External vs Internal Monitors: The Role of Restructuring Consequences and Information Technologies

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Abstract

This paper analyses the relative eŒciency of internal and external monitors. It conørms the intuition that, if the principal and her employee share aligned interests, internal monitoring is superior to external monitoring; vice versa if interests diverge. This result is not robust for two alternative information technologies considered. If monitoring eœort aœects the frequency instead of the accuracy of produced signals, the optimal monitoring mode depends on the contingency policy that is adopted in case monitoring fails. If, by contrast, the obtained signals are nonveriøable, then internal monitoring is weakly dominant.

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1 Introduction

This paper was inspired by the observation of the enormously increased popularity of management consultancies. This sparked the question: why should one engage them rather than sorting out any problems internally? Standard arguments include the greater expertise of management consultants which stems from their specialization. Admittedly, they may follow tried and tested blueprints in their analysis of a company. Moreover, they usually have access to powerful support systems. These reasons appear valid if a company which is 'typical' for its industry intends to appoint a consultant. For a company which either operates in a very specialized or 'unique' environment, ørm-speciøc characteristics may become more important, hence an insider might be more successful in raising a ørm's eŒciency.

These technological diœerences aside, the incentives to identify and solve a company's problems may depend crucially on the agent's position. Whereas independent consultants are considered to be impartial, an insider's behaviour is often biased in the one or other direction. These incentive diœerences inÆuence the optimal appointment decision and therefore constitute the main focus of this paper.

The decision whether to appoint an external consultant rather than appointing own staœ to analyse and rectify a ørm's weaknesses is multi-faceted, not least due to the complexity of the task. I therefore restrict my attention to the assessment or monitoring role of consultants when analysing the diœerential incentives of an external as opposed to an internal monitor to advocate change. Simultaneously, I suppress their task of recommending and designing alternative actions by linking the recommendation exogenously to the underlying state: when a good state is identiøed, the ørm should maintain the status quo; only in a bad state is the implementation of an action - restructuring, say - vital for the ørm.

In this context I identify the circumstances in which monitoring should be pursued internally or externally. Central to the analysis are restructuring consequences for the work-force. If an existing employee is assigned the monitoring task, he is also directly aœected by the implications of change. The appointment of an external monitor, by contrast, ensures that the restructuring impact on the work-force - though undiminished - does not interfere with the monitoring process. The type of contract chosen thus shapes the monitoring incentives. In this way, the optimal monitoring mode is dictated by the nature of the restructuring impact, together with the available information technology.

The idea that organizational aspects inÆuence monitoring or auditing, and vice versa, is not new. Williamson (1985, pp 153-155) argues informally that transferring a transaction out of the ørm and into the market will be attended by incentive

and governance realignments. Internal auditors, for example, can expect to receive greater cooperation than can be presumed when auditing across ørm boundaries is attempted. While our model captures a realignment of incentives when the monitoring task is assigned to an outsider vis--vis an employee, it is more general despite its disregard of cooperation and collusion. Since I do not a priori specify the direction of this incentive alignment, the superiority of internal monitoring can be conørmed only in some cases.

In an important contribution to the auditing literature, Kofman and Laware (1993) also analyse the merits of external and internal auditors, albeit in a dicerent setting. In particular, they investigate how an external auditor serves to prevent collusion, i.e. his purpose is to ascertain the internal auditor's independence. The appointment of an external thus complements the information-gathering role of the internal auditor rather than substituting it.

A related paper, Strausz (1997) considers delegation of monitoring within a hidden-action framework. Delegation of monitoring in this instance increases the contract space apart from serving as commitment to reveal evidence and is therefore optimal. His paper is, like mine, an example in which monitoring strengthens incentives rather than weakens them - contrary to the common stance of the literature on the relationship between information and incentives, which frequently posits that an organizational structure may be used as a commitment to limit information gathering and in this way strengthen incentives[1].

In a similar vein, Crmer (1994) argues that information Æows more freely but incentives are less powerful under vertical integration. Communication is hampered in the nonintegrated structure by a built-in conÆict of interest between the supplier and the client. This divergence of interest makes delegation of monitoring impossible and hence duplicates monitoring costs. Integration, on the other hand, annuls the conÆict of interest. The organizational choice thus determines the ease of monitoring which, in turn, has implications for agent incentives. The resulting tradeoce thus determines the optimal ownership structure. My set-up dicers in two regards: ørst, I am concerned with incentives to monitor rather than any incentive to improve production. Moreover, the organizational choice does not acect the (non)alignment of interest between the principal and the work-force. It does, however, inÆuence the strength of monitoring incentives.

This paper is organized as follows. Section 2 introduces the basic model and states the main assumptions. Section 3 identiøes how the alignment or divergence

[1]Refer, amongst others, to Riordan (1990), Aghion and Tirole (1997), Crmer (1995), and Schmidt (1996).

of interests aœects the optimal monitoring choice. In Section 4, I consider an inferior information technology which produces signals only with a certain frequency, and investigate its impact on the relative eŒciency of internal and external monitoring. The assumption of signal veriøability is relaxed in Section 5 to allow for forgery and misrepresentation. Section 6 investigates the validity of the 'scapegoat' argument as an explanation for the widespread use of independent consultants. The ønal section summarizes the results and concludes.

2 The model

A principal (P) faces the decision whether to implement an action or maintain the status quo. While this action can be interpreted as change in general, I think of it as restructuring. If implemented, its consequence R_θ for herself and r_θ for her work-force (agent A) depends on an underlying state of nature $\theta \in \{g, b\}$. The good state occurs with probability q, the bad state with the complementary probability. While the state cannot be observed, the principal may want to induce monitoring to obtain better information about the underlying state of nature. She can assign the monitoring task to the agent who thus becomes an internal monitor (IM); alternatively she can appoint an independent, or external, monitor (XM) in which case the agent merely participates[2]. Provided (hidden) monitoring eœort has been exerted at cost e, the produced signal s correctly reÆects the underlying state with probability $p > \frac{1}{2}$; otherwise it is completely noisy, i.e. correct with probability $\frac{1}{2}$. The probabilities q and p as well as the obtained signals are common knowledge.

Assuming that all players are risk neutral, their payoœs are given by

$$\begin{aligned} P &= \rho R_\theta - a \\ IM &= A = a + \rho r_\theta - e \end{aligned}$$

in case of internal monitoring and by

$$\begin{aligned} P &= \rho R_\theta - a - m \\ A &= a + \rho r_\theta \\ XM &= m - e \end{aligned}$$

[2]Note that there are two parties involved with internal monitoring (P and IM) and three in the case of external monitoring (P, A, and XM). An alternative set-up where the - internal or external - monitor is hired in addition to the work-force is considered in Section 6 as this corresponds to a diœerent interpretation.

if monitoring is conducted externally. The binary policy variable ρ indicates whether the ørm is restructured or not, $\rho \in \{0;1\}$. The transfers a and m to the work-force and the independent monitor, respectively, must be nonnegative to reÆect their assumed liquidity constraints. I suppose that these compensation schemes may condition only on the obtained signal and the policy choice ρ. Consequently, the principal may (implicitly) commit to any policy choice by the contracts oœered[3]. The fact that they cannot condition on the realized outcome indicates that the principal's return R_θ is diŒcult to measure, for instance, if it accrues over time. Moreover, the agent's consequence r_θ is of a private nature and can likewise not be contracted upon.

Without monitoring, the principal may either follow a consistent restructuring policy or maintain the status quo. The appointment of a monitor increases her policy space by signal-contingent decisions. In particular, it enables her to restructure selectively, i.e. whenever a bad signal is obtained, while abstaining from any action in case of a good signal[4].

