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Corporate Governance, Human Capital Investment, and Job Termination Clauses - a Lesson from the Literature on Hold-Up

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Abstract

This paper examines a principal-agent problem between a manager (principal) and an employee (agent). At the contracting date uncertainty with regard to the profitability of the relationship is present. Once the contract is signed, the employee performs a specific investment that reduces his disutility from working hard. After that, but before the employee performs his effort, the uncertainty is resolved. The manager and the employee are free to renegotiate the contract at this point. Moreover, we distinguish three settings with respect to the principal's and the agent's options to terminate the relationship irrespective of possible renegotiation. If both parties are free to quit we find that an underinvestment problem with regard to the employee's personal investment is present. If none of the parties are allowed to breach the contract, an overinvestment problem arises. Finally, allowing the employee to quit but not the manager allows achieving first best investment.

1 Introduction

In the wake of Enron and other spectacular company breakdowns at the beginning of the century, the issue of appropriate corporate governance mechanisms received great attention in policy as well as in academia. Many countries revised their company law and/or adopted corporate governance codices. The primary goal of these measures was to restore investors' confidence in corporations and capital markets. Corporate governance in this context can be considered as a conglomerate of mechanisms to protect the interests of shareholders.[1] As shareholders are primarily suppliers of capital, their natural interest is to get their money back with an appropriate return. An obvious threat to this interest, however, is immanent in the separation of ownership and control and the related, well recognized, principal-agent conflict between shareholders and managers. Corporate governance codices typically respond to this threat by proposing incentive contracting. Compensation of board members and members of the upper management should be tied to performance measures such as profit or share price in order to align incentives.

In this paper we focus on an incentive problem that is likely to arise on a lower organizational level of the firm. It is, however, directly related to the type of incentive contracting recommended in corporate governance codices and can be considered as a "side-effect".

Basically, we investigate an employee's incentives to privately invest in capabilities specifically related to his job needs, given that his superior manager, triggered by an incentive contract, behaves in the best interest of shareholders.

Doing so, we try to accommodate the fact that human capital is of great importance for many firms.[2] Specific knowledge and skills of the employees are often key for long term success. Part of these capabilities can certainly be acquired via firm specific trainings and are to be considered as investments of the firm rather than the employee. Other capabilities might be transferable to other jobs and in that sense are not job specific. However, it is very likely that some skills can be developed only via an employee's personal effort and are directly applicable to his specific job.[3] For instance one may assume that the employee could systematically process previous experience from working and thus raise efficiency whenever an issue repeats itself rather than to simply perform a predetermined procedure once and once again without any reflection.

We try to capture such a setting using the most parsimonious model that satisfies our needs.

[1] See e.g. Shleifer/Vishny (1997).
[2] See e.g. Becker (1993), Hanson (2004).
[3] See Pischke (2001) or Loewenstein/Spletzer (1999).

We assume that a manager employs a subordinated employee. This employee performs a contractible task. The task as well as the employee's compensation contributes to a performance measure that enters the manager's incentive contract. From the employee's perspective, performing the task is hard work and causes a disutility. However, the employee is able to reduce this disutility via a private investment of the nature described above. The employment considered is a long term relationship in the sense that additional information arises after the contract is signed, but before the particular task considered is carried out. In such a setting commitment is hard to achieve and we rather assume that renegotiation of the contract is feasible, if both parties to the contract agree to do so.

Our setup shows great similarities to previous contributions to the literature on hold-up.[4] However, it also shows some relevant differences. The hold-up literature typically considers a buyer - seller relationship with bilateral investments. Bargaining power is generally not fixed and various alternatives are considered. As opposed to that we consider a standard principal-agent relationship between a manager and an employee. Given this notion we allocate all bargaining power to the manager. Thus we assume that the manager offers a contract to the employee at the beginning of the game as well as (possibly) at the renegotiation stage, both on a take-it-or-leave-it basis. Specific investment opportunities are assumed to exist only on the employee's side, rather than for both parties.

We find that, whether the classical underinvestment problem related to hold-up arises, depends critically upon the assumptions we make with regard to the options both parties, the employee and the manager, have, to terminate the employment. In particular, if and only if, both parties are free to terminate the relationship, underinvestment arises. An overinvestment problem is present if none of the parties is entitled to quit, and, finally, first best investment incentives can be induced if only the employee is free to terminate the relationship.

