

Towards a New Theory of Corporate Governance:

Objectivity versus Proximity*

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Abstract

In this paper we identify the trade-off between *objectivity* and *proximity* as fundamental to the corporate governance debate. We stress the value of objectivity that comes with distance (e.g., the market oriented U.S. system), and the value of better information that comes with proximity (e.g., the more intrusive Continental European model). Our key result is that the optimal arrangement between management and monitor (board or shareholders) should either capitalize on the better information that comes with proximity or seek to optimally exploit the objectivity that comes with distance. We argue that the asset structure, in particular, the irreversibility of investments, and the opportunity costs associated with resource misallocation critically determine the optimality of the distance- or proximity-based arrangement. We also discuss the ways in which investors have “contracted around” the flaws in their own corporate governance systems, pointing at the *adaptability* of different arrangements.

1 Introduction

The most commonly invoked paradigms of corporate governance are the U.S. system of corporate governance which boasts strong capital markets but possibly weak institutional constraints on management, and the German model, where strong institutional (bank) controls on management may compensate for weak capital markets. This trade-off between institutional and market controls has received a considerable research interest. Coffee (1991) and Bhide (1993) have identified a trade-off in corporate governance between the characteristic of liquidity, which provides investors with a ready exit option in case their investment goes sour, and the characteristic of voice, which gives investors the ability to affect the performance of the firms in which they have invested if they become dissatisfied. The former points at the role of capital markets, the latter is reminiscent of institutional controls.

While this dichotomy is undoubtedly important, it does not address the question how control is exercised. Monitoring is the central ingredient here, and monitoring can occur with both institutional and market controls. Monitors come in a variety of forms, from directors to auditors, credit rating agencies, stock market analysts, takeover firms, arbitrageurs, large shareholders and outside lenders. Even customers and suppliers can be viewed as monitors because of their ability to observe management quality and send effective signals to the market about management's performance.

In this paper, we identify what we regard as a fundamental trade-off that must be faced when evaluating the ability of a monitor to succeed in improving a corporate governance system. This is the trade-off between *objectivity* and *proximity*, which we consider central to the corporate governance debate. Proximity exists where monitors such as board members are in close contact with firm management and participate in important decisions on a real-time basis. Objectivity exists when monitors such as hostile acquirers, analysts, credit rating agencies and outside lenders remain distant from management and make objective evaluations of management's performance. A trade-off in these monitoring functions exists because monitors that obtain close proximity necessarily forgo objectivity; and monitors that are objective must maintain sufficient distance from management, such that they lose the advantages of proximity. Thus monitors must *choose* which of these

characteristics they prefer. In particular, one implication of our analysis is that certain monitors, such as accounting firms and outside lenders, can be either objective or proximate (or neither). But they cannot be both objective and proximate monitors of the same firms at the same time.

Corporate governance systems differ primarily in the role that “the market for corporate control” can play. In Continental-Europe, there often is an intimate involvement in monitoring management either by large shareholders or by autonomous, but possibly entrenched, boards of directors (supervisory boards). It may often be the case that these monitors effectively become insiders and are captured by the firms they are monitoring. Where such capture occurs, the ostensible monitor will tend to adopt the perspective of the firm being supervised. Consequently, the informational advantage enjoyed by the insiders in certain corporate governance systems is mitigated by the fact that these investors may gradually lose the ability to evaluate the performance of the firms they are monitoring in an objective manner. By contrast, in a corporate governance system like the one that exists in the U.S., less monitoring comes from directors, and a more important role is played by the market for corporate control. In such a system, considerable distance exists between monitors (investors) and management. Investors may then face an obvious problem in obtaining timely, reliable information. This could negatively impact the effectiveness of their governance. In particular, monitoring may then be often *ex post* and evaluative rather than *ex ante* and pro-active. On the positive side, the distance that U.S. investors have from the firms in which they are investing brings with it a degree of objectivity lacking in corporate governance systems where the proximity of monitors subjects them to the risk of capture. A perfect system would combine the benefits of proximity and objectivity. Because this seems unattainable, adaptability features may come in to overcome the weaknesses of either system.

We construct a model where depending on the quality of the monitor and the distance between monitor and management, the monitor is more or less effective in immediately correcting managerial failure. If the monitor initially fails in correcting managerial failure by preventing bad decisions from being reversed, he can intervene later once he discovers that the firm’s project or strategy is wrong. The incentive of the monitor to intervene is in part affected by the potential reputational

consequences that (late) intervention has. That is, it can negatively reflect on the reputation of the monitor. Key now is that in a more distant system late intervention is less stigmatizing because early correction is not feasible due to lack of timely information *regardless* of the quality of the monitor. A proximity-based system, however, offers benefits in that it allows for more timely early correction, but faces more reputational distortions in (late) intervention.

Our key results are as follows. Proximity dominates when a firm's asset structure is characterized by irreversible investments. That is, when investments are highly firm-specific, immediate correction is most important (intervention comes too late and leads to an irreversible loss), and this requires proximity of the monitor. At the other extreme, when assets are marketable and investments are not irreversible, distance dominates. In that case, minimizing distortions in the intervention decision becomes the primary concern, and this dictates distance. In an alternative interpretation of our results, we argue that the optimality of proximity or distance depends on the opportunity costs of misallocated resources. If these are large, distance dominates because this optimizes intervention incentives and reduces opportunity losses. While our theory primarily points at the need to tailor governance arrangements to firm characteristics, we argue that aggregate shifts in industry structures have elevated the importance of distant (market-based) arrangements.

This paper is organized as follows. In Section 2 we develop our basic insight on the lack of objectivity that comes with proximity, and discuss related literature on corporate governance. Section 3 presents the formal model. Section 4 contains the analysis. In section 5, we interpret our results in the context of firm's asset structure (irreversibility of investments) and opportunity costs of misallocated resources. In that section, we also build on our point about adaptability. Section 6 concludes. All the proofs are in the Appendix.

2 Motivation and Related Literature

2.1 Sources of Capture and Lack of Objectivity

Key to understanding the importance of proximity and objectivity is how control is exercised and what makes control effective. Shareholders exercise control via two different channels. One is their

impact via the board of directors, the other consists of interventions via the market for corporate control. Corporate governance systems in the world may differ in the effectiveness of both channels. The Continental European model focuses primarily on the impact of shareholders on managerial decision making via the board of directors with a marginal role for the market for corporate control. The Anglo-Saxon model differs in that it puts more weight on the market for corporate control and possibly less on the board.

We do not want to put too much emphasis on this general characterization of corporate governance arrangements, but want to focus on the fundamental issue concerning the way these systems actually work. Here we identify a primary trade-off between *proximity* and *objectivity* in supervision and monitoring. Effective supervision and monitoring are best performed if the monitor (board or shareholders) is both well informed and objective. To see this, observe that monitoring and disciplining management are the primary issues in the corporate governance debate. Such monitoring and discipline may require timely corrective actions. However, the necessary objectivity may require sufficient distance between management and monitor, while being well informed is best accomplished by being close and thus intrusive. This suggests a trade-off between proximity and objectivity.

While it is obvious why being well informed is best accomplished by proximity, it may be less clear why objectivity requires a sufficient distance between management and monitor. Here we draw on research in public choice and psychology to make our point. There is ample evidence in the literature on social psychology to support the view that boards with close proximity to management are likely to become captured by management. For example, the “theory of escalating commitments” predicts that board members will come to identify strongly with management because they have begun a pattern of agreeing with management’s decisions. Those earlier decisions, once made and defended, will affect future decisions such that those later decisions will comport with earlier decisions (Myers, 1983). In fact, social psychologists have shown that people tend to internalize their vocational roles. Occupational choices, such as the choice to accept a particular position as a corporate director, will have a strong influence on our attitudes and values (Bachman

and O'Malley, 1977). In the context of boards of directors, this means that board members tend to internalize the perspective of management. This causes them to lose objectivity. Observe that this problem does not arise with shareholders in public capital markets who have little or no contact with management.