The time structure is as follows: the principal chooses a policy before oœering a take-it-or-leave-it contract $a(\rho, s)$ to the work-force and possibly another contract $m(\rho, s)$ to an external monitor. From the type of contract(s) oœered, the agent knows whether the selective-restructuring policy will be followed, and if so, who will be in charge of the monitoring task. Once the contracts are signed, the state of nature θ is realized. Provided monitoring eœort e is invested, a signal $s \in \{g, b\}$ is obtained. The planned policy is implemented and the outcomes are realized.

2.1 First-best analysis:

As a benchmark I consider the case where joint welfare $W = P+IM$ or $P+A+XM$ is maximized in the absence of incentive problems (i.e. if monitoring eœort were observable.) The assumption

$$R_g + r_g < 0 < R_b + r_b \tag{1}$$

ensures that restructuring is only desirable in a bad state. When a good state occurs it is optimal to maintain the status quo. This ørst-best policy of selective

[3]Alternatively, if commitment to the relevant policy is no problem, it suŒces if the transfers condition on the action choice.

[4]The fourth potential policy, reverse selective restructuring (i.e. restructuring only if good signals are obtained) can be disregarded in this analysis: due to assumption (1) speciøed below, it is dominated by selective restructuring both from a welfare aspect as well from the principal's viewpoint.

restructuring is also favoured by the principal, due to assumption

$$R_g < 0 < R_b. \tag{2}$$

It, moreover, ensures her motive to appoint a monitor. Whether the agent (employee) shares this view or not, depends on the restructuring impact he experiences in the good and bad state, respectively[5]:

Deønition 1 Aligned interests of the agent are indicated by $r_g \leq 0 \leq r_b$, conÆicting interests are reÆected by $r_b \leq 0 \leq r_g$.

Observe that, as long as no agency (hidden action) problem exists, the potential existence of a conÆict of interest does not aœect the relative monitoring eŒciency. According to welfare considerations, there is no distinction between internal and external monitoring.

3 The Role of Interest Alignment

In accordance with this paper's purpose of comparing internal with external monitoring, I conøne my analysis to the selective-restructuring policy. This approach is justiøed by implicitly assuming suŒciently low monitoring costs and a high enough signal precision[6]. Note also, that the principal will hire no costly monitor unless she follows the signal-contingent policy of selective restructuring. By implication, if the principal induces monitoring eœort her policy choice becomes trivial. She thus maximizes expected utility

$$E[P] = q(1-p)R_g + (1-q)pR_b - (1-z)\left(a^0 + m^0\right) - z\left(a^1 + m^1\right) \tag{3}$$

where $z = q(1-p) + (1-q)p$ reÆects the probability of a bad signal[7]. Due to the one-to-one relation between signals and the action choice implied by the principal's

[5]The restriction that r_b and r_g are of opposite sign, as implied by the deønition, focuses the analysis on the more interesting cases. If, for instance, the agent would beneøt equally from restructuring in both states, then the intensity of his monitoring incentives would exclusively be determined by the relative frequency of the underlying states of nature.

[6]Monitoring in the ørst-best setting requires $\frac{e}{2p-1} < -\tilde{q}(R_g + r_g)$ with $\tilde{q}$ deøned below by (5). In the presence of agency problems this condition is necessary but not suŒcient to warrant monitoring as a superior technology is required; the speciøc requirements depend on the monitoring mode chosen.

[7]Notice that, in case of internal monitoring, $m^0 = m^1 = 0$ to indicate that no contract $m(\rho, s)$ is oœered to a third party.

chosen policy, we may denote $a(\rho, s)$ and $m(\rho, s)$ by a^{ρ} and m^{ρ}, respectively. In case of internal monitoring, the principal maximizes $E[P]$ subject to the participation constraint

$$(1-z)\,a^0 + za^1 + q\,(1-p)\,r_g + (1-q)\,pr_b - e \geq 0 \qquad \text{(IPC)}$$

(with his reservation utility normalized to zero) and incentive constraint

$$\left(z - \tfrac{1}{2}\right)\ \left(a^1 - a^0\right) - \ \left(p - \tfrac{1}{2}\right)\ \left(qr_g - (1-q)\,r_b\right) \geq e \qquad \text{(IIC)}$$

of the agent. In case of external monitoring, the principal has to ensure that the work-force participates, i.e. that

$$(1-z)\,a^0 + za^1 + q\,(1-p)\,r_g + (1-q)\,pr_b \geq 0 \qquad \text{(APC)}$$

is satisøed, in addition to the participation constraint

$$(1-z)\,m^0 + zm^1 - e \geq 0 \qquad \text{(XPC)}$$

and the incentive constraint

$$\left(z - \tfrac{1}{2}\right)\ \left(m^1 - m^0\right) \geq e \qquad \text{(XIC)}$$

of the external monitor who, you may recall, remains unaœected by any restructuring consequences[8].

Whenever the work-force expects a restructuring burden the principal must take it into account, hence (IPC) and (APC) become binding under the respective monitoring modes. An expected restructuring beneøt, by contrast, constitutes a positive externality enjoyed by the non-monitoring work-force, since the liquidity constraint prevents the principal from extracting and capturing it herself. The internal monitor can only command a portion of this rent, provided it exceeds the monitoring investment.

The incentive-compatibility constraints reÆect that, without monitoring eœort, the obtained signals become uninformative as indicated by $p = z = \frac{1}{2}$. From (IIC) and (XIC) it becomes apparent that monitoring incentives are stronger the greater the perceived diœerence between good and bad signals. The principal may inÆuence this by raising the compensation diœerentials[9] $|a^1 - a^0|$ and $|m^1 - m^0|$. Moreover,

[8] For clarity we preøx the constraints applicable to the internal and external monitor with 'I' and 'X', respectively; the preøx 'A' is used to indicate that the agent does not monitor.

[9] It can, in fact, be easily shown that no compensation should be paid if a signal reÆecting the less likely state of nature is obtained. The principal's reluctance to compensate her agent and monitor for a signal reÆecting the less likely state is a direct implication of the technology: if the good state is more likely $\left(q > \frac{1}{2}\right)$, so is the good signal $\left(z < \frac{1}{2}\right)$. In view of (XIC), $m^0 > m^1$ must hold.

the internal monitor's incentives may be reinforced or inhibited, depending on his expected restructuring consequences. If his expected interests are aligned, that is $qr_g < (1-q)\, r_b$, he gains more (or suœers less) from restructuring in bad than in good states. Since his monitoring eœort improves the correlation of signals and states, he has an inherent interest to monitor.

To simplify the analysis assume that

$$r_g = 0. \tag{4}$$

Consequently, the expected alignment or divergence of interest becomes independent of the underlying stochastics[10]. Thus, supposing that restructuring does not aœect the agent if implemented in good states, he shares the principal's interests if he beneøts from restructuring in a bad state. Disregarding any cost and compensation aspects, he gains from investing monitoring eœort which raises the probability of restructuring in a bad state from $\frac{1-q}{2}$ to $(1-q)\, p$. If, on the other hand, restructuring inÆicts a burden on the agent he would prefer a noisy signal. Any conÆict of interests would thus raise the internal monitor's reluctance to monitor the state of nature.

This partiality of an internally employed monitor vis--vis an externally appointed one determines the optimal monitoring mode.

Proposition 1 Internal monitoring is strictly preferred to external monitoring if and only if the agent's interests are aligned.

This and subsequent proofs are relegated to the Appendix[11].

In view of the preceding discussion, the intuition of this proposition should be clear. Nevertheless, let us reÆect upon the circumstances in which interests are likely to be aligned or divergent. One possibility is to interpret the underlying state as some external condition. A bad state could, for instance, be conceived of as a shift of consumer preferences or a recession. Adaptation to changed circumstances may thus be vital for the ørm as a going concern; that is, restructuring is preferred to the status quo by the principal and work-force alike. Implementation of the same restructuring process in a good state is very likely to be misplaced, and hence harmful for all. Imagine, for example, the consequences of a ørm's realignment towards a perceived but mistaken change of demand.