Among the numerous contributions to the literature that investigate hold-up, our paper is most intertwined with Hart/Moore (1988), Chung (1991), and Nöldeke/Schmidt (1995), and, to a somewhat lesser extent, with Edlin/Reichelstein (1995) .

Hart/Moore (1988) in their seminal paper formalize the hold-up problem using a setting in which the trading quantity is binary and trade is voluntary. The original contract might be subject to renegotiation after all uncertainty is resolved. Building on Hart/Moore (1988), Chung (1991) and Nöldeke/Schmidt (1995) offer solutions to the hold-up problem. Chung

[4] See e.g. Shavell (1980), Hart/Moore (1988), Aghion et.al. (1990,1994), Nöldeke/Schmidt (1995), Hart (2009) to name some.

(1991) derives first best assuming that breach of contract is impossible while allowing for renegotiation. Assuming that the trading quantity is continuous, he shows that first best can be achieved. Nöldeke/Schmidt (1995) show that an option contract, that allows the seller to insist on trade, is sufficient to achieve first best, no matter whether the trading quantity is binary or variable. Finally Edlin/Reichelstein (1995) consider two types of breach remedies and investigate to what extend “specific performance” and “expectation damages” are suitable to solve the underinvestment problem, assuming once more continuous trading quantities.

As mentioned above, we investigate three settings that differ with regard to the employee’s and the manager’s options to terminate their relationship. Throughout the paper we assume that the employee’s effort is binary. In our first setting both parties are free to terminate their relationship before the employee performs his effort. This setting is closely related to the one in Hart/Moore (1988).

In our second setting no termination is possible, such as in Chung (1991). This setup also quite replicates the breach remedies considered by Edlin/Reichelstein (1995), at least given the specific assumptions about contract enforcement made in their paper. However, assuming in contrast to both papers, that effort is binary, prevents first best in our paper and we identify an overinvestment problem.

In the third setting we allow that the employee quits, but not the manager. This setting parallels the model of Nöldeke/Schmidt (1995).

Moreover, a paper by Gelter (2009) makes a point that is closely related to ours. He identifies a hold-up problem with regard to specific investments in human capital, if managers act in the best interest of shareholders, as we do. Based on that, he argues that the hold-up problem is especially severe if shareholders are powerful. He reasons that a system characterized by large blockholders (such as in Central Europe) aggravates the hold-up problem while one characterized by dispersed ownership (as in the US) reduces it. In contrast we assume that incentive contracts are relevant and affect managers’ behaviour without any need for direct interference by a blockholder whatsoever. Such contracts, however, appear to be even more common in the US as compared to Europe.

The next section describes our model. In section 3, 4 and 5 we derive solutions to the principal-agent problem, assuming alternative settings with regard to termination of the relationship as described above. Section 6 concludes.

2 The Model

We consider a principal-agent relationship between a manager and a subordinated employee. The manager aims at maximizing some output $x(a,\theta)$ net of compensation cost that contributes to the performance measure used to evaluate and to compensate the manager. $x(a,\theta)$ is increasing in the employee's effort a with $a \in \{0,1\}$. As a is binary we basically distinguish two cases. Either the employee works hard for the firm, indicated by $a = 1$, or he does not work at all ($a = 0$). Both cases are assumed to be observable and contractible. θ is a random variable that materializes throughout the game and takes on values from the set $\Theta \subset \Re$, with density $f(\theta)$. θ as well as $x(a,\theta)$ are assumed to be observable to the manager and the employee but not to a third party. Thus neither θ nor $x(a,\theta)$ can be used for contracting. If the agent does not work for the firm $x(0,\theta) = 0$ with certainty.

If the employee works hard this causes a disutility $d(a,I,\theta)$ thus that $d(1,I,\theta) > 0$ and $d(0,I,\theta) = 0$. The agent's disutility depends on θ as well as on an investment in his personal capabilities I. $I > 0$ improves specific knowledge needed for the job. It decreases disutility from working hard, $d_I(1,I,\theta) < 0$, at a decreasing rate, $d_{II}(1,I,\theta) > 0$. The investment has, however, no outside value in the sense that it is useless for possible future employments. Again we assume that I is not contractible directly and thus needs to be motivated via an appropriate contract. Both parties are risk neutral. The game proceeds as follows.