The basic idea is that once boards of directors have been in place for a while, they are likely to embrace management's perspective. More specifically, after a decision is made and defended by a board, it will affect future decisions such that those decisions will comport with the earlier actions (Rabin, 1998). For example, studies on the escalation of the Vietnam War showed that leaders paid more attention to new information that was compatible with their earlier decision. They tended to ignore information that contradicted those earlier decisions. As one researcher observed, "there was a tendency, when actions were out of line with ideas, for decision-makers to align their actions" (White, 1971). Once ideas and beliefs become ingrained in the mind of a board of directors, the possibility of altering these beliefs decreases substantially. This is an application of what Kahneman and Lovallo (1993) described as a cognitive bias known as the "inside view." Like parents who often are unable to view their own children in an objective or detached manner, proximate monitors may reject statistical reality and view the firms with which they are associated as above average. Objective monitors, by contrast, are able to evaluate management decisions and make comparisons in a dispassionate way.¹

An interesting illustration of this point is provided by Michaely and Womack (1999). Michaely and Womack look at analyst recommendations of companies that have been taken public by the broker-dealer firms for which they work. They find that the recommendations by underwriter analysts show significant elements of bias. In particular, underwriter analysts-recommended stocks perform more poorly than stocks recommended by independent analysts. One possible explanation for the systematically over-optimistic predictions of analysts who are affiliated with underwriters is that these analysts, unlike independent objective analysts, have "cognitive biases" such that they "genuinely believe that the firms they underwrite are better than the firms underwritten by other

¹ Crémer (1995) puts forward a related argument. He argues that too much access to information leads to too much understanding, and in doing so mitigates the incentive benefits of clear targets with associated rewards/punishments.

investment banks.” This results in a situation in which the reality is not likely to change their priors.

Michaely and Womack’s findings have a direct bearing on our analysis in that underwriter-affiliated analysts have more and better information than unaffiliated analysts; participating in the underwriting gives access to superior information and better access to management in the firms. Thus, the comparison between underwriter analysts and unaffiliated analysts is a very concrete illustration of the trade-off between proximity and objectivity in corporate governance. Michaely and Womack’s results are consistent with the view that an objective monitor can do a better job than the proximate monitor, despite the proximate monitor’s clearly superior access to information.²

Also from an economic perspective we can support the lack of objectivity by boards. Board supervision tends to make the board jointly responsible with management for the state of the firm. Corrective action can reveal that the board has previously failed to take the proper course of action. Boards may resist action for other reasons as well. They invest considerably in information that is specific to the incumbent management. Changing management would then potentially dilute the value of this investment. Moreover, to a very large extent, boards of directors can be viewed as legislatures with essentially one interest group constituency: management. Management not only has the time and the resources to cultivate management, it is also the group that presents the board with the information it must have to make its decisions. Over a wide range of issues, all management has to do is to present information in a way that is likely to generate support for its perspectives, or in a way that is slightly slanted, or in a selective way, to achieve effective capture of the board. It is, therefore, not surprising that boards often lack objectivity.

2.2 Related Literature

A central focus in the extensive literature on corporate governance in both finance and in law and economics has been on agency problems between management and shareholders stemming from the separation of ownership and control, and their potential solutions. Different strands address the

² What is interesting as well is that this explanation of analysts’ biases does not require analysts to be dishonest. While this has been a key accusation by (among others) the SEC, our explanation only uses the observation that their intimate involvement induces biases.

role of monitoring and supervision by the board, ownership structure and the market for corporate control, and executive compensation in mitigating these agency problems (see, e.g., Jensen, 1993, Shleifer and Vishny, 1997, and Hermalin and Weisbach, 2003).³

As a general comment, this literature has shed light on potential remedies for the agency problem between management and shareholders, but has said little about *how* effective control is exercised and what incentives corporate boards or shareholders have to intervene in managerial decisions. This is our primary focus. We focus on incentive problems that may arise at the level of the *monitor*, and particularly determine under which conditions distance (i.e., objectivity) or proximity on the side of the monitor are optimal. We first focus on corporate boards, and subsequently discuss ownership structure issues. Both have a direct bearing on our analysis.

Corporate Boards

The literature on corporate boards has primarily focused on the degree of independence of the board. Many studies have shown that boards often lack independence from the CEO (Hermalin and Weisbach, 1998). While this conclusion is widely supported, little is known about how board composition comes about. Some exceptions are recent studies that focus on the optimal board composition, particularly in the context of facilitating an optimal information flow between management and board. One conclusion in this literature is that if access to inside information is crucial, the board should be more tilted towards insiders (see Raheja, 2005, Gillette, Noe and Rebello, 2008, and Harris and Raviv, 2008). Similarly, if management is reluctant to disclose information, more friendly, i.e., insider-dominated, boards might be optimal (Adams and Ferreira, 2007). In this way the board would precommit to a lower monitoring intensity in order to encourage information sharing by management.⁴

What these papers show is that the need to access firm-specific information is a crucial determinant of the optimal distance of the board to management.⁵ Where firm-specific information

³ We could also add strands of research that have looked at the impact of internal controls and product market competition on managerial incentives, see Hirota and Kawamura (2002).

⁴ Hermalin and Weisbach (1998) focus on the impact of the bargaining power of the CEO on board composition (see also Warther, 1998). Denis and Sarin (1999) analyze empirically how changes in board composition are related to CEO turnover, stock price performance and firm characteristics. Yermack (1996) analyzes the link between board size and performance.

⁵ John and Kedia (2003) examine the link between firm-specific parameters, in particular, the impact and scale of

is crucial and only insiders can access it, an insider-dominated board is optimal. As will become clear, this insight is consistent with our results in that we will show that highly firm-specific investments require more intimate information and dictate proximity. But contrary to our analysis, the key tradeoff is between the degree of insider control of the board and managerial incentives. Our analysis takes managerial incentives as given, and concentrates on the board's incentives to intervene in the decisions of management.⁶

Kroszner and Strahan (2001) also address the issue of board composition, but analyze the incentive problems that arise in the presence of a banker on the board. The authors empirically examine the tradeoff between the benefits from bank monitoring and the costs associated with conflicts of interest between lenders and shareholders and lender liability in the case of financial distress, and show that bankers tend to be actively involved only in firms for which lender-shareholder conflicts are relatively unimportant. Similar to our analysis, other (private) objectives may interfere with the function of the board: in the case of Kroszner and Strahan (2001) the interest of a primary lender (the bank), in our case reputational concerns.

Several other papers have focused on the effectiveness of the board. Fama (1980) and Fama and Jensen (1983) focus on the monitoring role of (outside) directors and emphasize that board members have incentives to build reputations as expert monitors, and thus are “tougher” on managers. While this argument suggests that reputational considerations can mitigate agency problems between outside board members and a firm's shareholders (i.e., outsiders have more incentives to become informed and intervene), we argue that such considerations can also be at the root of incentive distortions. That is, if there is uncertainty with respect to the quality of the board, the board may abstain from intervening in managerial decisions if this could potentially worsen its reputation,

new investments, and optimal governance structures. The authors argue that insider (i.e., alignment-based) systems constitute the optimal governance arrangement for firms with technologies that are optimally implemented at a small scale (low productivity impact), while outsider (i.e., takeover-oriented or interventionist) systems dominate for technologies that are optimally implemented at a large scale (high productivity impact).

⁶ Allen (1993) qualifies the presumed link between insiders and access to information. He allows for the case where outsiders may have better access to information. In particular, he focuses on the information feedback role of financial markets, and argues that in industries with more standard production technologies insider- or proximity-based systems are optimal. His argument is that for standard technologies the complexity of managerial decision-making is relatively small and moral hazard problems may be the main concern; proximity then allows for monitoring and timely correction. For more advanced production technologies, on the other hand, outsider-based systems may be optimal, since financial markets, i.e., outsiders, can provide managers with information they would not otherwise have possessed. While Allen links the firm's financing choice (insider/bank versus outsider/financial market) to the asset structure of the firm, a link with the monitoring structure could exist as well.

even though intervention would be in the shareholders' interest.⁷

Ownership Structure

Another strand of literature our paper relates to is the literature on ownership structure and large shareholder monitoring. In this literature, the monitor's (shareholder's) incentives to intervene in firm management (and thus the degree of monitor independence) are typically linked to the degree of ownership dispersion.⁸ Shleifer and Vishny (1986) focus on the ways in which large shareholders bring about value-increasing changes in corporate financial policy through monitoring or takeovers, and show that the free-riding problem associated with a dispersed ownership structure can be mitigated by the presence of a large shareholder. Burkart, Gromb and Panunzi (1997) highlight a potential drawback of large shareholder intervention. In particular, the authors address the effect of ownership structure on managerial initiative and non-contractible (firm-specific) investments. Their argument is that a reduction of managerial discretion by a large shareholder may be ex post efficient, but lowers the ex ante incentives of managers to undertake firm-specific investments. The authors show that a dispersed ownership structure can serve as a precommitment device against excessive monitoring and interference, i.e., it commits shareholders not to exercise excessive control in the choice of investment projects, thus inducing the manager to show initiative.⁹ Contrary to our analysis, in these papers the incentives of the monitor (i.e., the shareholders) are fully aligned with value maximization.