[10] That is, if interests are aligned according to Deønition 1, so are expected interests; analogously for conÆicting interests. Since the sign of the expected restructuring impact dicœerential becomes independent of the underlying state uncertainty, this simpliøcation avoids case distinctions in terms of the probability q. No insight is lost, unless the sign of nonzero r_b is restricted a priori.

[11] Notice that this result holds equally for the alternative simpliøcation $r_b = 0$.

Alternatively, a conÆict of interest may emerge if the state of nature indicates some internal condition. While the principal beneøts from the enhanced eŒciency implied by restructuring in case of organizational slack or an overstaœed situation, the employees would bear immediate costs. Less on-the-job-leisure and (fear of) retrenchments may outweigh potential indirect beneøts from restructuring. In a bad state, employees would accordingly prefer the status quo. In case a ørm is well organized it may hurt itself by accidentally reducing its staœ to a suboptimal level. An employee who is retrenched in this process need not be materially aœected and could even beneøt. If, for instance, a well respected former employer signals his competency, his future prospects may increase. In addition, retrenched personnel usually receives a termination payment. Restructuring might therefore constitute the more attractive option for him.

In accordance with this interpretation, Proposition 1 establishes an outsider's relative advantage in detecting internal problems. An insider, by contrast, is more suitable in identifying external problems provided, of course, they are equally competent in accomplishing the monitoring task.

4 Signal Frequency

It is important to investigate the robustness of the ørst result to alterations of the speciøed information technology. This inquiry will not only improve our understanding of the forces driving Proposition 1 but will also clarify the circumstances in which it is applicable.

Consider an inferior signal technology, where monitoring eœort produces a signal only with probability $\alpha < 1$. If obtained, the signal is - as before - correct with probability p. Without eœort, no signal is obtained: $s = \emptyset$ with certainty. Exertion of monitoring eœort thus inÆuences the frequency but not the accuracy of obtained signals. This altered technology enlarges the policy space as the principal now conditions her choice on good, bad and no signals. That is, in addition to restructuring selectively in response to received signals, a fallback option must be speciøed to guide decision making in case no signal is produced. Two policies are relevant here: restructuring unless a good signal is received (where restructuring is the fallback option) and maintaining the status quo unless the obtained signal is bad (the status quo is the fallback option). The contract space is enlarged accordingly; transfers in the absence of signals, $a_\emptyset$ and $m_\emptyset$, must be included in the contract oœers[12].

[12]The assumption of hard signals such that compensation fees condition on $s \in \{g, b, \emptyset\}$ is

First-best analysis: Suppose monitoring eœort were observable. It can easily be shown that, given an informed policy of selective restructuring, joint welfare is maximized by choosing restructuring as the fallback option if $q \leq \tilde{q}$, where

$$\tilde{q} := \frac{R_b + r_b}{R_b + r_b - (R_g + r_g)} \ . \tag{5}$$

If, by contrast, the good state is more likely to occur $(q > \tilde{q})$, the status quo constitutes the optimal fallback option[13].

With this benchmark in mind, let me now investigate the principal's optimal behaviour when monitoring eœort involves a hidden action. First I present the optimization problems for the two relevant contingency policies.

i) Restructuring unless a good signal is obtained: When restructuring is the fallback option, the action will be implemented with probability $1 - \alpha(1 - z)$. The principal's optimization problem entails maximizing her expected utility

$$\begin{aligned} E[P] \ = \ & [1 - \alpha p] \, q R_g + [1 - \alpha(1 - p)](1 - q) R_b \\ & - \alpha(1 - z)\left(m^0 + a^0\right) - \alpha z \left(m^1 + a^1\right) - (1 - \alpha)\left(m_\emptyset + a_\emptyset\right) \end{aligned} \tag{6}$$

by oœering appropriate contracts that take into account the distinctive impacts of restructuring on employees and independent contractors. When opting for internal monitoring, the participation constraint

$$\alpha\left[(1 - z)\, a^0 + z a^1\right] + (1 - \alpha)\, a_\emptyset + [1 - \alpha p]\, q r_g + [1 - \alpha(1 - p)](1 - q)\, r_b - e \geq 0 \tag{IP C'}$$

and the incentive constraint

$$\alpha\left[(1 - z)\, a^0 + z a^1 - a_\emptyset - qpr_g - (1 - q)(1 - p)\, r_b\right] \geq e \tag{IIC'}$$

must be satisøed. Under external monitoring, the relevant constraints are

$$\alpha\left[(1 - z)\, a^0 + z a^1\right] + (1 - \alpha)\, a_\emptyset + [1 - \alpha p]\, q r_g + [1 - \alpha(1 - p)](1 - q)\, r_b \geq 0 \tag{A P C'}$$

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innocuous. As long as the principal may observe the signals or the absence thereof for the purpose of policy implementation, monitoring incentives need not be acœected.

[13] Note that at the cutoœ probability $\tilde{q}$ at which the two contingency policies are equally eŒcient, the principal would be indiœerent between non-monitored restructuring and status quo for both technologies considered so far.

to ensure that the work-force participates, and

$$\alpha\left[(1-z)\,m^0+zm^1\right]+(1-\alpha)\,m_{\emptyset}-e\geq 0 \qquad \text{(XPC')}$$

and

$$\alpha\left[(1-z)\,m^0+zm^1\right]+(1-\alpha)\,m_{\emptyset}-e\geq m_{\emptyset} \qquad \text{(XIC')}$$

to induce the external to accept the contract and invest into monitoring. In addition, the liquidity constraints must be satisøed.

ii) Status quo unless a bad signal is obtained: Suppose the fallback option is to refrain from implementing change, the principal aims to maximize

$$\begin{aligned} E[P] &= \alpha\left[q(1-p)\,R_g+(1-q)\,pR_b-(1-z)\left(m^0+a^0\right)-z\left(m^1+a^1\right)\right] \\ &\quad -(1-\alpha)\left(m_{\emptyset}+a_{\emptyset}\right) \end{aligned} \qquad (7)$$

subject to

$$\alpha\left[(1-z)\,a^0+za^1+q(1-p)\,r_g+(1-q)\,pr_b\right]+(1-\alpha)\,a_{\emptyset}-e\geq 0, \qquad \text{(IPC}_{\text{J}}\text{)}$$

and

$$\alpha\left[(1-z)\,a^0+za^1-a_{\emptyset}+q(1-p)\,r_g+(1-q)\,pr_b\right]\geq e \qquad \text{(IIC}_{\text{J}}\text{)}$$

if the agent is induced to monitor internally; or subject to

$$\alpha\left[(1-z)\,a^0+za^1+q(1-p)\,r_g+(1-q)\,pr_b\right]+(1-\alpha)\,a_{\emptyset}\geq 0, \qquad \text{(APC}_{\text{J}}\text{)}$$

(XPC'), and (XIC') in case the monitoring task is transferred to an outsider. In addition, the liquidity constraints apply again.

At the risk of anticipating somewhat, I will discuss the respective constraints in some detail to highlight the pivotal features which drive the next result[14]. Refer to the Appendix for the formal derivation of the optimal contracts and policy decisions.

The participation constraints of the work-force, (IPC'), (IPC$_{\text{J}}$), (APC'), and (APC$_{\text{J}}$), clearly indicate that for both policies positive compensation a is required if the expected restructuring impact inÆicts a burden, $E[r]<0$. Worker mobility thus forces the principal to internalize any negative restructuring consequences. If, however, the work-force expects to beneøt from restructuring, the liquidity constraint protects its positive restructuring externality; if monitoring is induced internally it

[14]For simplicity, again suppose (4).

does so only to some extent. Although this observation is equally true for the previous section, it has diœerent implications if signals are received only with frequency α. First, it aœects the principal's policy decision. In particular, a positive externality distorts it in favour of the status-quo fallback option. Any restructuring burden, by contrast, is internalized and the ørst-best policy choice is mimicked (provided no monitoring rent needs to be paid.)

