Career Concerns, Strategy Changes, and Takeovers

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Abstract

The paper analyses the relationship between corporate strategy changes and corporate governance in a moral hazard framework with unknown agent ability. If the CEO possesses private information on the firm’s strategic environment, his incentive scheme optimally includes a “golden parachute” and takeovers increase the compensation of the manager. On the contrary, when there is symmetric information on strategies, a golden parachute is never optimal and takeovers always lower the manager’s incentive pay. Takeovers can make a company more willing to innovate or more conservative, depending on the distribution of bargaining power between acquiring and selling firm, the likelihood of a takeover, and on whether or not the CEO possesses private strategy information.

Keywords: Corporate Governance, Managerial Compensation, Takeovers

1 Introduction

The paper analyses the interplay between managerial compensation, strategy choices and takeovers. I consider a corporation whose shareholders decide whether to stick to the company’s status quo or to undertake a strategy change. The firm can either stay in its established area of business or it can opt for change and shift its resources into a new business field.1 The first part of the paper analyses the case when shareholders and the incumbent manager are equally well informed about the different strategies. The second part focuses on the case when the manager possesses private strategy information.

In a nutshell, the paper argues that the incumbent manager is biased toward the firm’s status quo. When he has superior strategy information, shareholders include a “golden parachute”2 in his compensation scheme to eliminate his

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1 Prominent examples of this type of strategy change are the German corporation Mannesmann, which turned itself from a metal business into a wireless operator in the 1990s (and was later taken over by Vodafone), and the corporation Preussag, which migrated from the metal into the travel business in recent years.

2 A “golden parachute” is a reward for the manager if he is fired by shareholders after poor performance.
bias: while the parachute reduces the manager’s incentive to exert effort, it ensures that he always gives honest investment advice. The prospect of a future takeover reinforces the manager’s status quo bias. When there is symmetric strategy information, the possibility of a takeover allows shareholders to lower the manager’s compensation. When the manager possesses private information, it leads to an increase in the golden parachute.

The analysis is based on the following framework adapted from Crémer (1995). At the beginning of the game, neither the shareholders nor the manager know exactly how productive or competent the latter is. After shareholders have selected a strategy, the manager produces a first observable output, which allows the parties to update their belief about his ability. However, output is an imperfect signal, because it not only depends on ability but also on exogenous noise (and the manager’s effort). With some probability, the type of the manager can also be observed directly: after observing output, the shareholders may discover information about the circumstances of the manager’s performance which allows them to disentangle noise and ability. That way they can perfectly infer his ability. Based on the information which they have gathered, shareholders decide whether to retain the manager or to fire him. If they were able to directly monitor the manager’s type, their replacement policy is optimally only based on the observed ability and not on output. Otherwise, they have to rely on output to assess the manager’s ability. In this case, the manager is always fired if he performed poorly since it is (imperfect) evidence that he is of low quality. The manager always wants to keep his job in order to enjoy future private benefits.

In this framework, the manager may be exposed to implicit incentives or “career concerns”. The threat of being fired after poor performance provides an incentive to exert high effort (in addition to the explicit incentive from a compensation scheme). High effort reduces the probability of a low output and thus decreases the risk of being fired. Of course, this effect only works to the extent that shareholders need to rely on output when making a firing decision. It hinges on the deficiency of shareholders’ monitoring ability. If shareholders could always directly observe the manager’s ability after he has produced a first result, there would be no “career concerns”: shareholders would always base their firing decision on the observed ability whereas output, a noisy signal, would no longer affect their replacement policy. Hence, there would be neither a need nor a possibility for the manager to signal his competence through high output. Thus, the less efficient the shareholders’ monitoring technology, the greater the pressure on the manager to signal his quality through high output. This implicit incentive allows shareholders to reduce the compensation which they need to pay to induce a high effort.

I assume that the probability of directly observing the manager’s type is greater if the firm sticks to the status quo than if it decides to innovate. This can be justified on the grounds that it is more difficult to disentangle noise and managerial ability for an innovation because of its idiosyncrasy: it cannot easily be compared to other investments. Shareholders should be more likely to succeed in distilling the ability of the manager if the company does “business

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3 The literature on career concerns was pioneered by Holmstrom (1999). For a textbook treatment of implicit incentives see Bolton and Dewatripont (2005).

4 I use the terms routine strategy and status quo as well as the terms innovation and strategy change interchangeably in the paper.
as usual”. The difference in monitoring ability is the defining feature which distinguishes an innovation strategy from the status quo in this model.

With a less efficient monitoring technology, the manager is exposed to stronger implicit incentives. Of course, the manager does not like to be exposed to such additional pressure. Hence, he is better off if the firm sticks to the status quo. There is managerial conservatism.

Under symmetric strategy information, shareholders’ only concern when designing the manager’s compensation scheme is to ensure that he exerts high effort. If there is asymmetric strategy information, shareholders also want to induce the manager to reveal his private information truthfully. To do so they have to counter his status quo bias. Under reasonable restrictions on the type of contracts which the parties can sign, this can only be accomplished through a golden parachute.

I analyse the effect of takeovers by considering two ex-ante identical firms which operate in the framework described above. Each firm initially employs a manager of unknown ability and selects a strategy. After the managers have delivered first performances in their respective firms, the beliefs about their ability are updated. A takeover can then occur with the purpose of letting the more competent manager run both firms. For example, if the manager in firm $j$ is discovered to be of higher ability than the manager in firm $k$, firm $j$ acquires firm $k$ and its manager gets to run both firms. Since managerial ability is initially unknown, it is apriori not clear which company will turn out to be the target and which will be the bidder. If there is symmetric strategy information, the possibility of a takeover leads to a reduction in managerial compensation. From the manager’s perspective, takeovers constitute an opportunity to enjoy additional private benefits from running a second firm. If he succeeds in proving his ability, the manager not only gets to keep his old job, he might even be able to run another firm (if his rival failed to prove his ability). As a consequence, the manager is exposed to stronger career concerns which allows shareholders to reduce his compensation compared to the single-firm case. Career Concerns are always stronger if the company innovates due to less efficient monitoring. Hence, the reduction in compensation is larger than if the firm stuck to the status quo. Thus, takeovers reinforce the manager’s status quo bias. If there is asymmetric strategy information, the prospect of a takeover always necessitates an increase in the golden parachute to counter the stronger status quo bias.

The paper is related to several branches of the existing literature. First of all, there is the literature on corporate investment and agency conflicts. Hölmstrom and Ricart i Costa (1986) use a career concern framework to demonstrate that risk-averse managers might be reluctant to undertake new investments: a new investment reveals new information about the manager’s productive abilities and may thus cause variations in his future compensation. Unless the risk-averse manager is insured against this human capital risk, he prefers not to implement any new project. The following analysis provides a different rationale for conservatism. I consider a risk-neutral manager who has to exert unobservable effort and is protected by limited liability. The manager may be reluctant to undertake a new project because this exposes him to implicit incentives, which allows shareholders to reduce his monetary compensation. A recent paper on agency conflicts and strategy changes is Dow and Raposo (2005), who

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5 See Stein (2003) for a general survey on agency conflicts and corporate investment.
argue that CEOs are biased toward overly ambitious strategy changes. In their paper, the manager’s bias results from differences in effort cost and in the success probability. In my paper, the underlying technological parameters are the same for the different strategies. I introduce uncertainty about the manager’s competence and let the strategies differ in the way that ability information is updated which delivers the opposite conclusion, namely conservatism instead of activism.

The paper is also related to the literature on takeovers. Most of this literature focuses on the takeover mechanism itself and its ex-post effects (see Becht, Bolton and Roell for a survey (2003)), whereas this paper focuses on the change of incumbent management’s behavior in response to the possibility of a takeover, i.e. on the ex-ante effects. One of the few papers which deals with the ex-ante effects of takeovers is Scharfstein (1988), who considers the problem of managerial effort provision and shows that takeovers can play a disciplinary role, prompting managers to increase effort to avoid takeovers. This paper focuses on both the problem of effort provision and the problem of information elicitation. It shows that the effect of takeovers the agency conflict between the manager and shareholders is ambiguous. They reinforce the manager’s status quo bias and thus exacerbate the agency conflict between management and shareholders if there is asymmetric strategy information.

The next section presents the setup of the model. In section 3, I consider the single-firm case with symmetric strategy information and show that there is managerial conservatism. Section 4 discusses the effect of takeovers in this setting. In section 5, I analyse contracting under asymmetric strategy information in a single-firm setting. Finally, section 6 considers the effect of takeovers under asymmetric strategy information.

2 Presentation of the Model

The model focuses on a corporation which is owned by risk-neutral shareholders and run by a single, risk-neutral manager. In a first stage, the shareholders have to choose between two mutually exclusive strategies, denoted by $s \in \{r, i\}$: the company can either pursue a routine activity ($s = r$) or an innovation ($s = i$). In the second stage, the chosen strategy is implemented by the incumbent manager.

Information Structure. The paper compares contracting and strategy choices under two different information structures. In the first part of the paper, there is only one information asymmetry. Once shareholders have selected a strategy, its implementation always requires the manager’s effort which is unobservable. Only final output is observable and verifiable and therefore contracts can condition on its value.

In the second part of the paper, the manager also possesses private strategy information. While both parties are equally well informed about the characteristics of the routine strategy, the manager privately observes a signal about the profitability of the innovation before shareholders make their choice. After observing the signal, he recommends a decision to the shareholders. Information is assumed to be soft, i.e. in his recommendation, the manager can over- or understate the profitability of the innovation.\(^7\)

\(^6\)For a recent survey of the takeover literature see Burkart and Panunzi (2007).