⁷ Several other papers discuss the role of the board relative to management. Almazan and Suarez (2003) and Maug (1997) address the impact of board independence on managers' incentives to make firm-specific investments. Almazan and Suarez (2003) show that if the restructuring potential of the firm's assets is high and the costs of information acquisition are low, independent directors are optimal. This result is in line with our finding that objectivity (distance) becomes more optimal if opportunity costs increase. Maug (1997) focuses on the relative efficiency of independent directors versus shareholders. Hirshleifer and Thakor (1994) focus on the complementarity of monitoring by the board and the market for corporate control. Song and Thakor (2006) address inefficiencies that may result when both management and the board are driven by reputational considerations.

⁸ Shleifer and Vishny (1997) and Bebchuck (1999) observe that the concentration of ownership varies greatly across countries around the world, with dispersed ownership more common in the United States and control blocks dominant in Continental Europe. However, the ownership structure in the U.S. is not as dispersed as is sometimes suggested (La Porta, Lopez-de-Silanes and Shleifer, 1999).

⁹ Several other papers have looked at the impact of stock market liquidity on the effectiveness of shareholder monitoring. The suggestion is that liquidity comes with dispersed ownership, and implies lack of control. This suggested link between dispersed ownership and lack of control has been challenged by Berglof (1996), Bolton and Von Thadden (1998) and Maug (1998). Berglof argues that a dispersed ownership of shares does not necessarily imply a lack of control. In particular, cross holdings and pyramidal ownership structures could allow for disproportional voting rights relative to the capital committed. Bolton and Von Thadden (1998) argue that a large shareholder might be very desirable, but he may still require an exit option. Without sufficient liquidity in the market, exit is costly. Similarly, Maug (1998) argues that liquidity increases a large shareholder's incentive to monitor precisely when he has a possibility to trade.

3 The Economic Setting and Specification of the Model

3.1 Model Setup

We construct a stylized model to highlight the trade-off between proximity and objectivity that is central to this paper. We identify two parties that determine the corporate governance structure of a firm: management and a monitor (i.e., the board or the firm's shareholders). Management makes decisions (e.g., it decides on the firm's strategy or chooses to invest in a project); the board and/or the firm's shareholders can monitor and possibly intervene to correct managerial decisions. We will generally refer to the board as the monitor.

The model has three dates. At $t = 0$, management makes a decision on a project (or strategy), and potentially makes a mistake (managerial failure). At $t = 1$ (immediately following management's decision), the board monitors and can correct a managerial mistake by reversing the decision (e.g., it can change a bad project or strategy into a good one). Early correction by the board is only feasible if the board receives *timely* information. The likelihood of this depends on the distance between the board and management. The smaller the distance, the higher is the probability that timely information is received. We let $\beta \in [0, 1]$ reflect the probability that the board receives timely information; thus, the inverse of β can be interpreted as a measure of distance between monitor and management.

Even when timely information is received, monitoring by the board will not always be successful (i.e., result in early correction). Success depends in part on the *quality* of the board. We assume that the board is either of intrinsic quality G (good) or B (bad), and denote the board's type by $\tau \in \{G, B\}$. A type G board, conditional on having received timely information, monitors successfully with probability α_G , and a type B board with probability α_B , with $0 < \alpha_B < \alpha_G < 1$. If monitoring fails, managerial failure is not corrected at $t = 1$. The board can also intervene at $t = 2$. We assume that the board is fully informed at that time. This allows the board to correct an early monitoring failure. The board can do this regardless of the cause of the monitoring failure; that is, the board may either have monitored unsuccessfully or may not have received timely information.

At $t = 3$, outsiders receive a (publicly observable) noisy signal $\phi \in \{L, H\}$ with respect to the output of the firm's project. With a bad project in existence at that time, the probability that the output signal is high (H) equals \underline{p} , whereas with a good project the probability of an output signal H equals \bar{p} , where $0 < \underline{p} < \bar{p} < 1$. The probability of a low output signal (L) equals $1 - \underline{p}$ for a bad project and $1 - \bar{p}$ for a good project. *Figure 1* summarizes the potential outcomes of management's project decision and the timing of the board's correction and intervention decisions.

From a firm value maximization point of view, early correction of a bad project via monitoring is preferred to late intervention. Not correcting managerial failure at all, however, is most costly. We assume that late intervention at $t = 2$ costs X (relative to early correction), while abstaining from intervention in the case of managerial failure costs Y , with $0 < X < Y$. These costs measure the loss in firm value relative to successful early correction (monitoring) of managerial failure. Observe that in case of managerial success no intervention is optimal.

3.2 Information Structure, Remuneration and Objectives

The strategic player in the model is the board (the monitor). The decision process and incentives of management are not considered; that is, managerial decisions at $t = 0$ are exogenous. The information structure is as follows. The board knows its type, knows whether managerial failure has occurred, knows whether timely information was received and knows the success of its (early) monitoring efforts. Outsiders (including shareholders) only observe the intervention decision of the board at $t = 2$ and the output signal at $t = 3$. This means that prior to $t = 2$, no information becomes available to outsiders. The board's intervention or no intervention decision now is potentially informative to outsiders, because a type B board needs to intervene more often than a type G board. Since outsiders cannot observe actual managerial failure nor the success or failure of early monitoring, the board may choose to distort its intervention decision (see later). Although outsiders don't know the board's type, they do know the cross-sectional distribution of good and bad monitors. The prior probability that a board is of type G equals $\gamma \in [0, 1]$, and the probability of a type B board is $1 - \gamma$. We interpret γ as the initial reputation of the board.

The remuneration of the board is linked to its reputation. The board seeks to maximize its reputation over time. Let q_t be the board's reputation at time t , with the prior $q_0 = \gamma$. Following the intervention (or no intervention) decision at $t = 2$, outsiders update this prior and calculate their posterior belief q_2 with respect to the board's type.¹⁰ Further updating of the board's reputation takes place at $t = 3$ when outsiders receive the output signal ϕ . That is, $q_3(\phi)$ is a Bayesian update of q_2 following the output signal ϕ . Observe that in an efficient equilibrium with intervention in a bad project only, $q_3(\phi)$ equals q_2 in the case of intervention (i.e., since intervention only occurs in case of a bad project, nothing more can be learned from observing the signal ϕ). In the case of no intervention, $q_3(\phi)$ satisfies

$$q_3(\phi) = \frac{q_2 \times Pr(\phi | \tau = G)}{q_2 \times Pr(\phi | \tau = G) + (1 - q_2) \times Pr(\phi | \tau = B)}, \quad (1)$$

for $\phi \in \{L, H\}$. The board's objective function is given by

$$Max \ q_2 + \frac{E(q_3)}{1 + r}, \quad (2)$$

where $E(q_3)$ reflects the expected reputation of the board at $t = 3$, which depends on the distribution of the realization of the output signal ϕ , and r equals the discount rate.¹¹

A critical parameter in the model is β . As defined earlier, β measures the probability that the board will receive timely information and is able to correct managerial failure early. The core of the analysis is to show how changes in β affect the willingness of the board to intervene. The parameter β reflects the type of governance system in place. The value of β is known to all.

Summarizing, we have a signaling game where the board chooses an action at $t = 2$: it either intervenes or does not intervene. The objective is to maximize the remuneration function (2). Its

¹⁰ That is, we capture the board's potential lack of objectivity due to proximity with a reputational mechanism. This is consistent with the "joint responsibility" interpretation discussed in Section 2, which implies that a "close" board may abstain from late intervention in order to preserve its reputation. Alternatively, we could have modeled the "cognitive bias" of a close board. That is, the board may ignore negative information, but instead may focus on information which comports to earlier decisions. This interpretation, which is central in the social psychology literature, would have yielded qualitatively similar results. One could ask the question how important the reputation mechanism is. Recent empirical evidence suggests that reputational considerations are important for board members. In an interesting study, Coles and Hoi (2003) show that non-executive board members that vote against protective antitakeover provisions are viewed favorably in the labor market for directors and are rewarded with new non-executive directorships.

¹¹ We could also add a stock price component to the board's remuneration function. A sufficiently large weight on this component might mitigate reputational distortions. However, as long as reputational concerns are not fully eliminated, our analysis will remain qualitatively unaffected. Observe also that the reputation-dependent component of the board's remuneration highly correlates with the stock price component.

choice of action will depend on the publicly known distance between board and management (the inverse of β) and on the privately observed quality of the project, which may point at an earlier monitoring failure. *Figure 2* summarizes the sequence of events in the game.