Another eœect concerns the internal monitor's preference ordering of policy choices which, in turn, inÆuences his incentives. If he perceives restructuring to be harmful, it is clearly in his interest to minimize the probability of its implementation. His ambition to preserve the status quo thus reinforces his monitoring incentives if the fallback option prescribes restructuring. In case inaction is the fallback, it inhibits his incentives contrary to the principal's intention. A comparison of the constraints (IIC') and (IIC$_J$) clearly reÆects this sensitivity of an internal monitor's incentives with respect to the expected restructuring impact and chosen fallback option. However tempting, one should not jump to the fallacious conclusion that any reinforcement of an employee's monitoring incentives automatically makes him the superior monitor.

Another feature is important here. The frequent failure of signal production creates an additional degree of freedom for decision making and contract design. The shaping of incentives according to the principal's needs thus becomes a little easier. Consequently, she should expect to pay lower monitoring rents, if at all.

For the engagement of an internal monitor this intuition can be conørmed if restructuring constitutes a burden: binding participation constraints with $a_\emptyset = 0$ guarantee that the incentive constraint is satisøed, no matter which fallback option is speciøed. Thus, despite opposite policy preferences (i.e. when the status quo represents the fallback) he may be induced to exert monitoring eœort without commanding an agency rent. Speciøcally, he may become indiœerent between investing eœort and shirking: frequent but compensated restructuring costs do not leave him worse oœ than the security of the status quo without any accompanying transfers. In case of a positive externality, however, the subordinate role of employee preferences cannot be sustained. Suppose, for example, that the absence of a signal triggers restructuring. The mere satisfaction of his participation constraints does not induce him to monitor and thereby reduce his personal beneøt derived from restructuring - no matter how small the value of this externality. The opposite eœect occurs when the status quo constitutes the contingency policy: if the internal monitor expects to beneøt from restructuring, he clearly has inherent incentives to generate a signal that initiates restructuring. If these are suŒciently signiøcant, he will monitor the underlying state voluntarily to reap the according beneøts.

Consider now, brieÆy, the constraints imposed by an external monitor. Notice that they are identical for both fallback options. Moreover, by setting $m_{\emptyset} = 0$, constraints (XPC') and (XIC') become identical[15]. By implication, if an external monitor can be induced to accept a monitoring contract, he will also be willing to exert eœort. This ease of eœort inducement is indicative of the outsider's monitoring eŒciency as put forward below.

Proposition 2 If the expected restructuring impact on the work-force constitutes a burden, the ørst best can be achieved by appointing an internal or external monitor. In case the expected restructuring consequences represent a beneøt for the work-force, the optimal monitoring mode depends on the adopted fallback policy: the external monitor is superior if and only if the absence of a signal triggers restructuring. Moreover, the externality creates a policy distortion in favour of the status quo.

Apart from identifying the optimal monitoring mode, this result recognizes deviations from the ørst best that may emerge if the work-force beneøts from restructuring. As anticipated in the preceding discussion, the relative advantage of the external monitor originates from the fact that his appointment always solves the hidden action problem. The engagement of his internal counterpart, by comparison, may fail to do so if a high probability of the bad state prompts restructuring as the contingency measure. On the other hand, a high probability of the good state, which indicates the status quo to be the relevant fallback option, enables the principal to capture a portion (maximally the magnitude of the monitoring investment) of the positive restructuring externality that otherwise accrues to the internal monitor. This aspect makes internal monitoring more attractive than external monitoring, apart from causing a biased policy decision in favour of the status quo. Consequently, the ørst best - in terms of expected payoœs and policy decisions - can only be fully attained if the principal internalizes the restructuring impact.

Two questions remain to be answered. First, why is the driving force of Proposition 1, the (non)alignment of interests, irrelevant for Proposition 2? Recall that interest alignment relies on the diœerential impact of restructuring in the two states. Since monitoring eœort does not aœect the relative frequency of good and bad signals, the divergence or alignment of interest is of no consequence. The direction of the agent's monitoring incentives underlying Proposition 2 is instead driven by the expected restructuring burden or beneøt, respectively, i.e. the sign of the probability-weighted sum $E[r]$.

[15]The principal's reluctance to pay a positive monitoring transfer if no signal is obtained is not surprising, because the sole purpose of costly monitoring is to facilitate a signal-sensitive policy.

The question as to the existence of a direct link between aligned interests and a restructuring beneøt comes to mind. According to simpliøcation (4), it is reÆected by a positive magnitude of r_b irrespective of the probability of a good state. The above proposition would thus infer that an external monitor is preferred to an internal in case the latter shares aligned interests. The counter-intuitive nature of this inference points to an important caveat: the correspondence of aligned interests to a positive externality crucially hinges on the simpliøcation and should therefore not be overemphasized. It is reversed if $r_b = 0$. In that case an expected restructuring beneøt goes together with a conÆict of interest. To avoid any confusion it is crucial to express Proposition 2 in terms of the expected restructuring impact and not in terms of the (non)alignment of interests.

5 Nonveriøable Signals

Suppose now that the received signals are not veriøable. The external monitor is considered impartial and has thus no inherent incentive to misrepresent any signals. The internal monitor, by contrast, is not immune to the consequences caused by the policy choice and may therefore have an incentive to announce the signal most favourable to himself. It should therefore be interesting to investigate how the relative performance of the two monitors changes when signals can be forged. Assume the original information technology where monitoring eœort aœects the signal precision. Further assume that the contracts condition on the reported signal and the action choice. In this context the nonveriøability of signals leads to our next result.

Proposition 3 A monitor will be employed internally if at all.

The established weak preference of an internal monitor may be unexpected, but inspection of the optimization constraints clearly illustrates the underlying intuition. The principal faces a similar decision problem as in Section 3, albeit with additional constraints which invoke truthtelling on behalf of the monitors. An external monitor is induced to honestly announce observed good and bad signals if

$$m^0 \geq m^1 \qquad \text{(XTg)}$$

and

$$m^1 \geq m^0 \qquad \text{(XTb)}$$

hold respectively. Consequently, the principal should not distinguish between monitoring fees payable in good and bad states. This unresponsiveness destroys his

incentives to monitor at all. The incompatibility of simultaneously inducing honest signal announcement and monitoring eœort from an impartial outsider thus prohibits external monitoring from being viable.

Alternatively, if the principal appoints an internal monitor, she can induce truthful reporting of both signals only by respecting simultaneously

$$qpr_g + (1-q)(1-p)r_b \leq (1-z)\left(a^0 - a^1\right) \tag{IT g}$$

and

$$z\left(a^0 - a^1\right) \leq q(1-p)r_g + (1-q)pr_b. \tag{IT b}$$

These constraints are compatible if and only if $r_g \leq r_b$, that is, if his interests are aligned with the principal's. Consequently, internal monitoring must be ruled out a priori if there exists a conÆict of interest.

Proposition 3 can only be justiøed if there exist circumstances in which an internal monitor will indeed be employed. From the proof in the Appendix it becomes apparent that, in addition to aligned interests, suŒciently small monitoring costs

$$2e\min\{z; 1-z\} \leq (2p-1)q(1-q)(r_b - r_g) \tag{8}$$

are required to ensure the compatibility with monitoring incentives.

Signal Frequency: For the sake of completeness consider brieÆy whether this result applies equally to the alternative technology. The implied additional degree of freedom does not only facilitate better control of incentives as was the case in the previous section. Instead, it also increases the possibilities of misrepresentation: existing signals could potentially be concealed or forged and non-existing signals be created. To invoke truthtelling for a given monitoring policy, the optimal contracts must respect six constraints (one for each type of misrepresentation for both good and bad signals) in addition to the familiar liquidity, participation, and monitoring incentive constraints[16]. While this increased number of constraints need not necessarily preclude the employment of an internal monitor, I claim that his appointment is optimal only in very speciøc circumstances: the interaction of interest alignment and the direction of the entire expected restructuring impact inÆuences his incentives such that the suitability of internal monitoring becomes sensitive to the speciøed fallback option.