\(^7\)Hard information can be freely and instantaneously verified by the other party. Soft
Finally, the model also includes an element of incomplete (but symmetrically held) information. There is uncertainty about the manager’s intrinsic ability. Initially, neither the firm nor the manager know exactly how productive the latter is. Both parties share a prior belief about his ability, which they can update during the implementation phase.

Technology. After shareholders have selected a strategy, there are two periods of implementation. In the first period of production, the firm’s output is determined by managerial effort, ability, and luck. Managers can be of two types, either competent, denoted by $\theta$, or incompetent, denoted by $\bar{\theta}$. The prior probability that a manager is competent is $p$ in $(0,1)$ which is also the proportion of competent agents in the labor market. An incompetent manager always produces an output of zero in the first period. The performance of a competent agent depends on his effort. If he exerts a high effort, he generates a strategy-dependent return $R_s > 0$ (with $s \in \{i, r\}$) with probability $q_h$ and 0 with probability $(1 - q_h)$. These probabilities are $q_l$ and $(1 - q_l)$ respectively if he exerts a low effort, with $q_l < q_h$. A low effort allows the manager to enjoy a private benefit $B > 0$.

Second-period payoffs only depend on the manager’s type. The value to the shareholders of rehiring a competent manager is $\pi_2 > 0$. An incompetent manager always generates a second-period profit of 0. A competent manager enjoys a second-period rent $u_2 > 0$ if he is retained while an incompetent one gets a payoff of 0.

After the first period of production shareholders decide whether to retain the incumbent manager. The parties can update their belief regarding the manager’s type after the first period based on the observed output. Shareholders also possess a monitoring technology which allows them to observe directly the incumbent manager’s type with probability $x_s$ after the first period, where $s \in \{r,i\}$. Monitoring is costless.

Strategies. The innovation and routine strategy differ with respect to the first-period payoff $R_s$ and with respect to the monitoring technology, captured in $x_s$. In case of first-period success, the routine strategy yields $R_r$ while the innovation strategy yields $R_i = R_r + \epsilon$, where $\epsilon$ is a random variable following some distribution $F(\epsilon)$ on $\mathbb{R}^+$. The distribution function $F(\epsilon)$ is common knowledge.

With respect to the monitoring technology, I assume that monitoring is more likely to be successful if the firm sticks to the routine activity. If shareholders choose the routine strategy, they can perfectly observe the manager’s ability after the first period with probability $x_r = \alpha$. If they choose the innovation, they can do so with probability $x_i = \beta$. By assumption, $\beta < \alpha$. In general, the monitoring technology captures the idea that shareholders can ex-post examine the reasons for the manager’s poor performance and thus determine his ability. They can find out whether the performance was due to bad luck or incompetence. The above assumption simply states that the shareholders are more likely to succeed in disentangling the two effects if the firm does “business

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In the spirit of Burkart, Gromb, and Panunzi (1997), the levels of $\alpha$ and $\beta$ can be thought as being determined by the firm’s ownership structure. For a firm with dispersed outside ownership, $\alpha$ and $\beta$ would be lower than for a firm with concentrated ownership. I discuss the relationship between ownership concentration and strategy choice in Section 7.
Contracts. The manager is protected by limited liability. His reservation utility level is zero. At the very beginning of the game, before shareholders have picked a strategy, the parties sign a contract which specifies payments from the shareholders to the manager contingent on his performance during the implementation phase. Contracts are incomplete in the sense that the initial contract cannot be made contingent on the subsequent strategy choice of the shareholders. The strategy decision is observable, however, and the initial contract can be renegotiated after shareholders have chosen a strategy and before production begins. Furthermore, I assume that shareholders cannot commit to fire or rehire the manager after the first period of production.

Timing. The timing can be summarized as follows:

(i) The game starts with a contract offer from the shareholders to the manager.\(^9\)
(ii) Nature draws \(\epsilon\), the extra payoff of the innovation strategy, according to the distribution function \(F(\epsilon)\).
(iii) Shareholders select a strategy \(s \in \{r, i\}\).
(iv) The parties can renegotiate the contract signed in (i).
(v) Production begins: the manager chooses his effort.
(vi) First-period output is publicly observed and the manager is rewarded according to the terms of the contract in place.
(vii) If monitoring is successful, the parties observe the manager’s ability.
(viii) Shareholders decide whether to retain the incumbent manager or to hire a new manager from the labour market.
(viiii) Second-period production takes place.

The first part of the paper (Sections 3 and 4) focuses on the case where the signal at stage (ii) is publicly observed. Hence, there is symmetric strategy information. The second part of the paper (Sections 5 and 6) studies the case where the signal at stage (ii) is always privately observed by the manager. After the manager has privately observed his signal, he recommends a decision to shareholders before they make their choice at stage (iii). In the following, I will always refer to the contract signed in (i) as the ex-ante contract. If I speak of a contract without further precision, I mean a contract which is in place at stage (iii).

3 Symmetric Strategy Information

This section focuses on the case of symmetric strategy information. At the beginning of the game, shareholders do not know which strategy they will pursue. There is uncertainty with respect to \(R_i\), the profitability of the innovation. While the distribution \(F(\epsilon)\) is known, the exact value of \(\epsilon\) is only observed after the manager has been hired. After observing \(\epsilon\), shareholders decide whether to

\(^9\)According to Holmstrom (1989), the distinguishing features of an innovation compared to a standard investment project are its riskiness, its unpredictability, its labor intensiveness, and idiosyncracy. This paper focuses on idiosyncracy which is reflected in the difference in monitoring ability.

\(^{10}\)Since the manager is protected by limited liability and his reservation utility is normalized to be zero I ignore the manager’s participation constraint in the following analysis.
stick to the status quo or to innovate. When designing the manager’s incentive scheme, shareholders’ only concern is to ensure that he exerts high effort during the implementation of the selected strategy. After deriving the optimal contract, I present the shareholders’ optimal investment rule and discuss the manager’s strategy bias.

3.1 The optimal incentive scheme

It is instructive to start the analysis by considering the shareholders’ replacement policy after the first period. Shareholders can always fire the manager and hire a new manager from the labor market of quality $p$. If the manager succeeded in the first period, i.e. produced an output $R_s$, there is no doubt about his competence. The posterior probability $p'$ that he is competent is equal to one and he is retained since $\pi_2 > p\pi_2$. If he produced a zero outcome, the posterior probability $p'$ is below $p$. Shareholders then prefer to rehire a new manager from the labor market (since $p\pi_2 > p'\pi_2$) unless monitoring is successful and shows the manager to be competent. If monitoring proves his competence, shareholders will rehire the manager despite of his poor first-period performance.

Let $w = (w^S, w^0, w^F)$ denote the ex-ante contract which the parties sign at the beginning of the game. It includes payments to the manager in case of success ($w^S$), in case of a zero outcome ($w^0$), and in case the manager is replaced after the first period ($w^F$). The payment $w^F$ can be interpreted as a golden parachute or a severance payment. Let $(w^S_s(w), w^0_s(w), w^F_s(w))$ denote the contract which is in place after strategy $s \in \{i, r\}$ has been chosen and the ex-ante contract $w$ has been renegotiated.

In the following, I first consider each strategy in isolation and derive the optimal strategy-specific incentive scheme, i.e. the compensation scheme which shareholders would put in place in the absence of any prior contracting after they have chosen a strategy. In a next step, I show that shareholders can always implement these respective optimal compensation schemes despite the fact that the ex-ante contract is incomplete. Shareholders can simply rely on renegotiation to put in place the right contract given their strategy choice.

Consider first the routine strategy. When determining the optimal incentive scheme $(w^S_r, w^0_r, w^F_r)$ for the routine strategy, shareholders solve the following problem:

$$\max_{w^S_r, w^0_r, w^F_r} \pi_r = pq_h(R_r - w^S_r + \pi_2) + p(1 - q_h)\alpha\pi_2 + (1 - pq_h)(-w^0_r)$$

$$+ [p(1 - q_h)(1 - \alpha) + (1 - p)](p\pi_2 - w^F_r)$$

subject to

$$\begin{cases}
pq_h(w^S_r + u_2) + p(1 - q_h)\alpha u_2 + (1 - pq_h)w^0_r \\
+ [p(1 - q_h)(1 - \alpha) + (1 - p)]w^F_r \\
\geq pq_l(w^S_r + u_2) + p(1 - q_l)\alpha u_2 + (1 - pq_l)w^0_r \\
+ [p(1 - q_l)(1 - \alpha) + (1 - p)]w^F_r + B \\
w^S_r, w^0_r, w^F_r \geq 0
\end{cases}$$

(1)
With probability $pq$ the manager produces a first-period output of $R_r$ and receives a wage $w^S_r$. He is rehired which yields a second-period profit of $\pi_2$ to shareholders. The second summand in the objective function refers to the case when the manager is competent but unlucky in the first period (which occurs with probability $p(1 - q_h)$) and monitoring is successful. He is rehired which yields a sure second-period profit $\pi_2$ to shareholders. Concerning the incentive compatibility constraint, the left-hand side gives the manager’s expected rent if he exerts high effort, the right-hand side if he exerts low effort. By assumption the manager does not know his own type when choosing his effort. With probability $p(1 - q_h)\alpha$ the manager is rehired despite of poor performance and obtains the continuation utility $u_2$. Obviously shareholders never want to reward poor performance. Therefore, $w^0_r$ and $w^F_r$ are optimally set equal to 0. The optimal compensation scheme, which induces the agent to exert high effort is

$$
(w^S_r, w^0_r, w^F_r) = \left( \frac{B}{\rho d q} - u_2(1 - \alpha), 0, 0 \right)
$$