4 Analysis

In this section, we analyze the incentives of the board (the monitor) to intervene at $t = 2$ as a function of the proximity or distance to management. We start by analyzing the board's intervention strategy in the case of proximity, and subsequently analyze the optimal distance between management and monitor.

4.1 Preliminary Results

Initially, we start out with proximity ($\beta = 1$). Thus, the monitor has always access to timely information. For simplicity, we assume that managerial failure has occurred; hence, we put zero weight on the no failure (managerial success) branch in *Figure 1*. We will focus on Bayesian Perfect Nash Equilibria. The following results can be derived.

Theorem 1 *In the set of plausible Bayesian Perfect Nash Equilibria (BNE) no monitor intervenes in a good project or strategy. When confronted with a bad project or strategy, a type G monitor intervenes with a probability $\eta \in [\underline{\eta}, 1]$, while a type B monitor intervenes with a strictly lower probability $\varepsilon < \eta$.¹²*

The result in Theorem 1 shows that the monitor will strategically manipulate its intervention decision. The intuition is straightforward. If all good and bad monitors intervene whenever needed, intervention has a severe effect on their reputations q_2 and $E(q_3)$. The reason is that since a type B monitor needs to intervene more often than a type G monitor, the pool of monitors that intervenes

¹² The reference to “plausible” excludes BNE that are supported by implausible off-equilibrium path beliefs. There are two such equilibria: one in which neither type of monitor intervenes in a good or a bad project, and one in which both types of monitors intervene in a good and a bad project. These (pure-strategy) equilibria are clearly inefficient, and are supported by implausible (extreme) beliefs that a monitor is of type B with probability 1 if it does not follow the conjectured equilibrium strategy.

would include disproportionately many bad monitors.¹³ As a consequence, outsiders would lower their posterior probability assessment of the monitor's quality if intervention is observed. This makes a monitor reluctant to intervene. Therefore, an equilibrium may only come about if both types of monitors do not always intervene when needed. In other words, the monitor should follow a mixed strategy when confronted with a bad project or strategy.

Observe that in equilibrium a type B monitor intervenes with a strictly lower probability than a type G monitor. A bad monitor thus does not only reduce firm value due to its relative lack of ability, but also because it is less willing to intervene when needed. Theorem 1 allows for many combinations of η and ε . The Corollary to Theorem 1 identifies the most efficient equilibrium.

Corollary to Theorem 1 *In the most efficient BNE, a type G monitor intervenes in a bad project or strategy with a probability 1, and a type B monitor intervenes with a probability ε^* , where $0 < \varepsilon^* < 1$.*

This corollary shows that in the most efficient equilibrium only a type B monitor manipulates its intervention decision. The monitor's intervention strategy thus is closest to first best. In the remainder of our analysis, we will focus on this equilibrium. We next analyze how the type B monitor's optimal intervention strategy varies with distance.

4.2 Optimal Distance

Theorem 1 clearly establishes a previously unrecognized inefficiency in corporate governance that affects monitors' incentives to intervene to block failed initiatives at relatively late stages of the implementation of such initiatives. The monitor may not want to intervene when he discovers relatively late in the game that the firm is pursuing a bad project or strategy, because such late

¹³ A similar result holds if the monitor does *not* know its own type. It can be shown that in that case the monitor does not want to condition its intervention decision on the privately observed quality of the project, and hence on its potential failure of early monitoring. The intuition is that any form of conditioning on the quality of the project would stigmatize the intervention decision, and thus have reputational consequences. That is, in a conjectured equilibrium with no intervention in good projects, a monitor would not want to intervene in a bad project either in order to prevent a downgrade of its reputation. Thus, the only feasible equilibria are inefficient pooling BNE: one in which the monitor never intervenes, and one in which the monitor always intervenes (the latter equilibrium is supported by a posterior belief that a deviating monitor is bad with probability 1). Only in the case where $\beta = 0$ do we observe an efficient equilibrium in which a monitor is willing to intervene in bad projects only. In this case no monitor receives timely information and reputational considerations are unimportant.

intervention may damage the monitor’s reputation by elucidating an earlier monitoring failure.¹⁴ An interesting issue is whether efficiency will improve once we increase the distance between monitor and management. At first glance, this seems counterproductive. Increasing the distance will reduce β , and thus allow more projects to escape early correction because timely information did not become available. However, the question is whether this negative *volume effect* (more projects “survive” early correction) is offset by a tougher intervention policy (a *behavioral effect*). That is, intervention now stigmatizes less because the lack of timely information makes the ability of the monitor matter less. As a consequence, a type B monitor may choose to intervene with a strictly higher probability. The latter effect is good for efficiency. But could it dominate the negative volume effect? These arguments suggest a trade-off between proximity and objectivity. Objectivity increases with distance and may improve behavior, while proximity brings more timely information facilitating monitoring and early correction. Does there exist an optimal distance between management and monitor? A first result is stated in Lemma 1.

Lemma 1 *Increasing distance (lowering β) strictly improves the intervention policy of the type B monitor, i.e., $\frac{\partial \varepsilon^*}{\partial \beta} < 0$.*

Lemma 1 confirms the benefit of objectivity that comes with distance. Intervention, when needed, is more likely. However, the result in Lemma 1 does not necessarily point at an increase in efficiency. While the intervention policy ε^* improves, more projects escape early correction. This is costly, i.e., the cost X is incurred more often. In other words, can the tougher intervention policy keep up with the extra volume of bad projects? If this is not true, then minimizing the distance between monitor and management is always optimal. To see this, note that when the tougher intervention policy does not keep up with the extra volume of bad projects, more costs X are incurred *and* more projects escape intervention (inflating the costs to Y for those projects). But is it possible that increasing distance will actually reduce the number of projects that escape intervention? This depends on the relative importance of the improvement in ε^* vis-à-vis the

¹⁴ An interesting question is whether this reputational distortion could be prevented through contracting. Observe that only a truly long-term contract could potentially help. Short-term contracting is complicated precisely because of reputational concerns. Only in the long term are the reputational distortions fully internalized.

increase in the number of projects that need late intervention. As it turns out, increasing distance always helps reduce the number of projects that escape intervention. We can establish the following result.

Lemma 2 *Increasing distance (lowering β) strictly lowers the number of bad projects or strategies that escape intervention.*

The result in Lemma 2 points at a clear benefit that comes with distance (objectivity): the actual number of projects that escape intervention goes down. This shows that if we focus solely on the number of bad projects that ultimately survives, increasing distance is optimal because the behavioral effect outweighs the volume effect. But this is not necessarily the correct decision criterion. Also the relative magnitudes of the costs X and Y have to be taken into account. Following Lemma 2, increasing distance (lowering β) reduces the number of bad projects that survive intervention; this saves on the costs Y . However, a lower β also implies that fewer projects get corrected early; this elevates the costs X . The optimal distance thus minimizes the total costs associated with failure of early correction and potential distortions in late intervention. This is delineated in the following result.

Theorem 2 *The optimal distance (β^*) between management and monitor depends on the relative size of X and Y , in particular,*

1. *If $Y - X < \underline{\Delta}$, then proximity, $\beta^* = 1$, is optimal.*
2. *If $\underline{\Delta} \leq Y - X \leq \overline{\Delta}$, then the optimal distance $\beta^* \in [0, 1]$ (interior solution).*
3. *If $Y - X > \overline{\Delta}$, then distance, $\beta^* = 0$, is optimal.*

The cutoff levels $\underline{\Delta}$ and $\overline{\Delta}$ are defined in the Appendix.

Corollary to Theorem 2 *The cutoff levels $\underline{\Delta}$ and $\overline{\Delta}$ are increasing in the size of the costs X , i.e., $\frac{\partial \underline{\Delta}}{\partial X} > 0$ and $\frac{\partial \overline{\Delta}}{\partial X} > 0$.*

The result in Theorem 2 highlights the importance of the relative magnitudes of the costs X and Y . In the case where $Y - X$ is small (see part 1 of the theorem), the cost of distorting the intervention decision is small; hence, all emphasis should be on optimizing early correction. That means, as we stated in Theorem 2, that proximity is optimal ($\beta^* = 1$). At the other extreme, when distorting late intervention is very costly, i.e., $Y - X$ is large (see part 3 of the theorem), intervention incentives should be optimized, which dictates maximum distance ($\beta^* = 0$). The intuition is that in this case the benefits of a stricter intervention policy associated with more distance (i.e., fewer projects incur the cost Y , see Lemma 2) always dominate the additional cost X incurred due to less timely correction. For intermediate values $Y - X$ there exists an optimal interior distance between management and monitor which trades off the benefits of timely correction with proximity and a stricter intervention policy with distance ($\beta^* \in [0, 1]$, see part 2 of the theorem). We can establish that the optimal β^* in the intermediate range is decreasing in $Y - X$, which confirms the earlier intuition that when late intervention becomes more important, the optimal distance increases.