How is the scope of external monitoring aœected by the frequency technology? Again, equal compensation for all three possible reports is imperative for honest communication of observed or non-existing signals. Consequently, the same argument

[16] Some of these truthtelling-compatibility constraints may be degenerate.

as in Proposition 3 applies, conørming the impossibility of simultaneously inducing true signal reports and external monitoring eœort, and hence the robustness of this proposition.

It should be noted that a vitally important assumption underlying this robustness concerns the possibilities of misrepresenting received signals. Suppose, for instance, a limited scope of misrepresentation where existing signals can be concealed or forged, but non-existing signals are impossible to be created. In that case, an external monitor can be induced to report obtained signals truthfully if

$$m^1 = m^0 \geq m_{\emptyset}. \qquad \text{(XT)}$$

In view of the monitor's participation and incentive-compatibility constraints (XPC) and (XIC) of the preceding section, the optimal contract stipulates positive compensation only if a signal is obtained and reported. Consequently, frequent but nonveriøable signals which can only partially be forged, re-establish the external monitor's suitability of Proposition 2. More precisely, his relative advantage is even strengthened, because the truthtelling constraints may only decrease an employee's suitability to carry out the monitoring task, for example, if there exists a conÆict of interest.

Complementary Monitoring: An alternative method to prevent signal forgery involves the appointment of an outsider to complement the monitoring eœort of the agent. Especially if it is impossible to shape the internal monitor's incentives according to her needs (e.g. in case of conÆicting interests), the principal may consider this option. Its suitability depends inter alia on the magnitude of the duplicated monitoring costs and the ease with which she can play oœ one signal report against the other. The fact that both monitors are liquidity constrained clearly limits the scope of deterring misrepresentations. A low correlation of their obtained signals would have a similar eœect since a high probability of obtaining diœerent signals makes truthful reporting diŒcult to induce (apart from the fact that contradictory signals do not facilitate eŒcient policy decisions.) If, by contrast, the monitor's signals were perfectly correlated, the sole purpose of a second monitor would be to elicit true reports in the fashion of Kofman and Laware (1993). To avoid repetition and to maintain the focus on the relative eŒciency of the monitoring modes under consideration, this paper does not further pursue the question of complementary monitoring.

6 Revisiting the 'Scapegoat' Argument - An Application

It is often cited that management consultants are useful scapegoats. That is, an employer may ønd it easier to 'sell' the need for restructuring when independent consultants (with a supposedly objective view) recommend it rather than taking diŒcult decisions oneself. In its attempt to prevent any negative consequences, the work-force may ønd it easier to exert pressure within the ørm than directing any complaints to an outsider. I will now examine the validity of this argument.

I essentially remain within the framework of Section 2, but some alterations are necessary. In particular, I restrict my attention to the special case were restructuring inÆicts a burden in both states, that is

$$r_g \leq 0 \quad \text{and} \quad r_b \leq 0.$$

In this context the employee has a vested interest in trying to prevent restructuring by exerting pressure on the monitor. It is conceivable that an outsider is immune to such preventative endeavours while an internal monitor may indeed suœer from the hostile attitude of his colleagues caused by his unpopular task. I therefore assume that the internal monitor bears private restructuring costs k_θ proportional to r_θ. Moreover, it is assumed that this peer pressure is socially wasteful. To clearly reÆect that it inÆicts an additional burden, the internal monitor - if appointed - is hired to supplement the existing work-force which now merely participates in both organizational modes. Though important for the decision whether to monitor, the latter's participation constraint is irrelevant for the comparative appropriability of external or internal monitoring and can therefore be disregarded in the sequel. Consequently, only the payoœs

$$\begin{aligned} P &= \rho R_\theta - m^\rho \\ IM &= m^\rho - \rho k_\theta - e \\ XM &= m^\rho - e \end{aligned}$$

remain relevant for the principal's decision whether to employ a monitor internally (in addition to the existing work-force) or appoint him as an external contractor. As before there is no diœerence between the internal and the external apart from the diœerential impact of private costs; they are equally adept at producing the signal.

From a welfare point of view, i.e. in the absence of any incentive problems, it is obvious that monitoring should always be pursued externally rather than internally to avoid socially costly peer pressure. In case monitoring eœort constitutes a hidden

action, however, it is exactly this pressure which may result in the internal monitor's superiority: in his attempt to reduce the adversity faced from his colleagues, he will adjust his monitoring eœort as to minimize their expected restructuring burden. Proposition 1 predicts that he will increase it if interests are aligned. To reÆect this alignment and ease the exposition I assume that

$$k_g > 0 \text{ and } k_b = 0. \tag{9}$$

The resulting tradeoœ between the relative power of incentives and costs of monitoring determines the optimal appointment mode of a monitor.

Proposition 4 The principal prefers internal to external monitoring if peer pressure k_g is suŒciently small to satisfy

$$k_g \leq \hat{k} := \frac{e}{(2p-1)|1-2q|q(1-p)} .$$

Despite the assumed alignment of interests, the internal monitor's dominance now depends on the magnitude of the pressure his colleagues exert. It serves as a nonmonetary penalty that eœectively relaxes the monitor's liquidity constraint and thus reinforces his incentives. This incentive eœect rises in k_g until no agency rent can be commanded, that is, beyond

$$\tilde{k} := \frac{e}{(2p-1)q\max\{q;1-q\}} \tag{10}$$

it remains constant[17]. At this level the participation constraint becomes the stronger requirement, implying that the internal monitor becomes increasingly costly. Thus, as long as peer pressure falls short of $\tilde{k}$ such that he may earn a (low) rent, the incentive eœect dominates. Above $\tilde{k}$, however, the cost eœect becomes more pronounced and ultimately (at $\hat{k}$) outweighs the former. Hence the principal resorts to external monitoring which is more eŒcient despite the associated agency rent. This tradeoœ is clearly reÆected in

[17]The benchmark $\tilde{k}$ against which the restructuring burden is judged depends on the parameters. It rises with the monitoring costs, and falls with the signal precision as well as the probability of the good state. For very low q, consistent restructuring is very appealing since the restructuring costs materialize seldom. Since the monitor's incentives depend on the expected restructuring burden, they can only be maintained if the low probability is compensated by a high magnitude of k_g. Otherwise the negative impact of misplaced restructuring is too low to induce eœort. Ceteris paribus, $\tilde{k}$ falls as the good state occurs more frequently so as to maintain the expected restructuring burden at a level just high enough to make the investment e worthwhile.

Corollary 1 The principal's payoœs attains a maximum at $\tilde{k}$, provided she employs an internal monitor.

Thus, if the principal could endogenously control the intensity of peer pressure - for instance, by including some protective clauses in the contract - $\tilde{k}$ would clearly be the targeted level.

Though more costly, the internal monitor's restructuring burden may strengthen his incentives to gather information about the underlying state of nature, and consequently to identify the appropriateness of change. If this incentive eœect is strong enough, internal monitoring will be the superior strategy - thus invalidating the commonly known 'scapegoat' argument that categorically favours independent monitors. An employee may indeed be the more eœective monitor precisely because he is seen as scapegoat and hence as target for peer pressure. Moreover, the principal encourages some exertion of socially wasteful peer pressure.

7 Conclusion

This paper analyses how the consequences of restructuring and the available information technology inÆuence the relative eŒciency of internal and external monitors. They are, by assumption, equally competent in identifying an underlying state which serves as the basis for decision making. I establish that the alignment or divergence of the principal's and employee's interests determines the optimal monitoring mode when monitoring eœort increases the precision of veriøable signals. Crucial for this result is the diœerence of the employee's experienced consequences caused by implementing change in a good or a bad state of nature. He prefers a more accurate or noisy signal if his interests are aligned or conÆicting, respectively. Accepting that interests are likely to be aligned whenever the underlying state reÆects some external condition and that a conÆict of interest is indicated by the analogy between some internal condition and the state of nature, our ørst result proposes that an insider is more eŒcient in detecting an external problem. An outsider, on the other hand, is more suitable if some internally caused problem needs to be rectiøed.