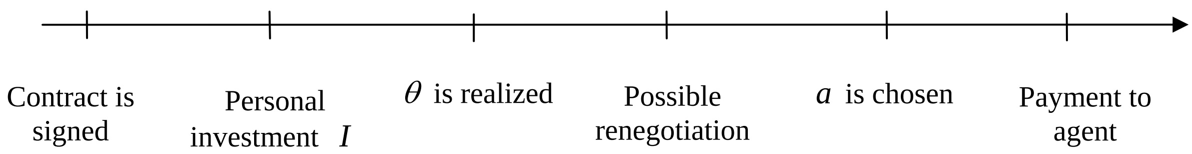

Figure 1: Timeline.

At the beginning of the game the manager offers a contract to the employee that specifies payments to be made to the employee depending on his effort level a. Having signed the contract, the employee chooses an investment level I. After both parties learned θ the effort a has to be decided upon. We will make different assumptions regarding the employee's options to quit or to perform as well as the manager's options for layoff/employment in the upcoming sections.

Regardless of these assumptions we assume that renegotiation of the following form is possible: The manager offers the employee a revised contract that again specifies a and related payments on a take-it-or-leave-it basis. If the employee accepts the revised terms, the new contract becomes binding, alternatively the old contract remains in place. Finally the employee is paid based on the actual contract.

2.1 Benchmark

To provide a benchmark for further analysis, we assume in this section that I as well as a is contractible and can be chosen by the manager. Solving the manager's optimization problem by backwards induction we start determining the optimal choice of a.

Once I has been chosen and all uncertainty has been resolved the manager chooses a such that

$$a^*(I,\theta) \equiv \arg\max_{a\in\{0,1\}}\{x(a,\theta) - d(a,I,\theta)\}.$$

Having assumed that $x(0,\theta) = 0$ and $d(0,I,\theta) = 0$ we obtain

$$a^* = \begin{cases} 1 & \text{if } x(1,\theta) - d(1,I,\theta) > 0 \\ 0 & \text{else} \end{cases}.$$

Given a^* the manager chooses I to maximize expected total surplus

$$EU^{MFB} = \int_{\Theta}[x(a^*,\theta) - d(a^*,I,\theta)]f(\theta)d\theta - I = \int_{\Theta'}[x(1,\theta) - d(1,I,\theta)]f(\theta)d\theta - I \qquad (1)$$

where $\Theta' = \{\theta \in \Theta \mid x(1,\theta) > d(1,I,\theta)\}$.

We assume that a unique interior I^* exists. Note that the solution to the manager's optimization problem (a^*, I^*) coincides with a setting in which the manager performs a and I himself (at identical costs) rather than to employ an agent. It also equals the socially optimal welfare maximizing solution.

3 Both parties are entitled to terminate the relationship

We assume in this section that the employee is free to resign from the job, that is to choose $a = 0$, after θ is learned. Likewise we assume that the manager is free to lay off the employee which also implies $a = 0$. Related to that we presume that two payments are contracted upon in the initial contract: If $a = 1$ the employee receives G_1 and G_0 is paid if $a = 0$. G_0 can be interpreted as severance payment received after termination of the relationship. For simplicity we assume that this payment is the same no matter whether the employee quits or is laid off.

As in the benchmark setting we use backwards induction starting at the point in time where all uncertainty is resolved, that is I and θ are known. At that stage the employee will generally decide to fulfil the contract whenever his benefit from working, $G_1 - d(1, I, \theta)$, is above the severance pay G_0 and he quits otherwise. Conversely, the manager sticks to the contract, if his benefits from doing so exceeds the costs involved with quitting, $x(1,\theta) - G_1 > -G_0$. Renegotiation, however, adds an additional option to both parties. The manager is free to offer a new contract and the employee can either accept or deny. We assume that the employee accepts whenever he is at least indifferent between the new contract and the payoff without renegotiation. These considerations lead us to distinguish basically four cases:

(1) $x(1,\theta) - G_1 > -G_0$ and $G_1 - d(1, I, \theta) > G_0$

The relationship benefits both parties. Renegotiation is not feasible as there exists no contract that benefits the manager without hurting the employee.