The Corollary to Theorem 2 shows that proximity becomes more attractive if the costs X of late intervention increase. That is, the higher the level of X , the larger the difference between the costs Y and X has to be such that the benefits of a stricter intervention policy dominate the costs of less timely correction, and objectivity dominates. This can be understood as follows. If the cost X increases, the firm's value loss from not immediately correcting a bad project choice increases. Holding fixed the additional cost $Y - X$ associated with failure of intervention, early correction thus becomes more critical. This suggests that for more important decisions, *ceteris paribus*, proximity becomes more optimal, despite its potentially negative impact on the intervention decision.

It is now interesting to examine the joint impact of the relative magnitude of X and Y and the absolute magnitude of X on the optimal corporate governance arrangement. Recall that X represents the immediate value loss suffered by the firm if a bad project or strategy is not corrected early, and $Y - X$ represents the additional cost incurred when the investment is not terminated by late intervention. Our theory predicts that the larger X and the smaller $Y - X$, the more important proximity becomes. If, on the other hand, the immediate loss X on a bad project is small, then

distance becomes optimal for a wider range of values of the opportunity loss $Y - X$.

5 Interpretation of the Results

Our analysis has important implications for the optimality of corporate governance arrangements in different industries. As we have seen, the optimal corporate governance arrangements depend on the magnitude of the costs X and Y , i.e., the losses incurred upon late intervention (X) and of the even higher losses (Y) if one abstains from intervention. For which type of industries or activities does proximity ($\beta^* = 1$) respectively distance ($\beta^* = 0$) dominate? Key implications follow from a comparison of the magnitude of the costs X and Y . We will relate this to the firm's asset structure, in particular the degree of irreversibility of the firm's investments, and to the notion of opportunity cost and managerial scope.

5.1 Irreversibility of Investments

The difference between Y and X can be interpreted as a measure of the *irreversibility* of the firm's investment in the project or strategy. The difference $Y - X$ is inversely related to the irreversibility of the firm's investments. For irreversible investments early correction is crucial, because late intervention would, given the irreversibility of the investment, not be particularly valuable, i.e. Y does not exceed X by much. Hence, preventing the failure of early correction should be the primary concern, i.e., the cost X is what matters, the additional cost $Y - X$ is trivial. The optimal corporate governance arrangement then dictates minimum distance, hence $\beta^* = 1$. This will minimize the number of projects that escapes early correction. In this way, the probability of incurring X is minimized. For reversible investments, on the other hand, the cost Y exceeds X by much. Late intervention, compared to not intervening at all, is now very valuable since it mitigates potentially large losses due to the long-term continuation of bad projects or strategies. For these projects, intervention incentives need to be optimized (to minimize the additional losses $Y - X$). This is accomplished by maximizing distance, hence $\beta^* = 0$.

But what determines the irreversibility of investments? An important determinant is the firm-

specificity of assets. Highly firm-specific assets cannot be readily sold or put to alternative uses (see, e.g., Shleifer and Vishny, 1992). Investments in these types of assets are sunk and a substantial loss is incurred if the initial investment is not immediately corrected. In such circumstances, early correction should be facilitated by minimizing distance.¹⁵ Similarly, we could establish for what type of firms objectivity dominates. These would be firms with more liquid and marketable assets. Those assets can readily be sold, and late intervention would not be particularly costly relative to early correction. The principal objective would then be to “optimize” the intervention incentives. Our results therefore indicate that for those firms the benefits of objectivity that come with distance dominate.¹⁶

We could also relate the notion of irreversibility to intertemporal changes in industry structure. Irreversible highly firm-specific investments in physical assets (e.g., as in manufacturing) have become less important for the economy at large. Moreover, with the proliferation of financial markets the marketability of assets has improved. More generally, the possibilities to alter the corporate structure by buying and selling business units have clearly broadened. Also the increased importance of the market for corporate control is suggestive of an increased marketability of firms and their assets. This implies that irreversibility may have become less important and points at a greater benefit of objectivity. This would augment the desirability of (more distant) market-based corporate governance arrangements.¹⁷ Real world changes in corporate governance arrangements seem to be consistent with this prediction.

5.2 Opportunity Costs

An alternative interpretation for the difference between Y and X is related to the notion of *opportunity cost*. More specifically, we could interpret $Y - X$ as the opportunity cost that materializes

¹⁵ Shleifer and Vishny (1989) argue that managers can make themselves indispensable to shareholders by making excessive manager-specific investments, i.e., investments in assets that are only valuable under current management. Such actions create irreversibility. Without timely information, such investments are difficult to prevent by the board. This suggests that proximity is optimal if the scope for managerial entrenchment is large.

¹⁶ One could interpret firm-specific investments as irreversible. Then our results are in line with the literature on board composition (see Section 2.2). There the argument is that proximity is needed with firm-specific investments, because information is otherwise less readily available.

¹⁷ This conclusion is also consistent with Shleifer and Vishny (1992), who argue that an enhancement in the marketability of the firm’s assets improves the effectiveness of the market for corporate control as a disciplinary device.

once the investment is not terminated by late intervention. This is particularly relevant if, due to limited managerial scope, capital constraints or other resource constraints, the continuation of the current project or strategy makes it impossible to undertake alternative investments. The likelihood that such alternative investments are present is another determinant of the opportunity cost. Theorem 2 implies that if the opportunity cost $Y - X$ is large, guaranteeing intervention is crucial, which asks for distance. If the opportunity cost $Y - X$ is small, early correction is more important, dictating proximity.

What this interpretation implies is that resource-constrained firms, and particularly when they have alternative investment opportunities present, should have more distant corporate governance arrangements. For less resource-constrained firms or firms with few alternative investment opportunities, the opportunity cost $Y - X$ is smaller, and hence intervention is less important, which puts more emphasis on early correction. This points at the optimality of proximity.

It should be noted that the level of opportunity costs also depends on other factors, in particular the level of competition in an industry. In a less competitive market, the opportunity costs of suboptimally allocated resources can be expected to be lower. Suboptimal firm behavior will not be penalized as severely. What this implies is that $Y - X$ is smaller, inducing more proximity. An increase in competition could elevate the opportunity cost $Y - X$ which optimally leads to more distance in monitoring. These predictions are consistent with recent developments within national industries in different countries. In the past, these industries were largely domestically focused and well-protected by local governments, shielding them from global competition. An increase in global competition suggests that opportunity costs associated with a suboptimal resource allocation have increased. As a consequence, distance has become more important.¹⁸ This prediction parallels our conclusion based on the increased marketability (i.e., reduced irreversibility) of the firm's assets over time.

¹⁸ While we have focused on the effect of competition on the opportunity cost $Y - X$, competition may also affect the level of the cost X . Depending on the direction of the effect that competition has on X , the drive towards more distance may be strengthened or weakened.

5.3 Adaptability

The analysis and interpretation so far has focused exclusively on a one-dimensional interpretation of proximity and objectivity. That is, we let the distance between monitor and management directly translate in the monitor's willingness to intervene; no other factors are in play. Obviously, this is a simplification. The objectivity of the monitor and the willingness to engage in corrective action are affected by other factors as well. Here we get to several issues that have become important in the corporate governance debate around the world (compare, for example, the 2002 Sarbanes-Oxley Act and OECD/EU directed corporate governance codes).

These issues can roughly be put in four categories: (1) measures to insure the proper functioning of non-executive directors, (2) rights for shareholders, (3) ownership structure issues, and (4) disclosure and transparency requirements. The first group of issues includes the appointment process of (non-executive) directors, the remuneration of those directors, the desirability of a two tier board structure (e.g., should the non-executive supervisory board be separated from the CEO/management board?) and the personal liability of directors. The main question underlying this group of issues is whether non-executive directors can be made sufficiently accountable to preserve their independence and thus overcome the problems of proximity.

The second group of issues addresses the rights of shareholders. In particular, how can information problems (due to distance) and free-rider problems be resolved to facilitate monitoring and prompt corrective actions by shareholders? In this context, for example, the desirability of proxy-voting and the presence of anti-takeover measures are being discussed. Also the protection of minority shareholders belongs to this group of issues.

