A Theory of Friendly Boards[1]

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Abstract

This paper analyzes the consequences of the board's dual role as an advisor as well as a monitor of management. As a result of this dual role, the manager faces a trade-off concerning the amount of information he discloses to the board. On the one hand, if he reveals his information he gets better advice. On the other hand, the board may change its opinion of his ability on the basis of his information. Our model shows that the board may choose to pre-commit to reduce its monitoring of the manager in order to encourage the manager to share his information. Therefore, management-friendly boards may be optimal governance structures under certain circumstances. Using the insights from the model we analyze the differences between a sole board system such as in the United States and the dual board system as in various countries in Europe. We conclude by highlighting several policy implications of our analysis.

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"Too much emphasis on monitoring tends to create a rift between non-executive and executive directors, whereas the more traditional job of forming strategy requires close collaboration. In both activities, though, independent directors face the same problem: they depend largely on the chief executive and the company's management for information."

The Economist (February 10, 2001, p. 68) describing a survey by PWC of British boards

1 Introduction

Both the Business Roundtable and the American Law Institute (Monks and Minnow, 1996, p. 172) list advising management among the top five functions of the board of directors in the United States. The advisory role of the board exists not only in the United States but also in, for example, Europe where boards in several countries are formally separated into a management board and a supervisory board. However, while the monitoring role of the board has been studied extensively in a large, mostly empirical, literature, the advisory role has received little attention.[3] This paper focuses initially on examining one implication of combining the advisory and monitoring roles of the board in a sole board system such as in the United States, then turns to a discussion of a dual board system. We argue that a characteristic of the sole board system is that because the whole board is responsible for evaluating the manager, the manager may face a trade-off when the board also advises him.

Directors generally agree that their main responsibility is to hire and fire the CEO (Lorsch and MacIver, 1989), thus to fulfill their duty of ensuring the best possible leadership for the firm, directors collect information that helps them evaluate whether the CEO should remain CEO. We define this type of information collection to be the board's monitoring role.

Replacing the CEO, however, is a right that directors seldom exercise. In times of normalcy, directors spend much more time acting as a sounding board for management and advising management on the strategic direction of the firm. Specifically, the board uses the expertise of its members to make recommendations to the manager. Since many board members are themselves CEOs or have full-time jobs in other corporations, they rely on the CEO to provide them with financial statements and specific management proposals to evaluate, for example, whether the company should enter a new line

[3] See the survey by Hermalin and Weisbach (2003). Results on the effectiveness of boards and their role in the corporate governance system are inconclusive. As Kaplan and Gertner (1996, p. 1) point out, the difficulty facing this type of research is that "it is far from clear, theoretically, what the optimal board should look like...nor what combination of the two [monitoring and advising] maximizes firm value."

of business. The more information the manager provides and the better the manager synthesizes the information, the better is the board's advice.

Given that the board monitors him, a manager who is uncertain about his ability may face a trade-off in sharing information. On the one hand the board will give better advice if the manager shares his information. On the other hand the additional information may cause the board to revise its previous good opinion of the manager and fire him. As Lorsch and MacIver (1989, p. 181) point out "each director is engaged in an ongoing assessment of the CEO's performance, as he or she listens to the chief's report." Information revealed by the manager helps the board disentangle the effects of managerial ability on corporate performance from those due to conditions beyond the manager's control. The more precise the board's information about the manager's ability, the greater the risk a manager whose job is currently secure faces. Thus a CEO may hesitate to communicate firm specific information to a board that has a dual role.

At first glance the advisory and monitoring roles of a sole board complement each other, because the board can use any information the manager provides during the advisory process both to make better recommendations and better evaluations. However, as the quote above illustrates, directors sometimes perceive a conflict between the two roles. Thus we argue that to govern effectively, directors may choose to play off one role against the other because they are aware of the trade-off the manager faces. Specifically, to fulfill their fiduciary duty to shareholders, directors may prefer to pre-commit to reduce their monitoring of the CEO to encourage the manager to share information when the manager's incentives for sharing information are otherwise low. Since directors that monitor the manager intensively to determine whether they should fire him do not appear management friendly, we define the amount by which the board optimally prefers to reduce its monitoring of the CEO to be its degree of management friendliness.

