ at cost $\frac{e^2}{2}$ must be exerted by the manager to identify such opportunity. Effort e enables the manager to identify the project with probability e . With probability $1-e$, the project is not identified and the manager only performs routine activities. The project offers a verifiable return $R > 0$ (independent of manager's type) with probability p and zero return with complementary probability. The investment also offers private benefits $b > 0$ to the manager provided that he is not fired.

Only after the manager has spent some time on the job, the board can assess his type through uncontractible monitoring. A monitoring intensity $M \in [0, 1]$ costs $M^2/2$ and allows the board to learn the manager's ability with probability $M \leq 1$. Following monitoring, the board makes a report \hat{t} on the manager's type, $\hat{t} = \hat{H}, \hat{L}$. Then, on the basis of this report and of the firing rule $P^F(\hat{t})$ specified in the contract between the board and the manager, the latter is either retained or fired. Since the firing/retention decision is observable and verifiable, $P^F(\hat{t}) \in \{0, 1\}$. Values of $P^F(\hat{t}) \in (0, 1)$ are ruled out because their implementation would not be verifiable. We assume that the managers' pool is large enough for the probability of a high-ability replacement to remain λ . We also assume that there are no firing costs other than severance pay and that, in the event of firing, the new manager cannot modify the investment project.

Both the board and the manager are risk-neutral. The latter has no wealth and is protected by limited liability. For simplicity we also assume that the manager's reservation level of utility is equal to zero.

Manager's compensation can be conditioned on verifiable returns and firing decision, so that the manager may receive severance pay if fired. Given that the manager cannot improve his (exogenously given) ability, there is no point in conditioning compensation on π . Performance pay, and possibly severance pay, conditional on return R can instead be added to a base salary in order to induce a greater effort. Given that the reservation utility is normalized to zero and that routine activity imposes no disutility on the manager, the base salary is equal to zero. Moreover, limited liability allows to focus on contracts yielding zero payment when the project return is zero and a non-negative bonus when the

project succeeds. This also guarantees that the participation constraint is not binding. The bonus is w if the manager is retained, and s if he is fired. Then, severance pay may be contingent on project success. In the event of firing, no incentive compensation is paid to the replacement because he cannot modify the project.

For technical reasons we assume $b < \lambda\pi \leq 1/(1 - \lambda)$ and $2 - b(1 - \beta) > pR > b(1 + \beta)$ where $\beta \equiv (\lambda\pi - \frac{b}{2})(1 - \lambda)^2$.¹

The timing is as follows:

period 1: The board offers the manager a contract $C = \{w, s, P^F(\hat{t})\}$.

period 2: The manager implements effort e . Possibly, an investment project is chosen.

period 3: Upon monitoring, the board learns the manager type with probability M and makes the firing/retention decision.

period 4: Cash flows are obtained, together with private benefits if investment is selected.

3 Monitoring and firing decision

In period 3, once the manager has exerted effort and a project has possibly been chosen, the board monitors the manager to learn his type that affects routine profits. If a low-ability (high-ability) manager is replaced, the increase (loss) in expected profit is $\lambda\pi$ ($(1 - \lambda)\pi$) because the ability of the replacement is unknown. For the cases when monitoring is successful (which happens with probability M), the optimal contract must then prescribe firing (retention) if low (high) ability is observed, i.e. $P^F(\hat{L}) = 1$ and $P^F(\hat{H}) = 0$. However, the decision of the board also depends on the difference between w and s . To guarantee that the board has no incentive to misreport the manager's type given $P^F(\hat{H}) = 0$

¹These assumptions ensure interior solutions for effort, incentive pay and monitoring thus simplifying the exposition. They also ensure that incentive compatibility conditions on s and w are satisfied. Qualitative results would not be affected by also considering corner solutions or binding constraints.

and $P^F(\widehat{L}) = 1$, w and s must satisfy the following incentive-compatibility conditions:

$$(1 - \lambda)\pi \geq p(w - s) \quad (1)$$

$$\lambda\pi \geq p(s - w) \quad (2)$$

Condition (1) guarantees that the expected cost from firing a high-ability manager, $(1 - \lambda)\pi$, is not smaller than the expected cost of retaining him given by the difference between expected bonus if he is retained and expected severance pay if he is fired, $p(w - s)$ when the investment is made. Similarly, condition (2) guarantees that the gain in firing the low-ability type, $\lambda\pi$, is not offset by the difference $p(s - w)$.