This result cannot be sustained for an inferior technology which produces imperfect signals with some frequency α. In this case, the total expected restructuring burden comes into play. That is, whether restructuring inÆicts a burden or creates a beneøt for the work-force may inÆuence the relative eŒciency of the two monitors: if restructuring constitutes the fallback option, a positive restructuring externality is responsible for the internal monitor's suboptimality, essentially because by shirking

he can prevent the generation of signals and hence ensure unconditional restructuring. This eœect is reversed if the status quo constitutes the relevant contingency policy, in which case his reinforced incentives imply the internal monitor's superiority. The principal's indiœerence as to the monitoring mode in other circumstances suggests that an expected restructuring burden plays only a subordinate role. More important is that - though inferior in terms of information generation - this technology enables the principal to avoid monitoring rent payments. Given the choice, she would trade oœ technological with organizational eŒciency in order to determine the optimal information technology endogenously. Possible cost diœerences aside, she would prefer the latter technology with $\alpha = 1$ for a straightforward reason: shirking of the monitor can more easily be prevented if it produces no signal rather than a noisy signal, because the former can be detected more easily.

The proøtability of external monitoring can be strengthened if we relax the assumption of veriøable signals, provided non-existing signals cannot be artiøcially created by the monitor. This result is, however, extremely sensitive to the extent to which true signals, or the absence thereof, can be manipulated. In case of unlimited possibilities of signal forgery, the truthtelling-compatibility constraints contradict the inducement of monitoring eœort. Consequently, external monitoring is not viable and the internal monitor becomes weakly dominant.

In a slightly diœerent setting in which a restructuring burden makes an internal monitor vulnerable to peer pressure, he becomes more costly to employ than an outsider. Given aligned interests, this pressure simultaneously strengthens his monitoring incentives. The 'scapegoat' argument thus only applies if peer pressure is substantial; its real magnitude - if beyond the principal's inÆuence - remains an empirical question.

In conclusion, this paper attributes the observed popularity of independent management consultancies to the following possibilities: existing performance problems are perceived to be internally caused, monitoring eœort tends to aœect primarily the frequency rather than the quality of information, the work-force perceives restructuring to inÆict personal burdens, and/or there exists considerable scope for peer pressure within the organization. In case the generated information is not veriøable, the scope of misrepresenting it must be limited. This explanation is necessarily only partial, as I have focussed on the monitoring role of consultants while disregarding other functions as well as possible technological diœerences. Apart from my belief that monitoring plays a very important role in the consulting process, this analysis provides a clear insight into the interaction between the organizational structure and monitoring incentives.

A Appendix

Proof of Proposition 1: First, I identify the optimal contract oœered to IM. For $q < \frac{1}{2}$ hence $z > \frac{1}{2}$, (IPC) and (IIC) can be rewritten as

$$a^1 - a^0 \geq \frac{e-(1-q)pr_b-a^0}{z} \qquad \text{(IPC)}$$

and

$$a^1 - a^0 \geq \frac{2e-(2p-1)(1-q)r_b}{2z-1} \ . \qquad \text{(IIC)}$$

(IPC) is the stricter requirement

$$\Leftrightarrow (2z-1)\left[e-(1-q)pr_b-a^0\right] \geq z\left[2e-(2p-1)(1-q)r_b\right]$$

$$\Leftrightarrow (2z-1)a^0 \leq (2p-1)q(1-q)r_b - e.$$

This inequality is compatible with the liquidity constraint $a^0 \geq 0$

$$\Leftrightarrow r_b \geq \frac{e}{(2p-1)q(1-q)} \ . \qquad (11)$$

Setting $a^0 = 0$, (IPC) can only bind if $a^1 \geq 0$ is satisøed, i.e.

$$za^1 = e-(1-q)pr_b \geq 0$$

$$\Leftrightarrow r_b \leq \frac{e}{(1-q)p} \ . \qquad (12)$$

Compatibility of (11) and (12) requires $z \leq 0$, a contradiction. Hence (IPC) never binds. Thus, if (11) holds, set $a^0 = a^1 = 0$; otherwise consider (IIC), which fulølls the liquidity constraint

$$\Leftrightarrow (2z-1)a^1 = 2e-(2p-1)(1-q)r_b \geq 0$$

$$\Leftrightarrow r_b \leq \frac{2e}{(2p-1)(1-q)} \qquad (13)$$

The optimal transfers whenever $q < \frac{1}{2}$ are thus

$$a^0 = 0 \quad \text{and} \quad a^1 = \begin{cases} 0 & \text{if } \neg(13) \\ \frac{2e-(2p-1)(1-q)r_b}{2z-1} & \text{if (13).} \end{cases} \qquad (14)$$

For $q > \frac{1}{2}$, rewrite (IPC) and (IIC) as

$$a^0 \geq \frac{e-(1-q)pr_b-za^1}{1-z} \qquad \text{(IPC)}$$

and

$$a^0 \geq \frac{2e-(2p-1)(1-q)r_b+(1-2z)a^1}{1-2z} \ . \qquad \text{(IIC)}$$

(IPC) is the stricter requirement

$$\Leftrightarrow (1-2z)\left[e-(1-q)\,pr_b-za^1\right] \geq (1-z)\left[2e-(2p-1)\,(1-q)\,r_b+(1-2z)\,a^1\right]$$

$$\Leftrightarrow (1-2z)\,a^1 \leq (2p-1)\,(1-q)^2\,r_b-e.$$

This inequality is compatible with the liquidity constraint $a^1 \geq 0$

$$\Leftrightarrow r_b \geq \frac{e}{(2p-1)(1-q)^2} \ . \qquad (15)$$

Setting $a^1 = 0$, (IPC) can only bind if $a^0 \geq 0$ is also satisøed, i.e.

$$(1-z)\,a^0 = e-(1-q)\,pr_b \geq 0$$

$$\Leftrightarrow r_b \leq \frac{e}{(1-q)p} \ . \qquad (16)$$

Inequalities (15) and (16) are incompatible, because $1-z>0$, hence (IPC) does not bind. Thus, if (15) holds, set $a^0 = a^1 = 0$; otherwise consider (IIC), which fulølls the liquidity constraint if

$$(1-2z)\,a^0 = 2e-(2p-1)\,(1-q)\,r_b \geq 0 \quad \Leftrightarrow (13)$$

The optimal transfers if $q > \frac{1}{2}$ are thus

$$a^1 = 0 \quad \text{and} \quad a^0 = \begin{cases} 0 & \text{if } \neg(13) \\ \frac{2e-(2p-1)(1-q)r_b}{1-2z} & \text{if } (13). \end{cases} \qquad (17)$$