To illustrate the argument that a friendlier board may be more effective at advising managers, this paper presents a model of the interaction between the board and the manager in which the manager cares about his job security. The board monitors the manager by observing measures of performance, it decides whether to dismiss the manager and it advises the manager. Advice here is over an investment decision, where the quality of the board's advice is improved if the manager provides it with some firm specific information.

We argue that the predictions of our model can be explored empirically. For example, the model implies a (roughly) "U"-shaped relation between monitoring and managerial incentive alignment and private benefits, i.e. monitoring decreases then increases with incentive alignment.

Other theoretical papers have examined why boards may not monitor too intensively. Warther (1998) focuses on how the management's power to eject board members affects the behavior of the board. Hermalin and Weisbach (1998) also use the manager's power over the board selection process to develop a model of how board composition is determined as a function of the intensity with which the board can monitor the manager. Both these papers describe how passive boards may arise. Unlike these papers Almazan and Suarez (2003) argue that passive (or weak) boards may be optimal under certain conditions. The reason is that in their framework severance pay and weak boards are substitutes for incentive compensation. Thus shareholders may prefer a weak board to reduce total compensation costs. Our paper is similar to Almazan and Suarez (2003) in that we also describe why it might be optimal to have a passive (in our terminology: management friendly) board, however the driving force behind this idea in our paper are potential conflicts between the different roles of the board in its dealings with management.

In the last part of the paper we reinterpret our model to discuss the implications of the separation of the advisory and monitoring functions of the board in a dual board system such as in Europe. When the two roles of the board are separated, the manager does not face a trade-off in the provision of information. The model shows, therefore, that under certain conditions shareholders prefer a dual board system to a sole board system. Thus the model has implications for cross-country variation in governance systems.

Overall, our analysis has several policy implications that are particularly topical given the emphasis on governance reform in the United States and in Europe in the wake of recent corporate scandals. Because boards have been criticized for being too friendly to managers (e.g. U.S. House, 2002), Congress, through the Sarbanes-Oxley Act of 2002, the NYSE and NASDAQ are requiring that independent directors play a more important role in firm governance. Others have asked whether a two-tier board structure might enhance board oversight in countries, such as Britain, that currently have a sole board structure (e.g. Financial Times, January 14, 2003, p. 14).

In a direct reaction to Enron, the European Commission extended the original mandate of the *High Level Group of Company Law Experts,* which was to provide recommendations for a modern European company law framework, to examine the role of independent directors and supervisory boards, among other charges. The Group's recommendations were that independent directors and independent supervisory directors play a more important role in decision-making. In addition, it recommended that listed companies in the EU have the option to choose between the unitary board structure and the two-tier board structure (European Commission, 2002).

In the context of our model we find first that policies that enhance board independence may be detrimental for shareholders in a sole board system, but not in a dual board system. Second, while the sole board structure is first-best, as long as shareholders are able to influence the choice, firms should generally be given the choice between board structures. Finally, shareholders are always better off if the board has an advisory role. Overall, our analysis shows that too much emphasis on independent directors may be misplaced. However, it also shows that the *High Level Group's* recommendation that firms should be allowed to choose their structures has merit and that such reforms may also improve governance in the United States.

This paper is structured as follows: Section 2 presents the model of the trade-off to the manager of consulting a sole board in an advisory capacity. Section 3 discusses the model's extension to the dual board system. In section 4 we make our final remarks and highlight the policy implications of our analysis. All proofs, figures and tables are in the appendix.

2 Model

In section 2.1, we describe the setup of the model. In section 2.2 we analyze the model for a fixed monitoring intensity of the board. We relax the assumption that the monitoring intensity is fixed in section 2.3 and analyze the comparative statics of the board's monitoring intensity in section 2.4.

2.1 Setup

2.1.1 Timing

We construct a three-period model whose timeline is described in Figure 1.