(2)

where $\delta q = q_h - q_l$. The manager is exposed to implicit incentives. The prospect of a second-period rent $u_2$ serves as a partial substitute for the necessary monetary compensation in the first period. The implicit incentive is stronger if the monitoring technology is less efficient, i.e. if $\alpha$ is low. The argument is the same as in Crémé (1995).\(^{11}\) Efficient monitoring makes it more difficult to threaten the agent with dismissal after poor performance. This can be seen easily by considering the case $\alpha = 1$. With perfect monitoring the agent’s first-period performance does not affect the chance of being rehired and the optimal compensation corresponds to the one in a single-period setting (which is $w^S_r = \frac{B}{\rho d q}$)

The manager’s expected rent is

$$
U_r(w^S_r, w^0_r, w^F_r) = pq_h(w^S_r + u_2) + p(1 - q_h)\alpha u_2 = u + p\alpha u_2
$$

(3)

where $u = \frac{q_l B}{\delta q}$ can be interpreted as the first-period rent. The total rent $U_r$ is increasing in the monitoring ability of the shareholders. The manager is better off if he is monitored more closely.

In a next step I consider the optimal incentive scheme when shareholders pursue the innovation strategy. It is straightforward to see that the analysis coincides with the one for the routine strategy when $\alpha$ is replaced by $\beta$. Hence, the optimal contract is

$$
(w^S_i, w^0_i, w^F_i) = \left( \frac{B}{\rho d q} - u_2(1 - \beta), 0, 0 \right).
$$

(4)

The wage is lower than for the routine strategy. Due to less efficient monitoring the manager is exposed to stronger implicit incentives. This lowers his expected rent which is

$$
U_i(w^S_i, w^0_i, w^F_i) = pq_h(w^S_i + u_2) + p(1 - q_h)\beta u_2 = u + p\beta u_2.
$$

(5)

\(^{11}\)The idea that monitoring can stifle incentives is explored in a different framework in Aghion and Tirole (1997).
The decrease results from the aggregation of two effects. The manager’s position is less secure when the company innovates and his first-period compensation is lower. Shareholders’ expected profit is

\[
\pi_i = pq_i(R_i - w^{S*}_2) + p(1 - q_h)\beta \pi_2 \\
+ p(1 - q_h)(1 - \beta)p\pi_2 + (1 - p)p\pi_2
\]  

(6)

It can easily be checked that the above incentive schemes can be implemented even if the ex-ante contract is incomplete in the sense that it cannot condition on strategy choice. This is due to the fact that there is a renegotiation stage after the strategy has been selected. One possible solution is for the parties to sign an initial contract \( w \) which corresponds to the one for the innovation strategy given in (4). If shareholders subsequently decide to innovate, no renegotiation occurs (I will present the shareholders’ optimal decision rule momentarily). If shareholders decide to the stick to the status quo, the initial contract is renegotiated and replaced by the one given in (2). Shareholders prefer to offer a new contract since the initial contract would not induce high effort under the routine strategy.

3.2 Shareholders’ investment rule and the manager’s strategy bias

After observing the realization of \( \epsilon \), the difference in rewards in case of first-period success, shareholders have to pick a strategy. It is convenient to express their investment rule in terms of a hurdle rate for \( \epsilon \). A comparison of expected profits yields the following result:

**Proposition 1.**

Shareholders optimally select the innovation strategy if \( \pi_i > \pi_r \) which is equivalent to

\[
\epsilon > \bar{\epsilon} \equiv (\alpha - \beta) \frac{(1 - q_h)}{q_h} \pi_2(1 - p) - (w^{S*}_2 - w^{S*}_1) = (\alpha - \beta) \frac{(1 - q_h)}{q_h} \pi_2(1 - p) - u_2(a - \beta).
\]

Intuitively, it is optimal to implement the innovation whenever its extra payoff, \( \epsilon \), is large. The threshold level may be smaller or greater than zero. The first summand captures the advantage of the routine strategy relative to second-period profits due to a more efficient monitoring technology. If the replacement policy is only based on the manager’s performance, it is inefficient because even a competent manager is sometimes dismissed and the company rehires randomly from the managerial labor market. Shareholders are less prone to make this mistake if the company does “business as usual”. Note that the first summand vanishes if \( \alpha = \beta \). The second summand is positive and thus lowers the threshold level. It reflects the adverse effect of monitoring on first-period incentives which reduces first-period profits. Depending on which of the two effects dominates, \( \bar{\epsilon} \) may positive or negative. Furthermore, the threshold level is decreasing in \( p \), the quality of the managerial labor market. A high level of \( p \) reduces the value of the monitoring technology by reducing the cost of erroneously replacing a good manager. Hence, it dilutes the relative advantage of the routine strategy.

The continuation utility \( u_2 \) can be interpreted not only as the manager’s private benefit on the job but more broadly as his career prospects. These

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12 This result corresponds to Lemma 1 in Crémer (1995).
are likely to be larger for a younger manager. Following this interpretation, the above proposition says that companies which are run by younger managers should innovate more.

In a next step, I turn to the manager’s preferences over the different strategies, which will become relevant once the assumption of symmetric strategy information is dropped. From the manager’s perspective, a comparison of the two strategies gives the following result:

**Proposition 2.**
The manager is biased toward the routine activity:

\[ U_r - U_i = (\alpha - \beta)pu_2 > 0. \]

The factor \((\alpha - \beta)\) can be interpreted as measure of the radicalness of the innovation. If the new business area is closely related to the firm’s established line of business, shareholders are more likely to have the necessary expertise to monitor the manager almost as efficiently as if the firm continued to do business as usual. Hence, \(\beta\) is close to \(\alpha\). The more radical the strategy change, the greater the gap between the two, and the stronger the manager’s status quo bias.  

4 Takeovers with symmetric strategy information

In this section, I analyse the effect of takeovers on the manager’s compensation, his strategy bias, and the shareholders’ investment rule. Does an active market for corporate control lead to more innovation? Do takeovers play a disciplinary role, mitigating the agency conflict between shareholders and the manager?

To address these questions, I assume that there are two firms, \(j\) and \(k\), and that each is endowed with the technology used in the previous section. Each firm initially hires an agent of quality \(p\) from the managerial labor market and faces the decision problem explored above: it has to choose one of two strategies which is subsequently implemented by its manager (who might be replaced after the first period). After the first period of production either firm can acquire the other one. If a takeover occurs, the manager in the target firm is replaced by the manager in the acquiring firm. This change of a management is the defining feature of a takeover in the ensuing analysis.

Concerning the takeover mechanism, I assume that first-period performances are publicly observable. The result of a firm’s monitoring activity is private information. After the observation of first-period outcomes and monitoring, a takeover can occur. To allow for a range of bargaining powers, I make the following assumption: With probability \(z\), the target firm has all the bargaining power and makes a take-it-or-leave-it offer to the acquiring firm to be acquired for a price \(P\). With probability \((1 - z)\), the acquiring firm makes a take-it-or-leave-it purchase offer \(P\) to the target firm. Thus \(z\) is a measure of the selling firm’s bargaining power. \(^{14}\) I assume that a firm accepts an offer if it is

\(^{13}\)This contrasts with Dow and Raposo (2005) who argue that managers are biased toward radical change.

\(^{14}\)For example, the argument justifying the seller’s bargaining power can be based on Grossman and Hart’s (1980) free-riding argument according to which a raider cannot offer less than the post-acquisition value of the firm.
indifferent.

With respect to the technology, there is independence between the firms’ production processes in the first period. Differences in first-period performance can therefore be due to luck or to a difference in managerial ability. If a takeover occurs, the merged firm produces a profit of $2\pi_2$ if the manager in charge is competent and 0 otherwise. The manager who is in charge of the merged firm enjoys a second-period rent $2u_2$ if he is competent and zero otherwise.

Finally, I assume that strategy choices are made simultaneously. Hence, firms do not observe their rival’s strategy choice. Each firm correctly attaches a probability $\tau_l$ to the event that the other firm innovates and a probability $(1 - \tau_l)$ to the event that the other firm sticks to the status quo (with $l \in \{j,k\}$).

The rationale for takeovers in this setup is the installation of a more competent manager in the target firm. A takeover occurs when one manager is discovered to be competent (whether through monitoring or first-period success), while the other is not. From an ex-ante perspective (i.e. in ignorance of the rival’s strategy choice), the chance that firm $j$ is taken over given that its own manager is not discovered to be competent, is

$$t_k = \left[ pq_h + p(1 - q_h)(\tau_j \beta + (1 - \tau_k)\alpha) \right].$$

which is simply the probability that the manager in firm $k$ is discovered to be competent. Importantly, this probability of being taken over is decreasing in $\tau_k$, the probability that the other firm innovates. If firm $j$ innovates, it expects to be acquired by firm $k$ with probability $[1 - (pq_h + p(1 - q_h)\beta)t_k]$, where the first term in squared brackets is the probability that firm $j$’s manager is not discovered to be competent. If firm $j$ instead sticks to the status quo, it expects to be acquired with probability $[1 - (pq_h + p(1 - q_h)\alpha)t_k]$. Due to better monitoring the first term in brackets is lower than in the previous case. Conversely, if firm $j$ innovates it expects to acquire firm $k$ with probability

$$[pq_h + p(1 - q_h)\beta](1 - t_k).$$

and with probability

$$[pq_h + p(1 - q_h)\alpha](1 - t_k)$$

if it sticks to the status quo. The probability of making an acquisition increases if firm $k$ is more likely to innovate.