Consider now the case with unsuccessful monitoring, which happens with probability $1 - M$. There is no gain from replacing the manager because the expected routine profit would not change. Expected routine profit is then independent of firing probability. Expected return from investment instead depends on the compensation paid to the manager in case of success. Hence, the corresponding incentive compatible firing probability, $P^F(\widehat{0}) \equiv P^F$, will depend on the sign of $w - s$:

$$P^F \begin{cases} = 1 & \text{if } w > s \\ = 0 & \text{if } w < s \\ \in \{0, 1\} & \text{if } w = s \end{cases} \quad (3)$$

The optimal values of w , s and P^F will be determined in Section 6. For the moment suffice it to note that the values of w , s and P^F contained in the contract satisfy conditions (1), (2) and (3) respectively.

The board chooses M to maximize expected profits:

$$\begin{aligned} & \max_M \{M[\lambda\pi + (1 - \lambda)\lambda\pi] + (1 - M)\lambda\pi \\ & + I_{pro}P [R - w(M\lambda + (1 - P^F)(1 - M)) - s(M(1 - \lambda) + (1 - M)P^F)] - \frac{M^2}{2} \end{aligned}$$

where $I_{pro} \in \{0, 1\}$ is an indicator function taking value 1 if a risky project has been selected and value 0 otherwise and the *next* term in square bracket represents the expected return from a risky project in addition to routine expected returns given by the two first terms. When a risky project is undertaken, w

(s) is paid if the manager is discovered to be high-ability (low-ability) or if the contract prescribes retention (firing) in case of unsuccessful monitoring.

From the first-order condition we obtain:

$$M = \{(1 - \lambda)\lambda\pi + I_{pro}p(1 - \lambda - P_d^F)(w - s)\}. \quad (4)$$

Monitoring increases in the expected gain from replacing a bad with a good manager, $\lambda\pi$. Given that P^F must satisfy (3), the level of monitoring is the highest when a risky project is not undertaken ($I_{pro} = 0$) or when a project is implemented if $w = s$. In such cases, monitoring intensity simplifies to:

$$M = (1 - \lambda)\lambda\pi \equiv \overline{M}. \quad (5)$$

This high-lights one aspect of the conflict between monitoring and incentives for project choice. Whenever incentives for effort require to set $w \neq s$, the level of monitoring must be reduced with respect to (5) to preserve incentive compatibility in the firing decision.

4 Managerial effort

The manager does not know his own type when deciding the level of e , but can anticipate the value of M , and calculate the *ex ante* firing probability in case the investment is undertaken,

$$F \equiv M(1 - \lambda) + (1 - M)P^F = P^F + M(1 - \lambda - P^F), \quad (6)$$

The manager then solves:

$$\max_e \quad e\{wp(1 - F) + spF + b(1 - F)\} - \frac{e^2}{2}$$

From the FOC we obtain :

$$e = p[w(1 - F) + sF] + b(1 - F) \quad (7)$$

Managerial effort increases in expected monetary compensation and private benefits. The expectation for monetary compensation is taken with respect to the

probability of project success. When the project succeeds, the bonus is w if the manager is confirmed (i.e. with probability $1 - F$) and s if he is fired (i.e. with probability F). Private benefits instead are obtained only if the manager remains with the firm. Since monetary compensation and private benefits are substitutes in motivating effort, the board will choose the combination of w , s that makes it cheaper to provide incentives, considering the effect on monitoring and firing probability.

5 Optimal monetary compensation

The board offers the contract $C = \langle w, s, P^F(\hat{t}) \rangle$, anticipating the subsequent choice of e and M . We know that $P^F(\hat{H}) = 0$ and $P^F(\hat{L}) = 1$, so that we only have to determine w, s, P^F .

The board solves :

$$\begin{aligned} \underset{w, s, P^F}{Max} \quad & ep[R - w(1 - F) - sF] + \lambda\pi + e \left[(1 - \lambda)\lambda\pi M - \frac{M^2}{2} \right] \\ & + (1 - e) \left[(1 - \lambda)\lambda\pi \bar{M} - \frac{\bar{M}^2}{2} \right] \end{aligned} \quad (8)$$

where e is given by (7), and $w - s$ and P^F satisfy (1), (2), (3). Recall that M represents the level of monitoring when a risky project is undertaken (see (4)) whereas \bar{M} is the level of monitoring when no investment is selected (see (5)). Then, the first term is the expected return from the investment, $\lambda\pi$ is the expected routine profit from a high-ability manager, and the third and fourth terms represent the expected routine profit from a low-ability manager which depends on monitoring. The following Proposition characterizes the solution

Proposition 1. The board optimally sets $w = \frac{R}{2} - \frac{b}{2p} - \frac{b(1-\lambda)^2\lambda\pi}{2p} + \frac{b^2(1-\lambda)^2}{4p}$, $s = w + \frac{b}{p}$ and $P^F = 0$.