Period 0 In period 0 the firm is established and the shareholders hire a manager. Shareholders choose the optimal level of monitoring π to evaluate the manager's ability. They choose a board that will monitor the manager with intensity π. From period zero on the manager owns an exogenous fraction w of the firm, as the result of a compensation package to induce unmodeled managerial effort, for example.

-insert Figure 1 here-

Period 1 In period 1 the manager and the board face a non-routine or innovative risky investment decision such as whether to enter a new product market or not. We assume that this decision is non-routine because on routine issues the board is unlikely to have much of an advisory role. The board observes its own private signal ε about the profitability of the project. The manager also receives a private signal s about the firm's environment that will help him choose whether or not to undertake the project. This information is uncorrelated with the manager's ability, for example, the information is about the firm's access to distribution channels or the size of the market. However, a high-ability manager receives a high-precision signal of firm conditions.[4]

The manager then decides whether to reveal his signal to the board or not. After listening to the manager's report, the board recommends whether or not to implement the project. We assume that ε reflects the board's combined expertise in many different areas and therefore cannot be costlessly communicated to the manager. Therefore, the board advises the manager by suggesting an action.

At the end of period 1, the manager chooses whether or not to implement the project.

Period 2 At the beginning of period 2 the board investigates the quality of the manager's information (monitors) by collecting information about the firm's environment with intensity π and uses this information to update its beliefs about the manager's ability. Shareholders (and the board) care about managerial ability because managers with more precise signals will make better decisions. We assume here that project "output" is not easily observable or, equivalently, that the output can only be verified in the long run, while decisions about the retention of the current CEO must be made before the output becomes fully observable.[5] Based on its evaluation the board decides whether to fire the manager and hire a replacement at the beginning of the second period. The manager loses his private benefits when he is fired, so he cares about his job security.

At the end of period two the firm is liquidated and all players are compensated out of first period project revenues and second period revenues.

2.1.2 Remarks on the main assumptions

Sharing information with the board Before the board recommends an action, the manager must decide whether to share his information with the board. Initially the board believes the ability of the CEO to be high enough that it will not fire him unless it obtains information that causes it to change its mind. The manager is uncertain about his ability, so any action he takes that allows the board to learn more about his ability imposes a risk on him. Since his job is initially secure, learning by the board can only hurt him. If the board did not monitor him, the manager would reveal his information since it does not reflect directly on his ability, and with more information the board's advice is improved

[4] Managerial ability is characterized in a similar way in Scharfstein and Stein (1990) and Prendergast and Stole (1996).

[5] This assumption can be relaxed. As long as the final output is not completely informative about the manager's ability, our model would still yield similar qualitative results.

and the value of the manager's shareholdings increases. However, when the board monitors him, the manager's information enables the board to update its prior on the manager's ability. Thus the board's posterior on the manager's ability is more precise when the manager reveals his information. Since without monitoring the board would not have fired him, the probability that the board fires the manager increases when the board has a more precise posterior on his ability.[6] In making his decision therefore, the manager must weigh the effect his information has on the value of his shareholdings versus on his job security.

The board can verify the manager's information ex post, for example through reports, so when the manager communicates his information to the board, it is always accurate. We also assume that the board cannot induce the manager to reveal his information by offering him a contract to reveal his information.[7] This is similar to Aghion and Tirole (1997), where the act of communicating information to the principal is noncontractible. Formally, this is a message game where the manager can choose between two messages $\{\emptyset, s\}$, where $\emptyset$ stands for "not reveal" and s is the manager's information when he chooses to reveal it, but the messages themselves cannot be contracted on.[8] Due to the limited time they spend in the firm, directors may not be able to evaluate what information they need unless management guides them, especially in the situations in which the board is most likely to have an important advisory role: when the issue at hand is non-routine.[9] This makes it difficult for them to implement contracts to induce the manager to reveal his information. One could incorporate this idea formally in our model by making the arrival of the signal stochastic. If the CEO does not always obtain a signal, the board cannot punish the CEO for not revealing information.