What is the effect of takeovers on managerial compensation and the shareholders’ investment rule? From the manager’s perspective takeovers create the opportunity of taking the other firm over and thus enjoying a greater second-period rent. Since the manager is already subjected to a strict replacement policy in autarky, they do not jeopardize his position. Shareholders have to take into consideration two effects. There is the effect on second-period profits, through a sale or through an acquisition. They also need to consider the necessary adjustments in the manager’s compensation scheme.

### 4.1 The optimal incentive scheme

As in the previous section, I consider each strategy in isolation and present the respective optimal compensation scheme. Again, these respective optimal schemes can be implemented due to renegotiation. I first analyse the effect of
takeovers when firm $j$ pursues the routine strategy. In order to determine their manager’s incentive scheme, shareholders of firm $j$ solve the following problem:

$$\max_{w_{rT}^*, w_{rT}^0, w_{rT}^F} \pi_{rT} = pq_h (R_r - w_{rT}^S + \pi_2^0) + (1 - p\pi_h) \alpha \pi_2 + (1 - p\pi_h)(-w_{rT}^0)$$

$$+ [p(1 - q_h)(1 - \alpha) + (1 - p)]((1 - t_k)z + t_kz - w_{rT}^F)$$

$$+ [pq_h + p(1 - q_h)\alpha]((1 - z)\pi_2(1 - p)(1 - t_k))$$

subject to

$$\begin{align*}
&pq_h (w_{rT}^S + u_2) + p(1 - q_h) \alpha u_2 + (1 - p\pi_h) w_{rT}^0 \\
&+ [pq_h + p(1 - q_h)\alpha](1 - t_k) u_2 + [p(1 - q_h)(1 - \alpha) + (1 - p)] w_{rT}^F \\
&\geq pq_h (w_{rT}^S + u_2) + p(1 - q_h) \alpha u_2 + (1 - p\pi_h) w_{rT}^0 + B \\
&+ [pq_h + p(1 - q_h)\alpha](1 - t_k) u_2 + [p(1 - q_h)(1 - \alpha) + (1 - p)] w_{rT}^F \\
&w_{rT}^S, w_{rT}^0, w_{rT}^F \geq 0
\end{align*}$$

The changes relative to the autarky problem in the previous section are straightforward. Shareholders’ expected second-period profit increases. Consider the second line in the objective function which captures the “selling-opportunity” created by takeovers. In case of a first-period outcome of zero and unsuccessful monitoring, shareholders of firm $j$ obtained an expected second-period profit of $p\pi_2$ in the absence of takeovers (by hiring a manager from the labor market). Now, they ex-ante expect to obtain $(1 - t_k)z \pi_2 + (t_kz) \pi_2 > p\pi_2$. With probability $t_kz$, firm $k$’s manager is discovered to be competent and shareholders of firm $j$, holding all the bargaining power, can sell their company for $P = \pi_2$. Otherwise, they still receive $p\pi_2$. The third line in the objective function reflects the “acquisition opportunity”, i.e the expected gain for shareholders in firm $j$ from acquiring firm $k$. With probability $(1 - t_k)(1 - z)$, the manager in firm $k$ failed to prove his competence and firm $j$, possessing all the bargaining power, can acquire firm $k$ for $P = p\pi_2$ which yields a second-period profit of $\pi_2 - P = \pi_2(1 - p)$. Concerning the incentive compatibility constraint, the manager’s expected second-period utility increases. If he is rehired there is the possibility of taking the other firm over and enjoying an additional rent $u_2$. This occurs with probability $[pq_h + p(1 - q_h)\alpha](1 - t_k)$.

It can easily be checked that the optimal contract is

$$\begin{pmatrix} w_{rT}^S, w_{rT}^0, w_{rT}^F \end{pmatrix} = \left( \frac{B}{\rho \delta q} - u_2(1 - \alpha) - u_2(1 - \alpha)(1 - t_k), 0, 0 \right).$$

The optimal reward in case of success, $w_{rT}^S$, is lower than the one under autarky given in (2). The only difference between the two is the third summand on the right hand side above. Note that $w_{rT}^S = w_0^S$ if $t_k = 1$. If the probability of acquiring firm $k$ is equal to zero, takeovers do not affect the compensation scheme for the manager in firm $j$. The prospect of being on the winning side of a takeover in the future provides an incentive to work harder today, allowing shareholders to reduce the necessary monetary compensation.

The manager’s expected rent with the routine strategy is equal to
The possibility of a takeover increases the manager’s expected rent. The third term represents the expected rent from acquiring firm \( k \), which is increasing in \( \tau_k \), the probability that firm \( k \) innovates.

In a next step, I consider the effect of takeovers if firm \( j \) decides to innovate. The analysis coincides with the one above when \( \alpha \) is replaced by \( \beta \). Hence, the optimal contract is

\[
(w_{iT}^{S*}, w_{iT}^{0*}, w_{iT}^{F*}) = \left( \frac{B}{p\delta q} - u_2(1 - \beta) - u_2(1 - \beta)(1 - \tau_k), 0 \right). \tag{13}
\]

Takeovers also reduce the compensation for the innovation strategy. The gap between the compensation for the two strategies widens relative to the autarky case \( (w_{iT}^{S*} - w_{iT}^{0*}) > (w_{iT}^{S*} - w_{iT}^{i*}) \). The manager’s expected rent increases compared to autarky and is equal to

\[
U_{iT}(w_{iT}^{S*}, w_{iT}^{0*}, w_{iT}^{F*}) = u_1 + p\beta u_2 + p\beta u_2(1 - \tau_k). \tag{14}
\]

### 4.2 Shareholders’ investment rule and the manager’s strategy bias with takeovers

In this section I analyse the effect of takeovers on the shareholders’ investment rule and the manager’s strategy bias. It is instructive to consider first the change in managerial compensation due to takeovers which is summarized in the following lemma:

**Lemma 1.**

Takeovers lead to a decrease in managerial compensation, irrespective of shareholders’ strategy choice. The decrease in compensation is always larger for the innovation than for the routine strategy.

A proof is omitted since the lemma follows immediately from the discussion in the previous subsection. The prospect of running a larger firm in the future in the event of an acquisition provides an incentive for the manager to work harder today. This allows shareholders to reduce first-period compensation, the more so the less efficient their monitoring technology.

In a next step I consider the effect of takeovers on the shareholders’ investment rule:

**Proposition 3.**

Shareholders optimally select the innovation strategy if \( \pi_{iT} > \pi_{rT} \) which is equivalent to

\[
\epsilon \equiv \frac{[2 - t_k - z](1 - \tau_k)(\alpha - \beta)\pi_2(1 - p) - (w_{iT}^{S*} - w_{iT}^{0*}) - (w_{iT}^{S*} - w_{iT}^{F*})}{q\delta}. \tag{13}
\]

Takeovers may lower or raise the threshold level for the innovation compared to the single-firm case. According to Lemma 1, the positive impact of takeovers on first-period profits due to lower incentive pay is always more pronounced for the innovation strategy. The second summand in the above expression, which captures the wage difference, is therefore larger than in \( \bar{\epsilon} \). The first summand reflects the difference in second-period profits due the difference in monitoring ability. The only change relative to autarky is the term in brackets, \([2 - t_k - z]\). It
is instructive to consider two polar cases. Suppose \( z = 1 \), i.e. all the bargaining power rests with the seller if a takeover occurs. Then \([2 - t_k - z] = [1 - t_k] < 1\) and the first summand decreases compared to autarky. The intuition is as follows. In this case, takeovers only provide a profitable selling opportunity. (An acquiring firm never makes any profit.) If the manager did not turn out to be competent, shareholders have a chance of selling the firm to the rival at \( P = \pi_2 \), rather than drawing on the managerial labor market which yields \( p\pi_2 \). Thus, takeovers dilute the advantage of the routine strategy. The ability to pursue a more efficient replacement policy due to better monitoring becomes less valuable. As a result, if \( z = 1 \), takeovers always lower the threshold level \((\hat{\epsilon}^T < \hat{\epsilon})\). Both the effect on first-period incentives and the effect on second-period profits make innovation more attractive.

If \( z = 0 \), this is not necessarily the case. The first summand increases compared to autarky (since \( 2 - t_k > 1 \)). When the acquiring firm has all the bargaining power the “selling opportunity effect”, described above, disappears. Instead, the ability to monitor becomes more valuable and hence the status quo becomes more attractive. In the single-firm case, the cost of an inefficient replacement policy (i.e. the forgone profit from firing a competent but unlucky manager) is \( \pi_2(1 - p) \). With takeovers and \( z = 0 \), this cost increases to \( \pi_2(1 - p)[2 - t_k] \) since the firm also forgoes the potential profit from acquiring its rival. As a consequence, the threshold level may increase or decrease compared to autarky.

In a next step I consider the interdependence of the firms’ strategy decisions and analyse whether firm \( j \) is more or less likely to innovate if firm \( k \) innovates. Strategic complementarity is equivalent to \( \delta \hat{\epsilon}^T \delta\tau_k < 0 \). If the probability that firm \( k \) innovates increases, the threshold level for firm \( j \) decreases. On the contrary, if \( \delta \hat{\epsilon}^T \delta\tau_k > 0 \), there is strategic substitutability. If the probability that firm \( k \) innovates increases, firm \( j \) is more likely to stick to the status quo.