(2) $x(1,\theta) - G_1 < -G_0$ and $G_1 - d(1, I, \theta) > G_0$

Given the initial contract the relationship benefits the employee while the manager prefers to quit, that is to lay off the employee. Two sub-settings need to be distinguished.

(a) If $x(1,\theta) - d(1, I, \theta) > 0$, the manager benefits from offering a new contract that pays the employee $\overline{G}_1 = G_0 + d(1, I, \theta)$ if $a = 1$. The employee receives the severance payment and is compensated for his disutility related to hard work. Thus he is left indifferent to being laid off, which is sufficient for him to agree to the renegotiation offer.

(b) If $x(1,\theta) - d(1, I, \theta) < 0$ it does not pay off for the manager to induce $a = 1$ via renegotiation and he decides to lay off the employee and to pay G_0.

(3) $x(1,\theta) - G_1 > -G_0$ and $G_1 - d(1, I, \theta) < G_0$

The initial contract benefits the manager but is unattractive for the employee. The latter would decide to quit without renegotiation. Again two sub-settings need to be distinguished.

(a) If $x(1,\theta)-d(1,I,\theta)>0$ it once more pays off for the manager to offer a new contract that pays $\overline{G}_1 = G_0 + d(1,I,\theta)$ and leaves the employee indifferent between fulfilling the new contract and terminating the relationship.

(b) If $x(1,\theta)-d(a,I,\theta)<0$, as above, the manager prefers not to interfere and lets the employee quit paying G_0.

(4) $x(1,\theta)-G_1 < -G_0$ and $G_1 - d(1,I,\theta) < G_0$

In this case neither the manager nor the employee benefit from sticking to the relationship. Moreover, the above inequalities imply $x(1,\theta)-d(a,I,\theta)<0$. Thus the manager cannot benefit from renegotiation and the relationship is terminated by paying G_0 to the employee.

The analysis above demonstrates that $a=1$ is part of the final contract if and only if $x(1,\theta)-d(1,I,\theta)>0$. Thus the benchmark solution is replicated in the renegotiation game. Given that a is contractible and chosen after all uncertainties have been resolved, however, this result comes as no surprise.

Moreover, we are ready to derive lemma 1.

Lemma 1: The ex ante expected utilities of the manager and the employee are given as follows:

$$EU^M = -G_0 + \int_{\Theta'} [x(1,\theta)-d(1,I,\theta)]f(\theta)d\theta - \int_{\Theta''} [(G_1-G_0)-d(1,I,\theta)]f(\theta)d\theta \qquad (2)$$

and

$$EU^E = G_0 - I + \int_{\Theta''} [(G_1-G_0)-d(1,I,\theta)]f(\theta)d\theta \qquad (3)$$

with $\Theta'' = \{\theta \in \Theta \,|\, x(1,\theta) \geq \mathrm{G}_1 - G_0 \geq d(1,I,\theta)\}$.

Proof:[5]

Summarizing the analysis of the renegotiation game from above we obtain the following net payoffs for the manager and the employee, respectively:

[5] See Nöldeke/Schmidt (1995), p. 169 for a similar approach.

$$U^M = \begin{cases} -G_0 + x(1,\theta) - (G_1 - G_0) & \text{if (1) applies} \\ -G_0 + x(1,\theta) - d(1,I,\theta) & \text{if (2a) or (3a) apply} \\ -G_0 & \text{if (2b), (3b) or (4) apply} \end{cases}$$

$$U^E = \begin{cases} G_0 + (G_1 - G_0) - d(1,I,\theta) & \text{if (1) applies} \\ G_0 & \text{if (2), (3) or (4) apply} \end{cases}$$

Integrating over θ yields (2) and (3).

□

Given Lemma 1 the ex ante optimization problem of the manager can be characterized as follows:

$$\max_{G_0, G_1} EU^M = -G_0 + \int_{\Theta'} [x(1,\theta) - d(1,I,\theta)] f(\theta) d\theta - \int_{\Theta''} [(G_1 - G_0) - d(1,I,\theta)] f(\theta) d\theta$$

s.t.

$$EU^E = G_0 - I + \int_{\Theta''} [(G_1 - G_0) - d(1,I,\theta)] f(\theta) d\theta \geq 0 \qquad \text{(IR)}$$

$$I \equiv \arg\max_{I'} G_0 - I' + \int_{\Theta''} [(G_1 - G_0) - d(1,I',\theta)] f(\theta) d\theta \qquad \text{(IC)}$$

The manager maximizes his expected net payoff subject to an individual rationality constraint (IR) and an incentive compatibility constraint (IC) of the employee. (IR) ensures that the employee is willing to sign the initial contract. We normalize his reservation pay to zero without loss of generality. The second constraint, (IC) states that the employee chooses I as to maximize his personal payoff.