Substitution of (14) and (17) into (3) yields

$$E[P] = \begin{cases} q\,(1-p)\,R_g+(1-q)\,pR_b+\max\{z;1-z\}\,\frac{(1-q)r_b}{|1-2q|}-\hat{e} & \text{if } r_b < \tilde{r} \\ q\,(1-p)\,R_g+(1-q)\,pR_b & \text{if } r_b \geq \tilde{r} \end{cases} \qquad (18)$$

where

$$\tilde{r} := \frac{2e}{(2p-1)(1-q)} > 0$$

$$\hat{e} := \max\{z; 1-z\} \ \tfrac{2e}{|1-2z|} \ .$$

Consider now the optimal contract oœered to XM. For $q < \frac{1}{2}$, rewrite the relevant constraints as

$$m^1 - m^0 \geq \ \tfrac{e-m^0}{z} \qquad \text{(XPC)}$$

and

$$m^1 - m^0 \geq \ \tfrac{2e}{2z-1} \ . \qquad \text{(XIC)}$$

It can be easily veriøed that, in view of the liquidity constraint, a binding (XPC) does not satisfy (XIC). Therefore set

$$m^0 = 0 \quad \text{and} \quad m^1 = \ \tfrac{2e}{2z-1} \ . \qquad (19)$$

Similarly, for $q > \frac{1}{2}$, the constraints

$$m^0 \geq \ \tfrac{e-zm^1}{1-z} \qquad \text{(XPC)}$$

and

$$m^0 \geq \ \tfrac{2e+(1-2z)m^1}{1-2z} \qquad \text{(XIC)}$$

together with the nonnegativity requirement on m imply that a binding (XIC) satisøes (XPC). The optimal monitoring fees are thus

$$m^1 = 0 \quad \text{and} \quad m^0 = \ \tfrac{2e}{1-2z} \ . \qquad (20)$$

Substituting (19) and (20) and, from (APC),

$$(1-z)\, a^0 + z a^1 = \max\{0; -(1-q)\, p r_b\}$$

into (3) yields

$$E[P] = \begin{cases} q(1-p)\, R_g + (1-q)\, p\, (R_b + r_b) - \hat{e} & \text{if } r_b < 0 \\ q(1-p)\, R_g + (1-q)\, p R_b - \hat{e} & \text{if } r_b \geq 0 \end{cases} \qquad (21)$$

A direct comparison of (18) and (21) shows that IM yields a higher $E[P]$ than XM if and only if $r_b \geq 0$. □

Proof of Proposition 2 I identify the highest attainable $E[P]$ for both policies speciøed in Section 4 and both types of monitors, taking the simpliøcation (4) into account[18]. Suppose IM is employed. Consider the policy of
(i) Restructuring unless a good signal is obtained:
if $E[r] = [1-\alpha(1-p)](1-q)r_b \geq 0$, then (IIC') is the stronger requirement of

$$\alpha\left[(1-z)a^0 + za^1\right] + (1-\alpha)a_\emptyset + [1-\alpha(1-p)](1-q)r_b \geq e \qquad \text{(IPC')}$$

and

$$\alpha\left[(1-z)a^0 + za^1\right] + (1-\alpha)a_\emptyset + [1-\alpha(1-p)](1-q)r_b \geq e + a_\emptyset + (1-q)r_b. \qquad \text{(IIC')}$$

Therefore let it bind. Set

$$a_\emptyset = 0 \quad \text{and} \quad \alpha\left[(1-z)a^0 + za^1\right] = e + \alpha(1-q)(1-p)r_b.$$

Substitution into (6) yields

$$E[P] = [1-\alpha p]qR_g + [1-\alpha(1-p)](1-q)R_b - \alpha(1-q)(1-p)r_b - e. \qquad (22)$$

If $E[r] < 0$, then with $a_\emptyset = 0$ (IPC') is stronger than (IIC') and should therefore bind. Set

$$a_\emptyset = 0 \qquad \text{and} \qquad \alpha\left[(1-z)a^0 + za^1\right] = e - [1-\alpha(1-p)](1-q)r_b.$$

Substituting into (6), we obtain

$$E[P] = [1-\alpha p]qR_g + [1-\alpha(1-p)](1-q)(R_b + r_b) - e = E[W]. \qquad (23)$$

(ii) Status quo unless a bad signal is obtained:
the constraints

$$\alpha\left[(1-z)a^0 + za^1 + (1-q)pr_b\right] + (1-\alpha)a_\emptyset - e \geq 0 \qquad \text{(IPC}_\text{J}\text{)}$$

and

$$\alpha\left[(1-z)a^0 + za^1 + (1-q)pr_b\right] + (1-\alpha)a_\emptyset - e \geq a_\emptyset \qquad \text{(IIC}_\text{J}\text{)}$$

coincide for $a_\emptyset = 0$. Hence, the liquidity constraint prescribes that

$$\alpha\left[(1-z)a^0 + za^1\right] = e - \alpha(1-q)pr_b \geq 0$$

[18] It is easy to verify that the result holds equally for the alternative simpliøcation $r_b = 0$.

$$\Leftrightarrow r_b \leq \frac{e}{\alpha(1-q)p} \ . \tag{24}$$

Payoœ (7) thus yields

$$E[P] = \begin{cases} \alpha[q(1-p)R_g + (1-q)p(R_b + r_b)] - e \quad = E[W] & \text{if (24)} \\ \alpha[q(1-p)R_g + (1-q)pR_b] & \text{if } \neg(24). \end{cases} \tag{25}$$

Suppose XM is appointed. Irrespective of the chosen policy (i) or (ii), the constraints

$$\alpha\left[(1-z)m^0 + zm^1\right] + (1-\alpha)m_\emptyset - e \geq 0 \tag{XPC'}$$

and

$$\alpha\left[(1-z)m^0 + zm^1\right] + (1-\alpha)m_\emptyset - e \geq m_\emptyset \tag{XIC'}$$

must be satisøed. Hence contract

$$m_\emptyset = 0 \qquad \text{and} \qquad \alpha\left[(1-z)m^0 + zm^1\right] = e \tag{26}$$

is optimal. Moreover, the agent participation constraints (APC') and (APC$_J$) indicate that $a = 0$ is optimal whenever $E[r] \geq 0$; if $E[r] < 0$ set

$$\alpha\left[(1-z)a^0 + za^1\right] + (1-\alpha)a_\emptyset = -[1-\alpha(1-p)](1-q)r_b \tag{27}$$

when restructuring is the fallback option, and

$$\alpha\left[(1-z)a^0 + za^1\right] + (1-\alpha)a_\emptyset = -(1-q)pr_b \tag{28}$$

whenever the status quo constitutes the fallback.

Substituting (26) and (27) into (6) results in

$$E[P] = \begin{cases} [1-\alpha p]qR_g + [1-\alpha(1-p)](1-q)(R_b + r_b) - e & \text{if } E[r] < 0 \\ [1-\alpha p]qR_g + [1-\alpha(1-p)](1-q)R_b - e & \text{if } E[r] \geq 0; \end{cases} \tag{29}$$

substitution of (26) and (28) into (7) yields

$$E[P] = \begin{cases} \alpha[q(1-p)R_g + (1-q)p(R_b + r_b)] - e & \text{if } E[r] < 0 \\ \alpha[q(1-p)R_g + (1-q)pR_b] - e & \text{if } E[r] \geq 0. \end{cases} \tag{30}$$

Suppose $E[r] < 0$. Equations (23), (25), (29) and (30) show that $E[P] = E[W]$ for both monitors and policies, and thereby establish the ørst part of the proposition. The fact that P expects $E[W]$ implies that she also mimics the ørst-best policy choice, i.e. pursue policy (i), if and only if $q \leq \tilde{q}$ as speciøed in (5).

Suppose $E[r] \geq 0$. Comparison of (22) with (29) shows that, provided policy (i) is adopted, XM $\succeq$ IM $\Leftrightarrow r_b \geq 0$. When policy (ii) is pursued, we have to distinguish between two cases when comparing (25) with (30): if (24) applies then IM $\succeq$ XM $\Leftrightarrow r_b \geq 0$; if (24) is violated then IM $\succeq$ XM because $e \geq 0$. Consequently, provided $E[r] \geq 0$, XM $\succeq$ IM $\Leftrightarrow$ policy (i) is adopted.