**Corollary 1.**
The firms’ strategy decisions can be complements or substitutes.
If \( \hat{\epsilon} > 0 \), there is strategic substitutability \((\delta \hat{\epsilon}^T \delta\tau_k > 0)\).
If \( \hat{\epsilon} < 0 \), there is strategic complementarity \((\delta \hat{\epsilon}^T \delta\tau_k < 0)\).

It can easily be checked, that \( \delta \hat{\epsilon}^T \delta\tau_k \) is equivalent to \((- \hat{\epsilon} \delta\tau_k \delta\hat{\epsilon}^T)\). Hence, if \( \hat{\epsilon} \) is greater than zero there is strategic substitutability, otherwise there is strategic substitutability. The intuition is as follows. If \( \tau_k \) increases, firm \( j \) is more likely to acquire firm \( k \) which increases the implicit incentive of the manager in firm \( j \) to exert effort.\(^{15}\) Hence, the threshold level for the innovation in firm \( j \) decreases since \((w_{iT}^{S_x} - w_{IT}^{S_x})\) increases. On the other hand, an increase in \( \tau_k \) also reduces the selling opportunity for firm \( j \). The probability that it can sell its company to firm \( k \) for \( P = \pi_2 \) if it has doubts about the competence of its manager after the first period decreases. As a consequence, the value of the monitoring technology increases and which renders the status quo more attractive. If \( \hat{\epsilon} \) is greater than zero, the second effect dominates. Hence, firm \( j \) is more willing to innovate if firm \( k \) sticks to the status quo. There is strategic substitutability. If

\(^{15}\)Above I made the assumption that each firm correctly expects the other firm to innovate with probability \( \tau \). Given the threshold levels in Proposition 3, \( \tau \) is equal to \( 1 - F(\hat{\epsilon}^T) \).
the incentive effect dominates, $\bar{\epsilon} < 0$ and there is strategic complementarity.\footnote{This contrasts with Perotti and Suarez (2002), who obtain strategic substitutability in a model of bank lending, and with Scharfstein and Stein’s (1990) herding result.}

Note that the above threshold level is always negative if both $t$ and $z$ are close to one. In this case, shareholders of firm $j$ are almost sure to obtain a second-period profit of $\pi_2$, having the opportunity to sell the company to their rival. Hence, when comparing both strategies only the adverse incentive effect of monitoring on first-period compensation matters which is stronger for the routine strategy. The effect of monitoring ability on the replacement policy becomes irrelevant.

In order to obtain the equilibrium strategy choices of the two firms, I make the simplifying assumption that there is agreement on the quality of the innovation. The profitability parameter $\epsilon$ is the same in each firm. Furthermore, I restrict the analysis to pure strategy Nash-equilibria. For each firm, a strategy is then a function $s(\epsilon)$ from $\mathbb{R}^+$ into a decision $\{i, r\}$ and there are only two relevant threshold levels. If firm $j$ expects firm $k$ to innovate, then $t_k = [pq_h + p(1 - q_h)\beta]$ which yields a threshold level $\bar{\epsilon}_T^i$. If it expects firm $k$ to opt for the status quo, then $t_k = [pq_h + p(1 - q_h)\alpha]$ which yields a threshold level $\bar{\epsilon}_T^r$. It follows from Corollary 1 that $\bar{\epsilon}_T^i > \bar{\epsilon}_T^r$ if $\bar{\epsilon} > 0$ and that $\bar{\epsilon}_T^i < \bar{\epsilon}_T^r$ if $\bar{\epsilon} < 0$.

**Proposition 4.**

If $\bar{\epsilon} > 0$, then $\bar{\epsilon}_T^i > \bar{\epsilon}_T^r$. If $\epsilon > \bar{\epsilon}_T^i$, both firms always innovate. If $\epsilon < \bar{\epsilon}_T^i$, both firms always choose the routine strategy. If $\bar{\epsilon}_T^r > \epsilon > \bar{\epsilon}_T^r$, there exist two asymmetric equilibria, in which one firm always innovates and the other firm always chooses the routine strategy. If $\bar{\epsilon}_T^r > \epsilon > \bar{\epsilon}_T^i$, both firms always choose the routine strategy. If $\bar{\epsilon}_T^r > \epsilon > \bar{\epsilon}_T^r$, there exist two symmetric equilibria. Either both firms always innovate or both firms always choose the routine strategy.

In the fringe cases, when $\epsilon$ is either large or small, both firms always select the same strategy. Interestingly, if $\bar{\epsilon} > 0$, equilibria with differentiated strategies can arise, where one firm chooses the innovation while the other chooses the status quo. If $\bar{\epsilon} < 0$, only “herding”equilibria exist in which the firms select the same strategy.

Finally, what is the effect of the possibility of a takeover on the manager’s strategy preferences? It turns out that takeovers always make the manager more conservative.

**Proposition 5.**

Takeovers always reinforce the manager’s bias toward the routine strategy:

$$U_{iT} - U_{rT} = p(\alpha - \beta)(u_2 + u_2(1 - t_k)) > U_r - U_i = p(\alpha - \beta)u_2$$

In the single-firm case, the manager is always better off with the routine strategy due to weaker implicit incentives. Takeovers reinforce this bias by increasing the continuation utility for a successful manager. Interestingly, the manager is more conservative if he is less likely to be taken over. Furthermore, the strength of the manager’s status-quo bias is an increasing function of the rival firm’s propensity to innovate.

To sum up, under symmetric strategy information takeovers are always efficiency enhancing. They reduce the necessary incentive pay and allow for a more
efficient replacement policy by letting a company with a competent manager take over a poorly performing rival. Takeovers always reinforce the manager’s bias toward the status quo.

5 Asymmetric strategy information

So far, shareholders and the manager were by assumption equally well informed about the different strategies. The only information asymmetry resulted from the manager’s unobservable effort. In reality, management is likely to have superior information on the strategic environment of the firm. In this section, I consider asymmetric strategy information in the single-firm case. The next section focuses on the effects of asymmetric information when there is the possibility of a takeover.

I assume that the difference in first-period rewards, $\epsilon$, is no longer publicly observed after the parties have signed a contract. It can only be observed ex-post, i.e. at the end of the first period. The prior distribution, $F(\epsilon)$, is still common knowledge. Suppose that the manager privately observes the realization of $\epsilon$ after he has signed a contract with shareholders, but before a strategy is selected. After observing the signal, he recommends a strategy decision to the shareholders. Let $E[\epsilon]$ denote the prior expectation of $\epsilon$ under the distribution $F(\epsilon)$. I assume that $E[\epsilon] < \bar{\epsilon}$, where $\bar{\epsilon}$ is the threshold level derived in Section 3. Hence, if shareholders have to base their decision on the prior distribution they always stick to the status quo.

It follows immediately from the analysis in Section 3 that shareholders cannot expect the manager to reveal his private information truthfully if they leave in place the compensation schemes given in (2) and (4). If shareholders followed his advice, the manager would always recommend the routine strategy since $U_r > U_i$ (see Proposition 2). While the optimal schemes in Section 3 ensure high effort during implementation, they fail to elicit the manager’s private information ex-ante. Shareholders then face two options. They can stick to these contracts, base their strategy decision on the prior distribution, and always select the status quo. Alternatively, shareholders can design a new contract which not only ensures high effort during implementation but also truthful reporting ex-ante.

In order to capitalize on the manager’s superior information shareholders have to drive him into indifference between the two strategies. With no personal stake in the shareholders’ decision, he has no reason not to reveal his information truthfully. Let $\tilde{w} = (\tilde{w}^S, \tilde{w}^0, \tilde{w}^F)$ denote the ex-ante contract which the parties sign at the beginning of the game. Let $(\tilde{w}^S(\tilde{w}), \tilde{w}^0(\tilde{w}), \tilde{w}^F(\tilde{w}))$ denote the contract which is in place after strategy $s$ has been chosen and the ex-ante contract has been renegotiated. Truthful information revelation requires that the compensation schemes satisfy the following reporting constraint in addition to the relevant incentive compatibility constraint:

$$ \tilde{U}_i(\tilde{w}_i^S(\tilde{w}), \tilde{w}_i^0(\tilde{w}), \tilde{w}_i^F(\tilde{w})) = U_r(\tilde{w}_r^S(\tilde{w}), \tilde{w}_r^0(\tilde{w}), \tilde{w}_r^F(\tilde{w})) $$

where

$$ U_r(\tilde{w}_r^S(\tilde{w}), \tilde{w}_r^0(\tilde{w}), \tilde{w}_r^F(\tilde{w})) = pq_h(\tilde{w}_r^S(\tilde{w}) + u_2) + p(1 - q_h)\alpha u_2 $$

$$ + (1 - pq_h)\tilde{w}_r^0(\tilde{w}) + [p(1 - q_h)(1 - \alpha) + (1 - p)]\tilde{w}_r^F(\tilde{w}) $$
The optimal initial contract is renegotiation-proof: the one under innovation by two effects: firstly, the manager faces a greater risk of dismissal with the innovation which eliminates the manager’s status quo bias. The bias in Section 3 is due to a constraint since it has an equal effect on \( \tilde{w} \) ex-post, it is optimally set equal to zero: \( \tilde{w} = 0 \). Hence, there does not exist an ex-ante contract with \( \tilde{w}^* = \tilde{w}^0 = 0 \) which satisfies both the incentive compatibility constraints and the reporting constraint. In a next step, it can be shown (see the proof in the appendix) that, without loss of generality, one can assume \( \tilde{w}^0 = \tilde{w}^S \) and \( \tilde{w}^F = \tilde{w}^F \). In words, the parties never renegotiate the reward for zero performance and the golden parachute which were fixed in the ex-ante contract.