Note that the first best solution to the manager's ex ante optimization problem, is indeed equivalent to the benchmark solution above, as is briefly demonstrated below.
At the optimum the (IR) is binding. Solving the (IR) for G_0 and inserting into the manager's objective function leads

$$\max_I EU^{MFB} = -I + \int_{\Theta'} [x(1,\theta) - d(1,I,\theta)] f(\theta) d\theta ,$$

which is identical to (1) from section 2.1.

In contrast, in the second best setting I is chosen according to (IC). Comparing both expressions leads to proposition 1.

Proposition 1:

If $\Theta'' \subsetneqq \Theta'$ there does not exist a contract that implements first best. Rather, the employee chooses $I^E < I^{MFB}$.

Proof:

Recalling the definition of Θ' the first best problem can be rewritten to obtain

$$EU^{MFB} = -I - \int_{\Theta'} d(1,I,\theta) f(\theta) d\theta + \int_{\Theta'} x(1,\theta) f(\theta) d\theta .$$

In contrast I^E is chosen as to maximize

$$EU^E = G_0 - I + \int_{\Theta''} [(G_1 - G_0) - d(1,I,\theta)] f(\theta) d\theta$$

$$= -I - \int_{\Theta''} d(1,I,\theta) f(\theta) d\theta \quad + G_0 + (G_1 - G_0) \int_{\Theta''} f(\theta) d\theta .$$

Taking the F.O.C. with respect to I we obtain

$$\frac{dEU^{MFB}}{dI} = -1 - \int_{\Theta'} d_I(1,I,\theta) f(\theta) d\theta = 0 \text{ and}$$

$$\frac{dEU^E}{dI} = -1 - \int_{\Theta''} d_I(1,I,\theta) f(\theta) d\theta = 0 .$$

Note that for $\Theta'' \subsetneqq \Theta'$ $\frac{dEU^{MFB}}{dI} > \frac{dEU^E}{dI} \; \forall\, I$ and thus $I^{MFB} > I^E$.

□

Intuitively the investment pays off for the employee, if and only if his net payoff depends on $d(1,I,\theta)$ after renegotiation. This happens only in case (1) as identified above. The probability that case (1) occurs, however is strictly lower than the one that $x(1,\theta) - d(1,I,\theta) > 0$, which drives the investment choice in the first best setting.

Accordingly, the employee's choice of I is below first best and an underinvestment problem, similar to the one identified in Hart/Moore (1988) arises.

4 None of the parties is entitled to terminate the relationship

In this section we assume that none of the parties can unilaterally decide to quit the relationship agreed upon in the initial contract. In fact we implicitly assume that if one party refuses to abide by the contract, a court would step in automatically and enforce the contract. [6] Accordingly, the original contract in this section fixes a payment G_1 to be paid if $a = 1$ but no payment G_0 to be paid in case of termination. At the renegotiation stage, however, the parties are still free to agree on $a = 0$ if this turns out to be attractive.

Starting with the renegotiation game again we identify four relevant cases that parallel the ones from the previous section.

(1) $x(1,\theta) - G_1 > 0$ and $G_1 - d(1, I, \theta) > 0$

Renegotiation does not take place based on the same arguments put forward in section 3.

(2) $x(1,\theta) - G_1 < 0$ and $G_1 - d(1, I, \theta) > 0$

(a) Assume $x(1,\theta) - d(1, I, \theta) > 0$. As the manager cannot terminate the relationship the threat-point present in the first setting is missing here and the best the manager can do is to stick to the original contract.

(b) Assume $x(1,\theta) - d(1, I, \theta) < 0$. Now the manager prefers to renegotiate the contract to implement $a = 0$. To see this, note that offering $\overline{G_0} = G_1 - d(1, I, \theta)$ ensures that the employee is indifferent between contracts and will accept the renegotiation offer. From the manager's perspective, however, $-G_1 + d(1, I, \theta) > x(1,\theta) - G_1$ given that $x(1,\theta) - d(1, I, \theta) < 0$, which renders the renegotiated contract beneficial.