The third and fourth groups of issues address the ownership structure and transparency and disclosure. Ownership structure is directly related to the role and effectiveness of shareholders. Are large shareholders needed to facilitate shareholder activism? Are cross-holdings helpful? Is a stable core shareholder base desirable? Transparency and disclosure requirements among other things may help to overcome the information gap between (distant) shareholders and management.

At their core, all these issues relate to the adaptability of corporate governance arrangements.

These issues might be important considering the result in Theorem 2. In particular, the type of solution to the optimal structure of corporate governance may go hand in hand with other features that may mitigate the disadvantages of proximity-based and objectivity-based systems. Here adaptability comes in. More specifically, a proximity-based system with for example a finely textured involvement of a board may benefit from shareholder activism. Shareholders could possibly align the board's incentives with their own. If the board knows that it will be ousted following a successful disciplinary takeover, the board may become more vigilant to preempt the need for corrective takeovers. The reputational distortions rooted in proximity may then be partially mitigated and the board may choose to intervene more readily. A takeover threat may then not only discipline management, but also discipline the monitoring board. Similarly, stronger information disclosure requirements may help overcome the disadvantages of a distance (market-based) corporate governance arrangement. Disclosure would reduce the information disadvantages of a distant system. In that way, it mitigates one of the weaknesses of that arrangement.

The importance of adaptability is now easy to see. The issues of ownership structure, shareholders rights and disclosure and transparency may all play a key role in facilitating shareholder activism. Similarly, in both types of systems we see the introduction of measures to facilitate the proper functioning of non-executive (or supervisory) directors. In the context of the Anglo-Saxon one-tier system these measures could be interpreted as an attempt to add some benefits of proximity to this objectivity-based system.¹⁹ It illustrates the importance of adaptability.

While our analysis primarily points at an industry-specific differentiation of corporate governance arrangements, we do realize that corporate governance systems differ primarily between countries. To the extent that laws are needed to fix arrangements, the observed country-specificness of arrangements can be understood. In that context, an important question that comes up is whether each type of system depends critically on a prior investment in a certain type of public good that is inconsistent with another system. For example, does the judicial system need to invest in expertise that is specific to a particular system? If this is the case, having diversity in corporate governance

¹⁹ For example, the Sarbanes-Oxley Act in the U.S. prescribes the creation of an independent audit committee. This could be interpreted as adding a second tier to the one-tier board structure.

systems within a judicial territory might be too costly . However, our analysis does suggest that a “check the box” option at the chartering stage can be optimal and allow corporations to choose their optimal arrangement. But feasibility is a primary concern.²⁰

6 Conclusion

We have postulated the corporate governance problem in developed economies as a trade-off between proximity and objectivity. Both objectivity and proximity have distinct costs and benefits. Objectivity goes hand in hand with distance and potentially less information. The latter may reduce the likelihood of timely correction. On the positive side, such a system would facilitate objectivity, and reputational concerns would interfere less with necessary interventions. A proximity-based system is more informative and this facilitates timely corrective action. However, reputational concerns may not provide the right incentives for tough intervention decisions.

We discussed several key determinants for the optimality of distance versus proximity, in particular, we emphasized the importance of the degree of irreversibility of a firm’s investments and the opportunity costs associated with a suboptimal resource allocation. We have argued that compared to the manufacturing-type industrial structure of the past, irreversibility of investments has become less important, and that competition may have elevated the opportunity cost. Both developments would push the optimal governance arrangement towards more distance. This could help explain the trend towards more market-based governance arrangements. Ideally, corporate governance arrangements should be tailor-made to fit the desired governance structure of a particular industry. That is, our theory of optimal corporate governance arrangements is primarily an industry-, i.e., activity-dependent theory of corporate governance. The degree of irreversibility of investments and the opportunity losses associated with misallocated resources should guide a firm’s corporate governance arrangements. In some industries the disadvantages of proximity might dominate; in

²⁰ We have not addressed how differences in governance arrangements between countries have come about. As a general observation, the U.S. depends more on capital markets and less on banks and large shareholders than other countries (Murray, 1997). As a consequence of this historical phenomenon, which is at least partially attributable to political causes (Roe, 1994), the performance of the American system of corporate governance hinges more on its ability to resolve agency problems that result from the more severe separation of ownership and management that uniquely characterize the U.S. public corporation. But this is beyond the scope of the present paper.

others the lack of information in case of distance and objectivity might be prohibitively costly. As we have argued, issues of adaptability play an important role as well. These could help overcome the inherent weaknesses of proximity-based or distance-based governance arrangements.

Finally, our analysis provides a new lens with which to view the spate of corporate governance scandals that have racked the U.S. A major problem appears to have been a basic confusion on the part of investors and other market participants about the objectivity of certain proximate monitors, particularly so-called independent directors. In our view, thinking of these monitors as objective, when under our analysis they clearly were not, led to an excess of trust, and concomitantly less monitoring by other monitors. Another insight into the recent wave of corporate scandals that our analysis permits is a greater understanding of the danger of “capture” of ostensibly objective monitors. In particular, regulators and others should closely observe the relationships between corporations and their accounting firms, credit rating agencies, stock market analysts and other ostensibly objective monitors in order to determine whether their relationships and patterns of dealings with the corporations they are supposed to be monitoring have remained truly distant and objective, or whether they have “morphed” into a proximate relationship without being detected by the market.

Appendix

Definition: Let $\tau \in \{G, B\}$ be the type of monitor and let σ be the intervention strategy at $t = 2$ with action $a = a(\sigma) \in \{I, NI\}$ and $\sigma \in \psi$ (set of strategies). Let $\phi \in \{L, H\}$ be the output signal received at $t = 3$. A pair of strategies and market beliefs $(\sigma_\tau, \forall \tau; q_2^{a(\sigma)}, q_3^{a(\sigma)}(\phi), \forall \sigma \in \psi, \forall \phi)$ constitutes a BNE if (i) a monitor of type τ chooses σ_τ optimally according to (2), anticipating the beliefs $q_2^{a(\sigma)}$; (ii) $q_3^{a(\sigma)}(\phi)$ is related to $q_2^{a(\sigma)}$ according to (1) (observe that (1) describes the relationship that holds in the case of no intervention (NI) at $t = 2$; in the case of intervention (I) at $t = 2$, $q_3^{a(\sigma)}(\phi)$ equals $q_2^{a(\sigma)}$); (iii) $q_2^{a(\sigma)}$ and $q_3^{a(\sigma)}(\phi)$ (i.e., beliefs) translate into remuneration $R_2 = q_2^{a(\sigma)}$ and $R_3(\phi) = q_3^{a(\sigma)}(\phi)$ (i.e., responses); and (iv) the market belief $q_2^{a(\sigma)}$ following an equilibrium move is a Bayesian posterior of γ .

Proof of Theorem 1: Let $\beta = 1$. We first show that the conjectured set of equilibria constitute BNE. Assume that neither type of monitor intervenes in a good project, while a type G and a type B monitor intervene in a bad project with a probability $\eta \in [0, 1]$, respectively, $\varepsilon \in [0, 1]$. The market's updated beliefs after the monitor's intervention decision follow from Bayes' rule, i.e.,

$$q_2^{NI} = \frac{\gamma[\alpha_G + (1 - \alpha_G)(1 - \eta)]}{\gamma[\alpha_G + (1 - \alpha_G)(1 - \eta)] + (1 - \gamma)[\alpha_B + (1 - \alpha_B)(1 - \varepsilon)]}, \quad (3)$$

and

$$q_2^I = \frac{\gamma(1 - \alpha_G)\eta}{\gamma(1 - \alpha_G)\eta + (1 - \gamma)(1 - \alpha_B)\varepsilon}. \quad (4)$$

At $t = 3$, the market updates its beliefs based on the signal ϕ . Thus,

$$q_3^{NI}(H) = \frac{\gamma[\alpha_G \bar{p} + (1 - \alpha_G)(1 - \eta)\underline{p}]}{\gamma[\alpha_G \bar{p} + (1 - \alpha_G)(1 - \eta)\underline{p}] + (1 - \gamma)[\alpha_B \bar{p} + (1 - \alpha_B)(1 - \varepsilon)\underline{p}]}, \quad (5)$$

and

$$q_3^{NI}(L) = \frac{\gamma[\alpha_G(1 - \bar{p}) + (1 - \alpha_G)(1 - \eta)(1 - \underline{p})]}{\gamma[\alpha_G(1 - \bar{p}) + (1 - \alpha_G)(1 - \eta)(1 - \underline{p})] + (1 - \gamma)[\alpha_B(1 - \bar{p}) + (1 - \alpha_B)(1 - \varepsilon)(1 - \underline{p})]}. \quad (6)$$

Recall that $q_3^I(\phi) = q_2^I$ for $\phi \in \{L, H\}$. In the case of a bad project, the expected beliefs of the market at $t = 3$ *after* the monitor's intervention decision, but *before* the realization of the output

signal (as a function of the intervention decision) can be written as

$$E(q_3^{NI}) = \underline{p} \times q_3^{NI}(H) + (1 - \underline{p}) \times q_3^{NI}(L) , \quad (7)$$

and

$$E(q_3^I) = q_2^I . \quad (8)$$

If a bad project is in place at $t = 2$, a monitor intervenes (does not intervene) if

$$q_2^I + E(q_3^I)[1 + r]^{-1} > (<) q_2^{NI} + E(q_3^{NI})[1 + r]^{-1} , \quad (9)$$

see equation (2). In the conjectured equilibrium (9) holds with equality. We first state a useful result.