A positive payment \( \tilde{w}^0 \) serves no useful purpose with regard to the reporting constraint since it has an equal effect on \( U_i \) and \( U_r \) and thus does not affect the manager’s strategy bias. Since it also hardens the manager’s incentive compatibility constraint ex-post, it is optimally set equal to zero: \( \tilde{w}^0 = \tilde{w}^S = \tilde{w}^F = 0 \).

The reporting constraint is then equal to

\[
p_{qh}(\tilde{w}^S + u_2) + p(1 - q_h) \alpha u_2 + [p(1 - q_h)(1 - \alpha) + (1 - p)] \tilde{w}^F = 0
\]

where \( \tilde{w}^S = \max\{\tilde{w}^S, w^S_\tau, \tilde{w}^S(1 - \alpha)\} \) and \( \tilde{w}^F = \max\{\tilde{w}^S, w^S_\tau + \tilde{w}^F(1 - \beta)\} \). It can easily be checked that there exists a unique solution, \( \tilde{w}^F = u_2 \), which solves the above equation. As a consequence, \( \tilde{w}^S = \tilde{w}^F = \tilde{w}^S = \frac{B}{pqh} \).

The optimal contract in Lemma 2 includes a strictly positive golden parachute which eliminates the manager’s status quo bias. The bias in Section 3 is due to two effects: firstly, the manager faces a greater risk of dismissal with the innovation strategy. The expected second-period utility with the status quo exceeds the one under innovation by \( p(1 - q_h)(\alpha - \beta)u_2 \). This difference is eliminated.

\[
U_i(\tilde{w}^S (w), \tilde{w}^0 (w), \tilde{w}^F (w)) = p_{qh}(\tilde{w}^S (w) + u_2) + p(1 - q_h) \beta u_2 \\
+ (1 - p_{qh})\tilde{w}^0 (w) + [p(1 - q_h)(1 - \beta) + (1 - p)] \tilde{w}^F (w)
\]
through the golden parachute. A payment $\tilde{w}^F = u_2$ implies that the manager always receives $u_2$, irrespective of whether he is rehired or fired. Secondly, the status quo bias results from the difference in first-period compensation, which reflects the fact that the threat of being fired is greater with the innovation because of a less efficient monitoring technology. But, as explained above, the golden parachute fully eliminates any implicit-incentive effect since the manager’s continuation utility no longer depends on his first-period performance. He always receives the same second-period rent. As a result, the optimal first-period reward for success is the same for each strategy ($\tilde{w}^S_i = \tilde{w}^S_r = \frac{B}{p \delta q}$). This reward is exactly equal to the optimal reward in a one-period setting.

Interpreting $u_2$ as the manager’s perks and private benefits, $\tilde{w}^F$ is likely to be a function of the firm’s corporate governance. Strict corporate governance decreases $u_2$ and thus reduces the size of the manager’s severance package. (In addition, it is likely to reduce $B$ which captures the manager’s private benefits in the first period.) Hence, a strong governance system is unambiguously efficiency enhancing. This was not case with symmetric strategy information, where weak governance, by increasing the manager’s private benefits in the future, provided a stronger incentive to work harder today.

The shareholders’ new investment rule is given in the following proposition:

**Proposition 6.**

Shareholders optimally select the innovation if $\tilde{\pi}_i$ exceeds $\tilde{\pi}_r$, which is equivalent to

$$
\epsilon > \tilde{\epsilon} \equiv \frac{1 - q_h}{q_h} (\alpha - \beta) \pi_2 (1 - p) + \frac{1 - q_h}{q_h} (\alpha - \beta) w^F_*.
$$

The manager’s bias feeds back on the shareholders’ investment rule. Unlike in Proposition 1, the threshold level is now unambiguously positive. Obviously, $\tilde{\epsilon}$ exceeds $\tilde{\epsilon}$. The company is less likely to innovate if the manager has private information. His status quo bias is eliminated through a severance payment, which makes it more costly for the company to innovate. Since innovation increases the manager’s risk of dismissal, it entails a higher expected cost of severance pay. Interpreting $u_2$ as the manager’s career prospects, a company which is run by a young manager should innovate less than one which is run by a manager closer to retirement. The opposite was the case with symmetric strategy information.

### 6 Takeovers with asymmetric information

What is the effect of an active market for corporate control on the manager’s incentive scheme and the shareholders’ investment rule when there is asymmetric strategy information? With symmetric strategy information takeovers are unambiguously efficiency enhancing. They allow shareholders’ to reduce the incentive pay for the manager and they allow for a reallocation of human capital. It turns out that this is no longer the case when the manager has private information and contracts are incomplete. While takeovers are still efficiency-enhancing with respect to second-period profits, they lead to an increase in managerial compensation.

The following lemma presents the optimal contracts when there is the possibility of a takeover:
Lemma 3.
The optimal renegotiation-proof compensation scheme is
\((\tilde{w}_S^*, \tilde{w}_0^*, \tilde{w}_F^*) = (\frac{B}{p q}, 0, u_2(1 - t_k)).\)

The only difference relative to Lemma 2 is an increase in the severance pay-
ment by \(u_2(1 - t_k).\) The reason is straightforward. According to Proposition 5,
takeovers reinforce the manager’s status-quo bias since he is exposed to stronger
implicit incentives when innovating. The difference in symmetric information
rents, which needs to be bridged through the severance payment, therefore in-
creases. The severance payment is decreasing in \(t_k,\) the probability that firm
\(k\) stands ready to acquire firm \(j.\) The reverse is true with symmetric informa-
tion where manager \(j’s\) incentive pay is increasing in \(t_k.\) A lower probability of
running firm \(k\) in the future weakened implicit incentives.

Furthermore, since \(t_k\) is decreasing in \(\tau_k,\) the severance payment is increasing
in \(\tau_k.\) Thus, shareholders find it optimal to increase the severance payment if
they think it more likely that their rival will undertake a strategy change. This
result is corroborated by Rusticus (2006), who finds that severance payments
are higher for managers in more volatile business environments.\(^{17}\)

Finally, what is the impact of takeovers on shareholders’ investment rule?
Shareholders optimally follow the following investment rule:

Proposition 7.
Shareholders optimally select the innovation strategy if \(\tilde{\pi}_{iT} > \tilde{\pi}_{rT}\) which is
equivalent to
\[ \epsilon > \tilde{\epsilon} \equiv [2 - t_k - z] \frac{(1-q_h)}{q_h} (\alpha - \beta) \pi_2 (1 - p) + \frac{(1-q_h)}{q_h} (\alpha - \beta) w_F^*. \]

There are two changes compared to threshold level in the single-firm case
given in Proposition 5: the factor \([2 - t_k - z]\) captures the effect of takeovers on
second-period profits through the opportunity of a sale or an acquisition. (This
effect is identical to the one under the symmetric strategy information). The sec-
ond summand includes the new severance payment \(w_F^*\) rather than \(w_F.\) The
increase in the severance payment reduces shareholders’ willingness to innovate.
As with symmetric strategy information, the total effect of takeovers on the
threshold level is ambiguous. By increasing the severance payment, they make
innovation more costly. On the other hand, through its effect on second-period
profits, an active market for corporate control can make innovation relatively
more profitable (if both \(t_k\) and \(z\) are large). If a selling firm’s bargaining power
is sufficiently low, takeovers unambiguously increase the threshold level for the
innovation. Not only do they increase severance pay, but they also increase the
value of monitoring by creating a profitable acquisition opportunity.

Corollary 2.
When there is asymmetric strategy information, the firms’ investment decisions
are always strategic substitutes:
\[ \frac{\delta \epsilon}{\delta \tau_k} > 0. \]

With asymmetric information there is no longer ambiguity concerning the
relationship between the two firms’ strategy choices. Firm \(j\) is more prone to
innovate if firm \(k\) sticks to the status quo. Firm \(k\) is then less likely to be a
takeover target, which reduces the severance payment in firm \(j.\) Furthermore, it
is more likely to rescue firm \(j\) if the manager of the latter firm performs poorly.

\(^{17}\)Rusticus (2006) also finds that severance payments are frequently contracted on at the
time the CEO is appointed rather than at a later stage which is consistent with the above
timing.
7 Ownership concentration, strategy choice, and takeovers

This section analyses the relationship between ownership concentration and strategy choice. In order to do so, I drop the assumption that the level of monitoring intensity, captured in the tuple $(\alpha, \beta)$, is exogenously determined.

Suppose that a fraction $x$ of the company’s shares is held by a large shareholder and a fraction $(1 - x)$ is dispersed among small shareholders. Following Burkart, Gromb, and Panunzi (1997) I consider the following monitoring technology. In order to observe the manager’s type after the first period of production, a shareholder has to exert effort. An effort $e \in [0, 1]$ enables a shareholder to observe the manager’s type with probability $e$. The cost of exerting effort is $\frac{1}{2}c_se^2$ which is higher if the company innovates ($c_i > c_r$). Shareholders and the manager determine their effort simultaneously. Finally, I suppose that because of free riding only the large shareholder finds it worthwhile to monitor.