(3) $x(1,\theta) - G_1 > 0$ and $G_1 - d(1, I, \theta) < 0$

(a) Assume that $x(1,\theta) - d(1, I, \theta) > 0$. As the employee cannot terminate the unfavourable relationship, the initial contract remains in place and benefits the manager.

[6] Note that this setting differs slightly from one in which one party needs to sue to ensure that the contract is enforced given that the other one breaches the contract.

(b) Assume $x(1,\theta) - d(a, I, \theta) < 0$. In this case the manager can improve his already favourable situation further by offering a new contract that implements $a = 0$ and pays $\overline{G_0} = G_1 - d(1, I, \theta)$ in the renegotiation setting similar to (2b).

(4) $x(1,\theta) - G_1 < 0$ and $G_1 - d(1, I, \theta) < 0$

Neither the manager nor the employee benefits from the original contract which implies $x(1,\theta) - d(1, I, \theta) < 0$. The best the manager can do to minimize losses is to offer a contract specifying $a = 0$ and to pay $\overline{G_0} = G_1 - d(1, I, \theta)$ to the employee.

Similar to the previous section, the analysis of the renegotiation game allows us to derive the ex ante expected payoffs for both players.

Lemma 2: The expected utilities of the manager and the employee are given as follows:

$$EU^M = -G_1 + \int_\Theta \max\{x(1,\theta); d(1, I, \theta)\} f(\theta) d\theta \tag{4}$$

and

$$EU^E = G_1 - I - \int_\Theta d(1, I, \theta)] f(\theta) d\theta \tag{5}$$

Proof:

Summarizing the analysis of the renegotiation game from above we obtain the following net payoffs for the manager and the employee, respectively:

$$U^M = \begin{cases} -G_1 + x(1,\theta) & \text{if (1), (2a), (3a) apply} \\ -G_1 + d(1, I, \theta) & \text{if (2b), (3b), or (4) apply} \end{cases}$$

$$U^E = G_1 - d(1, I, \theta)$$

Cases (1), (2a), and (3a) are characterized by $x(1,\theta) - d(1, I, \theta) > 0$, while the opposite is true for (2b), (3b), and (4). Thus whenever $x(1,\theta) > d(1, I, \theta)$ the manager “receives“ $x(1,\theta)$, $d(1, I, \theta)$ otherwise.

Integrating over θ yields (4) and (5).

□

Given lemma 2 the ex ante optimization problem of the manager can be characterized as follows:

$$\max_{G_1} EU^M = -G_1 + \int_{\Theta} \max\{x(1,\theta); d(1,I,\theta)\} f(\theta) d\theta$$

s.t.

$$EU^E = G_1 - I - \int_{\Theta} d(1,I,\theta) f(\theta) d\theta \geq 0 \qquad \text{(IR)}$$

$$I \equiv \arg\max_{I'} G_1 - I' - \int_{\Theta} d(1,I',\theta) f(\theta) d\theta \qquad \text{(IC)}$$

The first best solution to the above optimization problem is obtained again ignoring the (IC). The procedure equals the one shown in section 3 and is omitted here.

Comparing (1) to the (IC) from above allows to derive proposition 2.

Proposition 2:

If $\Theta' \subsetneqq \Theta$, there does not exist a contract that implements first best. Rather, the employee chooses $I^E > I^{MFB}$.

Proof:

The employee chooses I as to maximize

$$EU^E = G_1 - I - \int_{\Theta} d(1,I,\theta) f(\theta) d\theta$$

while the manager maximizes

$$EU^{MFB} = -I - \int_{\Theta'} d(1,I,\theta) f(\theta) d\theta + \int_{\Theta'} x(1,\theta) f(\theta) d\theta$$

in the first best setting.

Taking the F.O.C. we obtain

$$\frac{dEU^E}{dI} = -1 - \int_{\Theta} d_I(1,I,\theta) f(\theta) d\theta = 0 \quad \text{and}$$

$$\frac{dEU^{MFB}}{dI} = -1 - \int_{\Theta'} d_I(1,I,\theta) f(\theta) d\theta = 0 .$$

If $\Theta' \subsetneqq \Theta$ it follows that $\frac{dEU^E}{dI} > \frac{dEU^{MFB}}{dI}$ $\forall$ I and thus $I^E > I^{MFB}$.