Proof. See Appendix.

Severance pay is strictly positive and larger than incentive pay. P^F must be 0 for the contract to be incentive-compatible. If P^F were positive, the board would in fact have an incentive to report high ability even when it is uninformed.

Using Proposition 1 we obtain

$$M = (1 - \lambda)[\lambda\pi - b],$$

and

$$F = (1 - \lambda)M = (1 - \lambda)^2[\lambda\pi - b]$$

where M is lower than \overline{M} and F is lower than the ex-ante firing probability in the absence of an investment, $\overline{F} \equiv (1 - \lambda)^2\lambda\pi$. This is summarized in

Proposition 2. When managerial effort is successful, monitoring, the resulting ex ante firing probability, are optimally reduced.

Severance pay $s > w$ introduces a distortion in the level of monitoring, and consequently in the ex-ante firing probability which is reduced with respect to the case with no investment. This increases the expected value of private benefits, $(1 - F)b$, providing ex ante incentives for managerial effort. Moreover, by compensating the manager for the loss of private benefits, severance pay $s > w$ insulates him from the replacement policy when the project is successful.

6 Conclusions

We have considered a board of directors that monitors a manager to assess his ability, and possibly dismiss him, in a context where managerial effort is needed to undertake a risky project. Effort is low if the manager anticipates the he *might* be fired, so that a conflict arises between monitoring and incentives. Such conflict is solved introducing a contingent severance pay which results in a reduction in monitoring and firing. Moreover, severance pay insulates the manager from the adverse consequences of firing. Thus, we contribute to literature on the advantages of some managerial entrenchment and we offer a rationale for performance-based severance pay.

7 References

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8 Appendix: Proof of Proposition 1

By substituting for M and \bar{M} from (4) and (5) into (8) and solving s.t. (7), (3) we obtain the following FOCs. We ignore (1), (2), it will be clear that they are satisfied by the solutions.

$$w : \quad \frac{\partial e}{\partial w}(A + Z) + e\left[\frac{\partial A}{\partial w} + \frac{\partial Z}{\partial w}\right] = 0 \quad (9)$$

$$s : \quad \frac{\partial e}{\partial s}(A + Z) + e\left[\frac{\partial A}{\partial s} + \frac{\partial Z}{\partial s}\right] = 0 \quad (10)$$

where

$$A \equiv p[R - w(1 - F) - sF], \quad (11)$$

$$Z \equiv \frac{p^2(1 - \lambda - P^F)^2(w - s)^2}{2}, \quad (12)$$

$$\frac{\partial e}{\partial w} = p \left[(1 - F) - (w - s) \frac{\partial F}{\partial w} \right] - b \frac{\partial F}{\partial w} = -\frac{\partial A}{\partial w} - b \frac{\partial F}{\partial w}, \quad (13)$$

$$\frac{\partial e}{\partial s} = p \left[F - (w - s) \frac{\partial F}{\partial s} \right] - b \frac{\partial F}{\partial s} = -\frac{\partial A}{\partial s} - b \frac{\partial F}{\partial s}, \quad (14)$$

$$\frac{\partial F}{\partial w} = (1 - \lambda - P^F) \frac{\partial M}{\partial w} = -(1 - \lambda - P^F) \frac{\partial M}{\partial s} = -\frac{\partial F}{\partial s}, \quad (15)$$

$$\frac{\partial M}{\partial w} = p(1 - \lambda - P^F) = -\frac{\partial M}{\partial s}. \quad (16)$$

Summing up (9) and (10) and substituting for the derivatives we obtain:

$$A + Z = e \tag{17}$$

Substituting (17) and (13)–(16) into (9), and considering that $\frac{\partial Z}{\partial w} = \frac{\partial M}{\partial w} [\lambda\pi(1 - \lambda) - M]$, we have

$$b(1 - \lambda - P^F) = \lambda\pi(1 - \lambda) - M. \tag{18}$$

Substituting (4) with $I_{pro} = 1$ into (18) and considering that P^F must satisfy (3), we obtain:

$$s - w = \frac{b}{p} \quad \text{and} \quad P^F = 0.$$

Considering (11), (12), (7) and substituting for $s - w$ in (17) we obtain:

$$w = \frac{R}{2} - \frac{b}{2p} - \frac{b(1 - \lambda)^2\lambda\pi}{2p} + \frac{b^2(1 - \lambda)^2}{4p}.$$