The large shareholder chooses his monitoring effort to maximise

$$xep(1 - q_h)(\pi_2 - p\pi_2) - \frac{1}{2}c_se^2.$$  \hskip 1em (19)

This function is adapted from the objective function in (24) by eliminating irrelevant terms. Successful monitoring only affects second-period profits if the manager is competent but unlucky in the first period. The first-order condition gives

$$e_s(x) = \frac{xp(1 - q_h)p\pi_2(1 - p)}{c_s}.$$  \hskip 1em (20)

Using this result, one can determine the optimal level of ownership concentration. The net equity value, i.e. the firm value net of monitoring cost, is

$$pqh(R - w_s + \pi_2) + e_s(x)p(1 - q_h)\pi_2 + (1 - e_s(x))p(1 - q_h)p\pi_2 + (1 - p)p\pi_2 - \frac{1}{2}e_s(x)^2.$$  \hskip 1em (21)

where $w_s = \frac{B}{pq^2} - u_2(1 - e_s(x))$. Maximization of the above function yields the optimal level of ownership concentration which is equal to

$$x_s^* = 1 - \frac{pqh_w}{p(1 - q_h)p(1 - p)}.$$  \hskip 1em (22)

The second summand reflects the familiar tradeoff between lower implicit incentives due to monitoring and higher second-period profits. The optimal level of ownership concentration is independent of the firm’s strategy choice ($x^*_i = x^*_r = x^*$). Thus, given the first-order condition in (17), the level of monitoring is always lower if the firm innovates ($e_i(x^*) < e_r(x^*)$).

What is the effect of takeovers on the optimal level of ownership concentration? With an active market for corporate control, the large shareholder chooses his monitoring effort in order to maximise

$$xep(1 - q_h)(\pi_2 + (1 - t_k)(1 - z)\pi_2(1 - p)]$$

$$+ p(1 - q_h)(1 - e)\pi_2 + t_kz\pi_2] - \frac{1}{2}c_se^2$$  \hskip 1em (23)
The first line reflects the expected payoff if monitoring is successful, the second line the expected payoff if monitoring fails. The first-order condition gives

\[ c_s(x) = \frac{xp(1 - q_h)\pi_2(1 - p)[2 - t_k - z]}{c_s} \]  

(24)

The term in squared brackets reflects the effect of takeovers discussed in the previous section. It can easily be checked that the optimal level of ownership concentration is

\[ x_s^{*T} = 1 - \frac{pq_h\nu_2}{p(1 - q_h)\pi_2(1 - p)} \frac{(2 - t_k)}{(2 - t_k - z)}. \]  

(25)

As in the previous section, the optimal level of ownership concentration is independent of strategy choice \( x_s^{*T} = x_s^{*T} \). A comparison of the above result with (19) yields the following result.

**Proposition 8.**

*An active market for corporate control decreases the optimal level of ownership concentration: \( x_s^{*T} < x_s^{*} \).*

The adverse effect of monitoring on first-period compensation is amplified through takeovers and dominates the additional benefit of monitoring from acquiring a poorly performing rival.

8 Conclusion

The effect of an active market for corporate control on managerial compensation crucially depends on the type of information-asymmetry under consideration. If shareholders’ only concern is managerial effort provision, takeovers always lead to a reduction in managerial compensation. The prospect of running a larger firm after an acquisition increases the manager’s incentive to exert effort which allows shareholders to reduce his compensation. If shareholders also need to elicit private strategy information from the manager, the reverse is true. By reinforcing the manager’s status quo bias, takeovers necessitate an increase in the manager’s compensation.

A commonly held view regarding takeovers is that they facilitate innovation and expedite structural change in an economy.\(^{18}\) The paper addresses the validity and limitations of this argument. When the manager is better informed about the firm’s strategic environment, takeovers make innovation more costly by increasing the size of his severance pay. They may thus lead to a more conservative investment policy.

The basic building block of the analysis is the career concern framework in the spirit of Crémer (1995). Within this setup, the updating or learning process is biased against the manager in the sense that he is replaced rather than retained in case of doubt. It would be interesting to check the robustness of the above results to alternative specifications of the updating process.

\(^{18}\)The European Antitakeover Directive, for example, was promoted by the European Commission on the grounds that it would promote restructuring and help Europe to become “one of the worlds most dynamic regions”.
9 Appendix

Proof of Proposition 1.
Shareholders invest in the innovation if \( \pi_i \) exceeds \( \pi_r \) which is equivalent to
\[
pq_h (R_t - w^{S*}_t + \pi_2) + p(1 - q_h) \alpha \pi_2 + [(1 - p) + p(1 - q_h)(1 - \alpha)] \pi_2 \\
\geq pq_h (R_r - w^{S*}_r + \pi_2) + p(1 - q_h) \beta \pi_2 + [(1 - p) + p(1 - q_h)(1 - \beta)] \pi_2
\]
Using the fact that \( R_t = R_r + \epsilon \), the above inequality reduces to
\[
\epsilon \geq (\alpha - \beta) \frac{(1 - q_h)}{q_h} \pi_2 (1 - p) - (w^{S*}_r - w^{S*}_r) \quad \square
\]

Proof of Proposition 3.
Shareholders invest in the innovation if \( \pi_{iT} \) exceeds \( \pi_r - t \) which is equivalent to
\[
pq_h (R_t - w^{S*}_{iT} + \pi_2) + p(1 - q_h) \beta \pi_2 + (1 - pq_h) (-w^{0*}_r) \\
+ [p(1 - q_h)(1 - \beta) + (1 - p)] \pi_2 ((1 - t_k z)p + t_k z) \\
+ [pq_h + p(1 - q_h) \beta] (1 - z) \pi_2 (1 - p) (1 - t_k)
\]
Using the fact that \( R_t = R_r + \epsilon \), the above inequality reduces to
\[
\epsilon > [2 - t_k - z] \frac{(1 - q_h)}{q_h} (\alpha - \beta) \pi_2 (1 - p) - (w^{S*}_{iT} - w^{S*}_r). \quad \square
\]

Proof of Corollary 1.
After rearranging terms, the threshold level \( \epsilon^T \) is equal to
\[
-t_k \frac{(1 - q_h)}{q_h} (\alpha - \beta) \pi_2 (1 - p) - (\alpha - \beta) u_2 + [2 - z] \frac{(1 - q_h)}{q_h} (\alpha - \beta) \pi_2 (1 - p) - 2(\alpha - \beta) u_2
\]
which is equal to
\[
-t_k \epsilon + [2 - z] \frac{(1 - q_h)}{q_h} (\alpha - \beta) \pi_2 (1 - p) - 2(\alpha - \beta) u_2
\]
Hence, \( \frac{\epsilon^*}{\sigma_T} \) is equal to \( -\frac{t_k}{\sigma_T} \epsilon \), which can be smaller or greater than zero since \( \frac{t_k}{\sigma_T} \) is strictly negative. \quad \square

Proof of Proposition 5.
Shareholders invest in the innovation if
\[
pq_h (R_t - w^{S*}_t + \pi_2) + p(1 - q_h) \alpha \pi_2 + [p(1 - q_h)(1 - \alpha) + (1 - p)] (\pi_2 - w^{F*}) \\
\geq pq_h (R_r - w^{S*}_r + \pi_2) + p(1 - q_h) \beta \pi_2 + [p(1 - q_h)(1 - \beta) + (1 - p)] (\pi_2 - w^{F*})
\]
which is equivalent to

\[ \epsilon \geq \frac{(1 - q_h)}{q_h} (\alpha - \beta) \pi_2 (1 - p) + \frac{(1 - q_h)}{q_h} (\alpha - \beta) w^R_s \]

**Proof of Lemma 2.**

Let \( \tilde{w} = (\tilde{w}_s^R, \tilde{w}_s^0, \tilde{w}_s^F) \) denote the contract signed at the beginning of the game and \((\tilde{w}_s^R(\tilde{w}), \tilde{w}_s^0(\tilde{w}), \tilde{w}_s^F(\tilde{w}))\) denote the contract which is in place after renegotiation (with \( s \in \{i, r\} \)). Shareholders solve the following problem

\[
\max_{\tilde{w}_s^R, \tilde{w}_s^0, \tilde{w}_s^F} \gamma \tilde{\pi}_i(\tilde{w}) + (1 - \gamma) \tilde{\pi}_r(\tilde{w})
\]