□

Without an option for layoff, the employee's threat-point at the renegotiation stage is the employed status quo. Thus the manager needs to ensure (at least) indifference between this status quo and the new contract. It follows that the employee's net payoff after renegotiation equals the payoff from the original contract for all realizations of θ. The employee thus always benefits from investment, while in the benchmark setting investment only pays off if $x(1,\theta) - d(1,I,\theta) > 0$. This drives the overinvestment problem identified in proposition 2.

5 Only the employee is entitled to quit

Having identified an underinvestment problem in the setting with two sided options to quit and an overinvestment problem when none of the parties can quit, we continue to investigate an intermediate case. Due to presumed greater practical relevance we analyze the setting in which the employee can terminate the relationship while the manager has no such option, rather than vice versa.

Thus from now on we assume that the employee can either quit or insist on fulfilling his contract before a renegotiation offer is made by the manager. If he decides to quit, he receives a severance payment G_0. Again, this affects the threat-point relevant for renegotiation.

Analyzing the cases identified already in the renegotiation game in section 3 leads to the following outcomes.

(1) $x(1,\theta) - G_1 > -G_0$ and $G_1 - d(1,I,\theta) > G_0$

No changes occur as compared to the first setting. No renegotiation takes place.

(2) $x(1,\theta) - G_1 < -G_0$ and $G_1 - d(1,I,\theta) > G_0$

(a) Assume $x(1,\theta) - d(1,I,\theta) > 0$. The contract benefits the employee, who will insist on working for the firm. As the manager cannot lay off the employee, the best he can do is to stick to the initial contract.

(b) Assume $x(1,\theta) - d(1,I,\theta) < 0$. Here the manager benefits from preventing the employee from working hard. He does so by offering a new contract $\overline{G}_0 = G_1 - d(1,I,\theta)$ that is accepted by the employee.

(3) $x(1,\theta) - G_1 > -G_0$ and $G_1 - d(1,I,\theta) < G_0$

(a) Assume $x(1,\theta) - d(1, I, \theta) > 0$. The employee would decide to quit given he receives no renegotiation offer from the manager. As the relationship is generally efficient, it benefits the manager to offer a contract $\overline{G_1} = G_0 + d(1, I, \theta)$ to ensure that the employee agrees to perform $a = 1$.

(b) Assume $x(1,\theta) - d(a, I, \theta) < 0$. Given such inefficient relationship, as in section 3 the manager prefers not to interfere and lets the employee quit paying him G_0.

(4) $x(1,\theta) - G_1 < -G_0$ and $G_1 - d(1, I, \theta) < G_0$

In this case neither the manager nor the employee benefit from sticking to the relationship. Here, with the employee's option to quit, the manager accepts the employee's decision and pays G_0.

The above considerations lead to lemma 3.

Lemma 3: The expected utilities of the manager and the employee are given as follows:

$$EU^M = -G_0 + \int_{\Theta'} [x(1,\theta) - d(1, I, \theta)] f(\theta) d\theta - \int_{\Theta'''} [(G_1 - G_0) - d(1, I, \theta)] f(\theta) d\theta \quad (6)$$

and

$$EU^E = G_0 - I + \int_{\Theta'''} [(G_1 - G_0) - d(1, I, \theta)] f(\theta) d\theta \quad (7)$$

with $\Theta''' = \{\theta \in \Theta | G_1 - G_0 \geq d(1, I, \theta)\}$.

Proof:

Summarizing the analysis of the renegotiation game from above we obtain the following net payoffs for the manager and the employee, respectively:

$$U^M = \begin{cases} -G_0 + x(1,\theta) - (G_1 - G_0) & \text{if (1) or (2a) apply} \\ -G_0 - (G_1 - G_0) + d(1, I, \theta) & \text{if (2b) applies} \\ -G_0 + x(1,\theta) - d(1, I, \theta) & \text{if (3a) applies} \\ -G_0 & \text{if (3b) or (4) apply} \end{cases}$$

$$U^E = \begin{cases} G_0 + (G_1 - G_0) - d(1, I, \theta) & \text{if (1) or (2) apply} \\ G_0 & \text{if (3) or (4) apply} \end{cases}$$

Integrating over θ yields (6) and (7).