Result A: q_2^{NI} and $E(q_3^{NI})$ are monotonically increasing (decreasing) in ε (η). Furthermore, q_2^I and $E(q_3^I)$ are monotonically decreasing (increasing) in ε (η). For all $\eta \in (0, 1]$ and $\varepsilon \in [0, 1]$ or $\{\eta = 0, \varepsilon > 0\}$, q_2^I , $E(q_3^I)$, q_2^{NI} and $E(q_3^{NI})$ are continuous in ε and η .

The proof for Result A follows directly from (3) through (8). We now prove by contradiction that in the conjectured equilibrium $\eta \neq \varepsilon$. Suppose counterfactually that $\eta = \varepsilon$. From (3) and (4), we get $q_2^{NI} > q_2^I$, and from (7) and (8), $E(q_3^{NI}) > E(q_3^I)$ (since $q_3^{NI}(H) > q_3^{NI}(L) > q_2^I$). From (9) it then follows that no intervention is strictly preferred. This contradicts the optimality of $\eta = \varepsilon$. From Result A it can then be seen that $\varepsilon < \eta$ is necessary for equality in (9), and that ε is monotonically increasing in η . We show next that for $\eta = 1$ and ε sufficiently small, intervention is strictly preferred. Note that $\lim_{\varepsilon \downarrow 0} q_2^I |_{\eta=1} = 1$, and that $E(q_3^I) = q_2^I$, whereas both q_2^{NI} and $E(q_3^{NI})$ are strictly less than one. Thus, by (9), intervention is strictly preferred. Finally, observe that for $\eta = 0$, no intervention is strictly preferred, since $q_2^I = E(q_3^I) = 0$, and q_2^{NI} and $E(q_3^{NI})$ are strictly larger than zero. Result A then establishes that $\exists \varepsilon \in (0, \eta)$ for which (9) holds as an equality, where $\eta \in [\underline{\eta}, 1]$.

In the case of a good project, observe that $E(q_3^{NI}) = \bar{p} \times q_3^{NI}(H) + (1 - \bar{p}) \times q_3^{NI}(L)$, which strictly exceeds $E(q_3^{NI})$ as given in (7). All other beliefs are given in (3), (4) and (8). Thus, if a

monitor is indifferent between intervention and no intervention with a bad project in place at $t = 2$, a monitor prefers not to intervene with a good project in place. This shows that the conjectured equilibria are Nash. Bayesian Perfect Nash (BNE) follows since there are no out-of-equilibrium moves.

Two other BNE can be identified. These involve either type of monitor always intervening or not intervening (see footnote 12 for the implausible beliefs needed to sustain these equilibria). \square

Proof of Corollary to Theorem 1: Observe from Theorem 1 that the equilibrium identified in the corollary is BNE. The corollary identifies the most efficient BNE, since the good and bad monitor's intervention strategies are closer to first best than any other BNE in Theorem 1. \square

Proof of Lemma 1: Let $\eta = 1$ and $\varepsilon < 1$ (i.e., we focus on the most efficient BNE). For $\beta < 1$, we now have

$$\hat{q}_2^{NI} = \frac{\gamma\beta\alpha_G}{\gamma\beta\alpha_G + (1-\gamma)[\beta\alpha_B + \beta(1-\alpha_B)(1-\varepsilon) + (1-\beta)(1-\varepsilon)]}, \quad (10)$$

and

$$\hat{q}_2^I = \frac{\gamma[\beta(1-\alpha_G) + (1-\beta)]}{\gamma[\beta(1-\alpha_G) + (1-\beta)] + (1-\gamma)[\beta(1-\alpha_B)\varepsilon + (1-\beta)\varepsilon]}. \quad (11)$$

Following the signal ϕ , we get

$$\hat{q}_3^{NI}(H) = \frac{\gamma\beta\alpha_G\bar{p}}{\gamma\beta\alpha_G\bar{p} + (1-\gamma)[\beta\alpha_B\bar{p} + \beta(1-\alpha_B)(1-\varepsilon)\underline{p} + (1-\beta)(1-\varepsilon)\underline{p}]}, \quad (12)$$

and

$$\hat{q}_3^{NI}(L) = \frac{\gamma\beta\alpha_G(1-\bar{p})}{\gamma\beta\alpha_G(1-\bar{p}) + (1-\gamma)[\beta\alpha_B(1-\bar{p}) + \beta(1-\alpha_B)(1-\varepsilon)(1-\underline{p}) + (1-\beta)(1-\varepsilon)(1-\underline{p})]}. \quad (13)$$

Recall that $\hat{q}_3^I(\phi) = \hat{q}_2^I$ for $\phi \in \{L, H\}$. In the case of a bad project, the expected beliefs with respect to the monitor's quality are

$$E(\hat{q}_3^{NI}) = \underline{p} \times \hat{q}_3^{NI}(H) + (1-\underline{p}) \times \hat{q}_3^{NI}(L), \quad (14)$$

$$E(\hat{q}_3^I) = \hat{q}_2^I. \quad (15)$$

We want to show that $\frac{\partial \varepsilon^*}{\partial \beta} < 0$, thus lowering β improves the intervention probability ε^* . For the equilibrium value ε^* we have

$$\hat{q}_2^I + E(\hat{q}_3^I)[1+r]^{-1} |_{\varepsilon=\varepsilon^*} = \hat{q}_2^{NI} + E(q_3^{NI})[1+r]^{-1} |_{\varepsilon=\varepsilon^*} . \quad (16)$$

It can easily be shown that the LHS of (16) is monotonically decreasing in β , while the RHS is monotonically increasing in β . Thus intervention stigmatizes less for lower values of β , and $\frac{\partial \varepsilon^*}{\partial \beta} < 0$ follows readily. \square

Proof of Lemma 2: The number of bad projects K that escape late intervention equals

$$K = (1 - \gamma)[(1 - \beta) + \beta(1 - \alpha_B)](1 - \varepsilon^*) . \quad (17)$$

The first derivative with respect to β is given by

$$\frac{\partial K}{\partial \beta} = -(1 - \gamma)\alpha_B(1 - \varepsilon^*) + (1 - \gamma)[(1 - \beta) + \beta(1 - \alpha_B)] \times \left(-\frac{\partial \varepsilon^*}{\partial \beta} \right) . \quad (18)$$

The first term on the RHS of (18) represents the ‘‘volume effect’’, and the second term represents the ‘‘behavioral effect’’. We want to show that $\frac{\partial K}{\partial \beta} > 0$, that is lowering β lowers the number of bad projects that escape intervention. Observe that $\frac{\partial K}{\partial \beta} > 0$ if

$$\left(-\frac{\partial \varepsilon^*}{\partial \beta} \right) > \alpha_B(1 - \varepsilon^*)[(1 - \beta) + \beta(1 - \alpha_B)]^{-1} . \quad (19)$$

It can be shown that condition (19) always holds. This can be seen from writing equation (16) as a function of ε^* respectively K , and applying the Implicit Function Theorem. The tedious algebraic details are available upon request. \square