subject to

\[
\begin{align*}
(1C_r) & \quad p_{qh}(\tilde{w}_r^R(\tilde{w}) + u_2) + p(1 - q_h) \alpha u_2 + (1 - p_{qh}) \tilde{w}_r^0(\tilde{w}) + [p(1 - q_h)(1 - \alpha) + (1 - p)] \tilde{w}_r^F(\tilde{w}) \\
& \quad \geq p_{q}(\tilde{w}_r^R(\tilde{w}) + u_2) + p(1 - q_h) \alpha u_2 + (1 - p_{q})(\tilde{w}_r^0(\tilde{w}) + [p(1 - q_h)(1 - \alpha) + (1 - p)] \tilde{w}_r^F(\tilde{w}) + B \\
(1C_i) & \quad p_{qh}(\tilde{w}_i^R(\tilde{w}) + u_2) + p(1 - q_h) \beta u_2 + (1 - p_{qh}) \tilde{w}_i^0(\tilde{w}) + [p(1 - q_h)(1 - \beta) + (1 - p)] \tilde{w}_i^F(\tilde{w}) \\
& \quad \geq p_{q}(\tilde{w}_i^R(\tilde{w}) + u_2) + p(1 - q_h) \beta u_2 + (1 - p_{q})(\tilde{w}_i^0(\tilde{w}) + [p(1 - q_h)(1 - \beta) + (1 - p)] \tilde{w}_i^F(\tilde{w}) + B \\
(RC) & \quad p_{qh}(\tilde{w}_r^0(\tilde{w}) + u_2) + p(1 - q_h) \alpha u_2 + (1 - p_{qh}) \tilde{w}_r^0(\tilde{w}) + [p(1 - q_h)(1 - \alpha) + (1 - p)] \tilde{w}_r^F(\tilde{w}) \\
& \quad = p_{q}(\tilde{w}_r^0(\tilde{w}) + u_2) + p(1 - q_h) \alpha u_2 + (1 - p_{q})(\tilde{w}_r^0(\tilde{w}) + [p(1 - q_h)(1 - \alpha) + (1 - p)] \tilde{w}_r^F(\tilde{w}) \\
(LL) & \quad \tilde{w}_s^R(\tilde{w}), \tilde{w}_s^0(\tilde{w}), \tilde{w}_s^F(\tilde{w}) \geq 0 \text{ with } s \in \{i, r\}
\end{align*}
\]

where

\[
\begin{align*}
\tilde{\pi}_i &= p_{qh}(R_i - \tilde{w}_s^R(\tilde{w}) + \pi_2) + p(1 - q_h) \beta \pi_2 + (1 - p_{qh})(-\tilde{w}_r^0(\tilde{w})) + [p(1 - q_h)(1 - \beta) + (1 - p)] (p \pi_2 - \tilde{w}_r^F(\tilde{w})) \\
\tilde{\pi}_r &= p_{qh}(R_r - \tilde{w}_s^R(\tilde{w}) + \pi_2) + p(1 - q_h) \alpha \pi_2 + (1 - p_{qh})(-\tilde{w}_r^0(\tilde{w})) + [p(1 - q_h)(1 - \alpha) + (1 - p)] (p \pi_2 - \tilde{w}_r^F(\tilde{w})) \\
\gamma &= 1 - F(\tilde{e}(\tilde{w})) \quad \text{and} \quad (1 - \gamma) = F(\tilde{e}(\tilde{w}))
\end{align*}
\]

In the last line, \( \tilde{e}(\tilde{w}) \) denotes the threshold level for the innovation under asymmetric strategy information. The first inequality is the incentive compatibility constraint for the routine strategy, the second one is the incentive compatibility constraint for the innovation. The third constraint ensures truthful reporting \((\hat{U}_r = \hat{U}_i)\).
It is straightforward to check that there does not exist a solution with \( \bar{w}_s = \bar{w}_t = 0 \) where the manager is only rewarded in case of success. In this case \( \tilde{w}_s^r = \max \{ \tilde{w}_s, w_s^* \} \) and \( \tilde{w}_t^r = \max \{ \tilde{w}_t, w_t^* \} \) since the manager would never accept a lower payment at the renegotiation stage and shareholders never want to pay less than \( w_s^* \). Furthermore, \( \tilde{w}_s^F = \tilde{w}_t^F = \bar{w}_s^T = \bar{w}_t^T = 0 \). Shareholders never want to raise these payments above zero at the renegotiation stage since this would merely harden the manager’s incentive constraints. As a consequence, the reporting constraint is always violated. To see this, three sub-cases have to be distinguished: If \( \tilde{w}_s^r < w_s^* \), then \( \bar{U}_i = U_i \) and \( \bar{U}_r = U_r \) (where \( U_i \) and \( U_r \) are given (3) and (5)) which implies that the reporting constraint is violated. If \( \tilde{w}_s^r > w_s^* \), then \( \bar{U}_r - \bar{U}_i = p(1-q_h)(\alpha - \beta)u_2 > 0 \), again violating the reporting constraint. Finally, if \( w_s^* < \tilde{w}_s^r < w_s^* \), then \( \bar{U}_r - \bar{U}_i = pq_h(w_s^* - \tilde{w}_s^r) + p(1-q_h)(\alpha - \beta)u_2 > 0 \), which violates the reporting constraint. Hence, there does not exist a solution with \( \tilde{w}_s^F = \bar{w}_s^T = 0 \).

In a next step I show that \( \tilde{w}_s^* = 0 \). I present the argument for the case where shareholders opt for the routine strategy. Analogous reasoning applies to the case when the company innovates. Suppose that \( \tilde{w}_s^* > 0 \). There is no scope for renegotiating the payments \( \tilde{w}_s^F \) and \( \tilde{w}_s^T \) after shareholders have selected a strategy such that both sides accept the new contract and at least one party is made strictly better off: the manager only accepts a change in \( \tilde{w}_s^F, \tilde{w}_s^T \) if

\[
\begin{align*}
 pq_h\tilde{w}_s^r + (1-pq_h)\tilde{w}_r^0 + [p(1-q_h)(1-\alpha) + (1-p)]\tilde{w}_r^F \\
\geq pq_h(\max \{ \tilde{w}_s^r, w_s^* + \tilde{w}_r^0 + \tilde{w}_s^F(1-\alpha) \}) + (1-pq_h)\tilde{w}_r^0 \\

+ [p(1-q_h)(1-\alpha) + (1-p)]\tilde{w}_r^F
\end{align*}
\]

where the second and third line give the manager’s expected compensation if he refuses to renegotiate \( (\tilde{w}_s^F, \tilde{w}_s^T) \). A necessary condition for shareholders’ acceptance of any changes in \( (\tilde{w}_s^F, \tilde{w}_s^T) \) is the reverse of the above inequality. Hence, without loss of generality I can assume that \( (\tilde{w}_s^r, \tilde{w}_s^T, \tilde{w}_s^0) = (\max \{ \tilde{w}_s^r, \frac{B}{p^q} - (1-\alpha)u_2 + \tilde{w}_s^0 + \tilde{w}_s^F(1-\alpha) \}, \tilde{w}_s^F, \tilde{w}_s^0) \). Ex-post, shareholders would always prefer to have set \( \tilde{w}_s^* = 0 \) ex-ante since it merely hardens the manager’s incentive compatibility constraint once they have chosen a strategy. A strictly positive payment \( \tilde{w}_s^0 \) is therefore only optimal if it mitigates the manager’s ex-ante strategy bias, reflected in \( \bar{U}_i - \bar{U}_r \). It is straightforward to check that this is never the case. Hence, \( \tilde{w}_s^* = 0 \).

Given \( \tilde{w}_s^* = 0 \), the reporting constraint is

\[
\begin{align*}
pq_h(\tilde{w}_s^r + u_2) + p(1-q_h)(1-\alpha)u_2 + [p(1-q_h)(1-\alpha) + (1-p)]\tilde{w}_r^F \\
= pq_h(\tilde{w}_s^r + u_2) + p(1-q_h)\beta u_2 + [p(1-q_h)(1-\beta) + (1-p)]\tilde{w}_r^F
\end{align*}
\]

where \( \tilde{w}_s^r = \max \{ \tilde{w}_s, w_s^r + \tilde{w}_r^0 + \tilde{w}_s^F(1-\alpha) \} \) and \( \tilde{w}_s^T = \max \{ \tilde{w}_s, w_s^T + \tilde{w}_r^F(1-\beta) \} \).

It can be checked that there exists a unique solution, \( \tilde{w}_s^{F*} = u_2 \), which solves the above equation. As a consequence, \( \tilde{w}_s^r = \tilde{w}_s^{F*} = \tilde{w}_s^T = \frac{B}{p^q} \). Therefore, \( (\tilde{w}_s^*, \tilde{w}_s^0, \tilde{w}_s^{F*}) = (\frac{B}{p^q}, 0, u_2) \).

**Proof of Proposition 7.**

Shareholders invest in the innovation if \( \tilde{\pi}_i \) exceeds \( \tilde{\pi}_r \), which is equivalent to

\[
\begin{align*}
pq_h(\tilde{\pi}_r - \tilde{w}_s^* + \pi_2) + p(1-q_h)\beta \pi_2 + [(1-p) + p(1-q_h)(1-\beta)][p\pi_2 - \tilde{w}_s^{F*}] \\
\geq pq_h(\tilde{\pi}_r - \tilde{w}_s^* + \pi_2) + p(1-q_h)\alpha \pi_2 + [(1-p) + p(1-q_h)(1-\alpha)][p\pi_2 - \tilde{w}_s^{F*}]
\end{align*}
\]

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where $\tilde{R}_t = R_t + \epsilon$. The above inequality reduces to
\[
\epsilon > \frac{(1 - q_h)}{q_h}(\alpha - \beta)(1 - p)\pi_2 + \frac{(1 - q_h)}{q_h}(\alpha - \beta)\tilde{w}F^*
\]

Proof of Corollary 2.
After rearranging terms, the threshold level $\tilde{\epsilon}^T$ is equal to
\[
-t_k \tilde{\epsilon} + (2 - z)\frac{(1 - q_h)}{q_h}(\alpha - \beta)\pi_2(1 - p) + \frac{(1 - q_h)}{q_h}(\alpha - \beta)2u_2
\]
Hence, $\frac{\delta\tilde{\epsilon}^T}{\delta t_k}$ is equal to $-\frac{\delta t_k}{\delta t_k} \tilde{\epsilon}$. Since $\tilde{\epsilon}$ is strictly positive, so is $\frac{\delta\tilde{\epsilon}^T}{\delta t_k}$. 

References