To conørm the policy distortion caused by $E[r] \geq 0$ consider ørst the external monitor. Comparing (29) with (30) it follows that policy (i) $\succeq$ (ii)

$$\Leftrightarrow q \leq \underline{q} := \tfrac{R_b}{R_b - R_g} \ .$$

Since $\underline{q} \leq \tilde{q} \Leftrightarrow r_b \geq 0$, the policy choice is distorted in favour of the status-quo fallback. Similarly for internal monitoring: given $E[r] \geq 0$, recall from (22) and (25) that $E[P] < E[W]$ if policy (i) is adopted, $E[P] \leq E[W]$ under policy (ii). The latter inequality is only strict if (24) is violated. In that case policy (i) $\succeq$ (ii)

$$\Leftrightarrow q \leq \underline{\underline{q}} := \tfrac{(1-\alpha)R_b - \alpha(1-p)r_b - e}{(1-\alpha)(R_b - R_g) - \alpha(1-p)r_b}$$

Since $\underline{\underline{q}} \leq \underline{q} \Leftrightarrow \alpha(1-p)\, r_b R_g \leq e\,(R_b - R_g)$, which always holds because $R_g < 0$, the threshold probability at which both policies yield equal payoœs is smaller than $\underline{q}$. Consequently, the status-quo fallback dominates restructuring for a larger range of parameter q relative to the ørst-best scenario. □

Proof of Proposition 3 The impossibility of employing XM follows immediately from the contradiction of constraints introduced in Sections 3 and 5,

$$\left(z - \tfrac{1}{2}\right) \ \left(m^1 - m^0\right) \geq e \qquad \text{(XIC)}$$

and

$$m^0 = m^1. \qquad \text{(XTg\&b)}$$

Consider IM. For simplicity substitute $r_g = 0$ in line with (4). Compatibility of (ITg) and (ITb) requires $r_b > 0$. From (ITg) we know that $a^0 - a^1 \geq 0$ and therefore rewrite the remaining constraints as

$$\frac{e-(1-q)pr_b-a^1}{1-z} \leq a^0 - a^1 \qquad \text{(IPC)}$$

$$\frac{(1-q)(1-p)r_b}{1-z} \leq a^0 - a^1 \qquad \text{(ITg)}$$

$$a^0 - a^1 \leq \frac{(1-q)pr_b}{z} \qquad \text{(ITb)}$$

$$a^0 - a^1 \leq \frac{(2p-1)(1-q)r_b-2e}{2z-1} \quad \text{if } q < \tfrac{1}{2} \qquad \text{(IIC)}$$

$$\frac{2e-(2p-1)(1-q)r_b}{1-2z} \leq a^0 - a^1 \quad \text{if } q > \tfrac{1}{2} \qquad \text{(IIC)}$$

Compatibility of (ITg) with (IIC) if $q < \frac{1}{2}$, and (ITb) with (IIC) if $q > \frac{1}{2}$ requires (8), i.e.

$$r_b \geq \min\{z; 1-z\} \ \frac{2e}{(2p-1)q(1-q)} \ .$$

Moreover, (IPC) and (ITb) are compatible only if

$$\frac{ze-(1-q)pr_b}{z} \leq a^1. \qquad (31)$$

If $q < \frac{1}{2}$, (IPC) may not contradict (IIC), that is,

$$\frac{e-(1-q)pr_b}{2z-1} \leq a^1 \qquad (32)$$

must hold. Provided (8) is satisøed, P is able to employ IM (i.e. simultaneously induce monitoring eœort and truthtelling) by choosing an appropriate contract:
If $q < \frac{1}{2}$, set

$$a^1 = \max\left\{0; \ \frac{ze-(1-q)pr_b}{z}; \frac{e-(1-q)pr_b}{2z-1} \right\}$$

and

$$a^0 = a^1 + \max\left\{ \ \frac{e-(1-q)pr_b-a^1}{1-z}; \frac{(1-q)(1-p)r_b}{1-z} \ \right\},$$

If $q > \frac{1}{2}$, set

$$a^1 = \max\left\{0; \ \frac{ze-(1-q)pr_b}{z} \right\}$$

and

$$a^0 = a^1 + \max\left\{ \ \frac{e-(1-q)pr_b-a^1}{1-z}; \frac{(1-q)(1-p)r_b}{1-z}; \frac{2e-(2p-1)(1-q)r_b}{1-2z} \ \right\}.$$

□

Proof of Proposition 4: Similar to the proof of Proposition 1. First derive the highest $E[P]$ attainable by internal and external monitoring, respectively.

Suppose P employs IM, she maximizes

$$\max_m q(1-p)R_g + (1-q)pR_b - (1-z)m^0 - zm^1 \tag{33}$$

subject to

$$(1-z)m^0 + zm^1 - q(1-p)k_g - (1-q)pk_b - e \geq 0 \tag{IPC}$$

$$\left(z - \tfrac{1}{2}\right)(m^1 - m^0) \geq e - \left(p - \tfrac{1}{2}\right)[qk_g - (1-q)k_b] \tag{IIC}$$

Substitute $k_b = 0$.

Suppose $q < \frac{1}{2}$: The compensation dicerential is bounded below by both constraints

$$m^1 - m^0 \geq \tfrac{e+q(1-p)k_g - m^0}{z} \tag{IPC}$$

$$m^1 - m^0 \geq \tfrac{2e-q(2p-1)k_g}{2z-1}. \tag{IIC}$$

(IPC) is binding if and only if $(2z-1)m^0 \leq (2p-1)q(1-q)k_g - e$. In view of the liquidity constraint $m^0 \geq 0$, compatibility requires

$$k_g \geq \tfrac{e}{(2p-1)q(1-q)} \ . \tag{34}$$

The best the principal can do to save herself the agency rent is to set

$$m^0 = 0 \quad \text{and} \quad m^1 = \begin{cases} \frac{e+q(1-p)k_g}{z} & \text{if (34)} \\ \frac{2e-q(2p-1)k_g}{2z-1} & \text{otherwise.} \end{cases} \tag{35}$$

Suppose $q > \frac{1}{2}$: Due to the changed sign of $\left(z - \frac{1}{2}\right)$, m^0 is bounded below by the constraints

$$m^0 \geq \tfrac{e+q(1-p)k_g - zm^1}{1-z} \tag{IPC}$$

$$m^0 \geq m^1 + \tfrac{2e-q(2p-1)k_g}{1-2z} \ . \tag{IIC}$$

(IPC) is the stricter requirement if and only if $(1-2z)m^1 \leq (2p-1)q^2k_g - e$. This is compatible with $m^1 \geq 0$ if

$$k_g \geq \tfrac{e}{(2p-1)q^2} \ . \tag{36}$$

W.l.o.g. set

$$m^1 = 0 \quad \text{and} \quad m^0 = \begin{cases} \frac{e+q(1-p)k_g}{1-z} & \text{if (36)} \\ \frac{2e-q(2p-1)k_g}{1-2z} & \text{otherwise.} \end{cases} \tag{37}$$

Substitute (35) and (37) into (33) to obtain the principal's maximum payoœ associated with selective restructuring and internal monitoring

$$E[P] = \begin{cases} q(1-p)(R_g - k_g) + (1-q)pR_b - e & \text{if } k_g \geq \tilde{k} \\ q(1-p)(R_g - k_g) + (1-q)pR_b + \frac{\max\{q;1-q\}}{|1-2q|}qk_g - \hat{e} & \text{if } k_g < \tilde{k} \end{cases} \quad (38)$$

where

$$\hat{e} := \frac{\max\{z;1-z\}}{|1-2z|}\ 2e$$

and, combining (34) and (36),

$$\tilde{k} := \frac{e}{(2p-1)q\max\{q;1-q\}}\ .$$

Suppose P appoints XM, substitute $k_g = 0$ into (38) to obtain

$$E[P] = q(1-p)R_g + (1-q)pR_b - \hat{e}.$$

Second, compare the relevant payoœs. It is easy to verify that, if $k_g \leq \tilde{k}$, IM is always preferred to XM, because

$$\frac{\max\{z;1-z\}}{|1-2q|}\ qk_g \geq 0.$$

If $k_g > \tilde{k}$, IM is preferred to XM

$$\Leftrightarrow \quad k_g \leq \frac{e}{(2p-1)|1-2q|q(1-p)} = \hat{k}.$$

Note that $\tilde{k} < \hat{k}$. □

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