Proof of Theorem 2: Observe from Lemma 2 that minimizing the number of bad projects that escape late intervention dictates $\beta = 0$. This saves on the costs Y . But for $\beta = 0$, the costs X will be very high. That is, the lower β , the smaller the number of bad projects that get corrected early. The optimal distance β^* minimizes the total costs T associated with failure of early correction and potential distortions in late intervention, where T is given by

$$T = [(1 - \beta)\gamma + \beta\gamma(1 - \alpha_G) + (1 - \beta)(1 - \gamma) + \beta(1 - \gamma)(1 - \alpha_B)] \times X + K \times (Y - X) , \quad (20)$$

with K defined in (17). The first and second order conditions for a minimum are given by

$$\frac{\partial T}{\partial \beta} = -[\gamma\alpha_G + (1 - \gamma)\alpha_B] \times X + \frac{\partial K}{\partial \beta} \times [Y - X] = 0, \quad (21)$$

and $\frac{\partial^2 K}{\partial \beta^2}(Y - X) > 0$. Following a similar approach to that in Lemma 2, we can establish that $\frac{\partial^2 K}{\partial \beta^2} > 0$ holds. We can now define $\underline{\Delta} \equiv \frac{[\gamma\alpha_G + (1 - \gamma)\alpha_B]X}{\partial K / \partial \beta} \Big|_{\beta=1}$ and $\overline{\Delta} \equiv \frac{[\gamma\alpha_G + (1 - \gamma)\alpha_B]X}{\partial K / \partial \beta} \Big|_{\beta=0}$. Given $\frac{\partial^2 K}{\partial \beta^2} > 0$ and $\frac{\partial K}{\partial \beta} > 0$ (see Lemma 2), it follows that for Y marginally higher than X (i.e., for $Y - X < \underline{\Delta}$), $\frac{\partial T}{\partial \beta} < 0 \forall \beta \in [0, 1]$, and $\beta^* = 1$. Similarly, for Y significantly larger than X (i.e., for $Y - X > \overline{\Delta}$), $\frac{\partial T}{\partial \beta} > 0 \forall \beta \in [0, 1]$, and $\beta^* = 0$. These observations show the optimality of $\beta^* = 1$ and $\beta^* = 0$ in region 1 and region 3 of Theorem 2. For intermediate values of Y , such that $\underline{\Delta} \leq Y - X \leq \overline{\Delta}$, $\exists \beta^* \in [0, 1]$ such that $\frac{\partial T}{\partial \beta} \Big|_{\beta=\beta^*} = 0$ and $\frac{\partial^2 T}{\partial \beta^2} \Big|_{\beta=\beta^*} > 0$. To see this, note that $\frac{\partial T}{\partial \beta}$ evaluated at $\underline{\Delta}$ is smaller than 0, $\frac{\partial T}{\partial \beta}$ evaluated at $\overline{\Delta}$ is larger than 0, and $\frac{\partial^2 T}{\partial \beta^2} > 0$ (follows immediately from (21) and $\frac{\partial^2 K}{\partial \beta^2} > 0$). This completes the proof for region 2. \square

Proof of Corollary to Theorem 2: This result follows directly from taking the partial derivatives of $\underline{\Delta}$ and $\overline{\Delta}$ as defined in Theorem 2 with respect to X . \square

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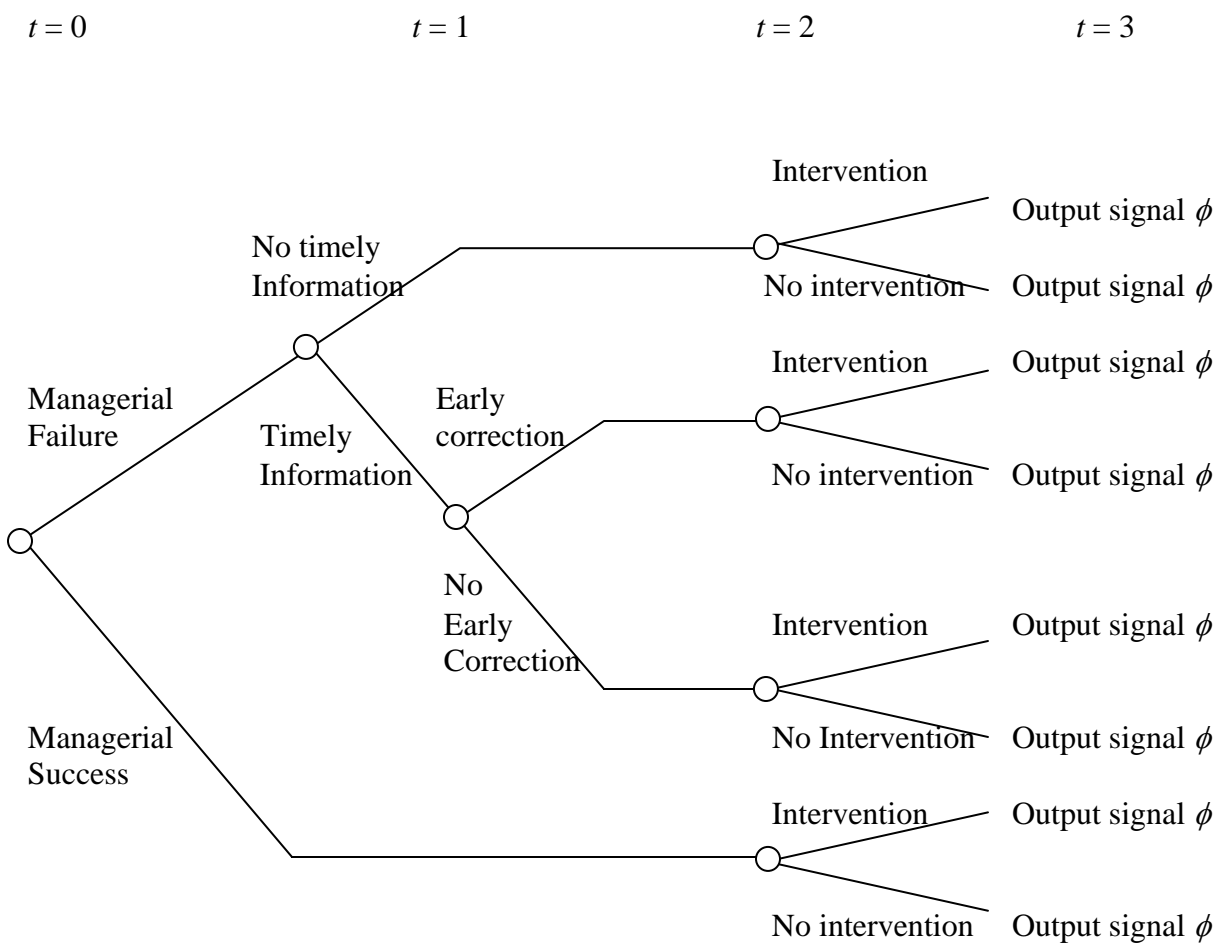


Figure 1: The Timing of Correction and Intervention Decisions

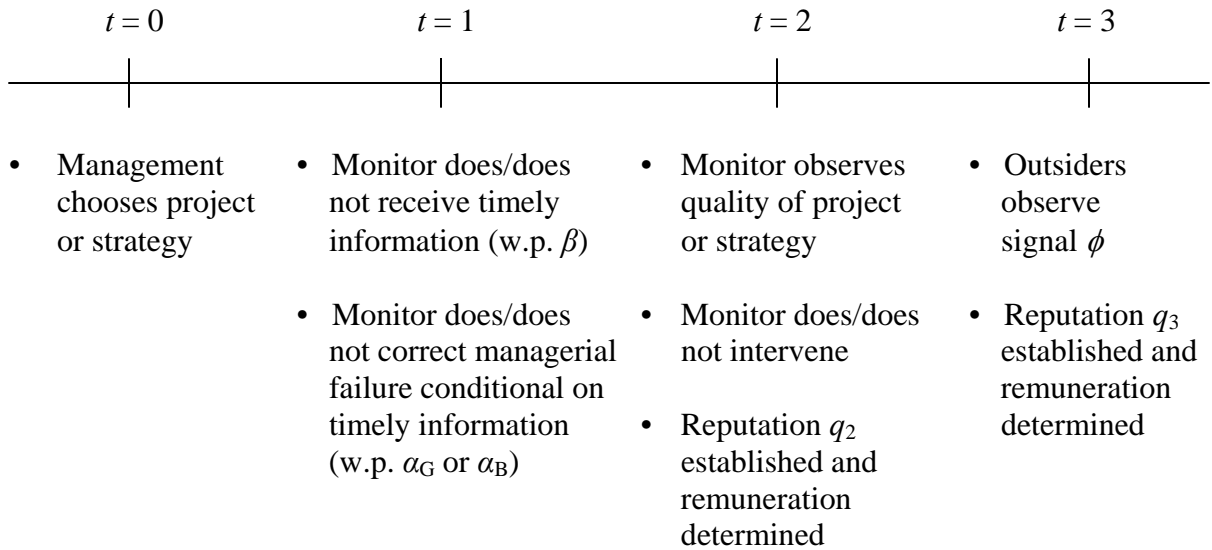


Figure 2: Sequence of Events