□

Given lemma 3 the ex ante optimization problem of the manager can be characterized as follows:

$$\max_{G_0, G_1} EU^M = -G_0 + \int_{\Theta'} [x(1,\theta) - d(1,I,\theta)] f(\theta) d\theta - \int_{\Theta'''} [(G_1 - G_0) - d(1,I,\theta)] f(\theta) d\theta$$

s.t.

$$EU^E = G_0 - I + \int_{\Theta'''} [(G_1 - G_0) - d(1,I,\theta)] f(\theta) d\theta \geq 0 \qquad \text{(IR)}$$

$$I \equiv \arg\max_{I'} G_0 - I' + \int_{\Theta'''} [(G_1 - G_0) - d(1,I',\theta)] f(\theta) d\theta \qquad \text{(IC)}$$

Again first best as derived in 2.1 is obtained ignoring the (IC). Comparing the manager's first best to the employee's (IC) leads to proposition 3, given that the set of assumptions below holds.

Assumption 1: Define $\Delta G \equiv G_1 - G_0$ with $\Delta G \in [\underline{\Delta G}, \overline{\Delta G}]$

(i) There exists a $\underline{\Delta G}$ such that $[\max\{\underline{\Delta G} - d(1,I,\theta);0\} = 0$ for sure and a $\overline{\Delta G}$ such that $\max\{[\overline{\Delta G} - d(1,I,\theta);0\} = \overline{\Delta G} - d(1,I,\theta)$ for sure.

(ii) $I(\Delta G)$ is a continuous function in ΔG with a unique maximum $I^*(\Delta G)$.

Proposition 3: Choosing $\Delta G = (G_1 - G_0)$ and G_0 appropriately implements the first best.

Proof:

Note that the ex ante probability that $a^* = 1$ is below one. Thus in the benchmark setting I is chosen based on the fact that investment does not pay off in some states of nature θ and does so in others. Choosing $\Delta G = \underline{\Delta G}$ ensures that investment never pays off for the employee. He chooses $I = 0$ and thus under-invests. $\Delta G = \overline{\Delta G}$, in contrast, ensures that investment always pays off for the employee and provides him with incentives to over-invest. From assumption 1 (ii) and the intermediate value theorem it follows that there exists a $\Delta G \in [\underline{\Delta G}, \overline{\Delta G}]$ such that $I(\Delta G^*) = I^*$. Holding ΔG fixed G_0 can be chosen appropriately to satisfy (IR).

□

Recall that in our first setting in section 3 the two-sided option to quit gave rise to an underinvestment problem. In contrast no option to quit in section 4 produced overinvestment. In both settings first best was prevented by the fact, that the ex ante probability of the investment to pay off for the employee differed from the ex ante probability for the whole relationship to be efficient, which is relevant for the benchmark level $I*$. In section 3 this probability was too low; it was too high in section 4. In the actual setting, however, the one sided option to quit effectively provides the manager with an additional degree of freedom that can be used in contracting. In fact $\Delta G = G_1 - G_0$ can be freely chosen by the manager in order to match the probability that the investment pays off for the employee in the second best setting with the probability that it pays off in the benchmark setting. Moreover, G_0 can be chosen to ensure that the (IR) is binding. This is basically the result from Nöldeke/Schmidt (1995).

6 Conclusions

In this paper we consider a relationship between an employee and a manager with specific investment on the side of the employee. We find that an incentive contract designed to align the manager's incentives to those of shareholders at the same time may create an incentive problem with regard to investment incentives of the employee. Given that human capital and ongoing investment therein appears to be of raising importance for many firms, this "side-effect" of what is perceived as good corporate governance might turn out to be problematic. However, with appropriate regulations concerning job termination, incentive contracts are shown to be innocuous.

Our analysis is closely intertwined with several contributions to the hold-up literature. In contrast to that literature, however, our focus is not so much on designing a mechanism that produces first best. Rather we compare different termination rules in order to understand their effect on investment incentives. To do so we contrast different approaches found in the literature and adapt them in order to be able to interpret them in the context of a principal-agent relationship and employment contracting.

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