Advising We assume that ε reflects the board's combined expertise in many different areas and therefore cannot be costlessly communicated to the manager. In other words, we assume that the combined board expertise ε is too complex to be transmitted in a simple message from the board to the CEO. Therefore, the board advises the manager by suggesting an action. In general this implies

[6] This is like the argument in Zwiebel (1995): with more information, the variance of the CEOs estimated ability increases, so if the CEO is of high ability getting a bad draw is more likely and will hurt him. If the CEO is of low ability, his chances of getting a good draw increase and he is better off. The difference here is that the manager does not know his actual ability.

[7] In fact, because his shareholdings increase in value when he reveals, the manager does get a payoff for revealing. If the board can give him enough shares the manager will reveal as we show later. However in some cases it may be too costly for the board to induce revelation. This could correspond to a case where the manager's contract (number of shares) is fixed ex ante and new projects arise unexpectedly. It may be too costly to renegotiate the contract whenever this happens.

[8] Milgrom (1981) provides an early example of a model of this sort.

[9] See Demb and Neubauer (1992, pp. 116-128) for a discussion of the problem that directors may not know the right questions to ask when the CEO's strategy is not to disclose.

incomplete communication, because the recommended action might not be completely informative about the board's overall information ε.

We believe our characterization of advising captures some key features of the advisory process, which one might characterize as consisting of the following three steps. First, the advisee seeks out an advisor who has some information or some information processing capability that the advisee does not have. The advisee then considers whether to share information (or how much information to share) with the advisor. The advisor finally recommends an *action* based on the information the advisee shares (i.e. the advisor does not simply share his information with the advisee), which the advisee may or may not take. Consistent with this description, in the setup of this paper the manager decides whether to share information with the board, the board recommends whether to undertake the project or not and the manager then decides whether to go along with his recommendation.

To facilitate our analysis, we rule out the possibility of many rounds of communication between the board and the CEO by assumption. If multiple rounds were allowed, one could generate the same results we obtain by introducing explicit costs of communication (e.g. delay).

2.1.3 Output Technology

The project outcome (if undertaken) at the end of the first period is given by

$$y_1 = \theta + \varepsilon - c, \tag{1}$$

where θ is a fixed parameter reflecting firm specific conditions, ε is a fixed parameter reflecting the board's expertise concerning industry or economy-wide conditions and c is the (a priori known) cost of undertaking the project. If the project is not undertaken, $y_1 = 0$.

To simplify the board's firing strategy, firm revenues at the end of the second period are given by $y_2 = \alpha$, where α is the manager's ability. The board will dismiss the manager if expected second period output under his leadership, $\widehat{\alpha}$, is less than expected second period output, $\overline{\alpha}$, under a replacement manager, i.e. $\widehat{\alpha} < \overline{\alpha}$.

We interpret the project implementation decision as an one-shot strategic decision that has long-term implications. After the firm makes the decision, the board may replace the current manager with a new one. However, this change can only affect part of the total long-run output, $y = y_1 + y_2$, namely y_2. We interpret the first component y_1 as the part of the outcome that is due to the implementation decision only and is not affected by the identity of the manager in charge.

2.1.4 Information

At the beginning of period zero, neither the board nor the manager knows the manager's ability α, the exact firm-specific conditions θ or the general conditions ε. Instead, they have common priors over α, θ and ε. They believe α, θ and ε are independently distributed, with $\alpha = \alpha_H$ with probability q and $\alpha = \alpha_L$ with probability $1-q$. For simplicity, firm specific conditions can be either good θ_G or bad θ_B with equal probabilities. The random variable representing the board's expertise concerning industry or economy-wide conditions ε has an (unspecified) cumulative distribution function $F(.)$, which we assume is continuous with an unbounded domain.[10] At the end of period zero, the manager observes a signal $s \in \{\theta_B, \theta_G\}$ of the firm-specific conditions. The signal s equals the true value of θ with probability 1 if the manager has high ability α_H and with probability $p > \frac{1}{2}$ if the manager has low ability α_L. Therefore, better managers receive more precise estimates of true firm conditions θ.

Since managers do not know their ability, managers are not able to signal their ability nor can firms sort managers ex ante by offering a menu of contracts. This is a common assumption in the literature on career concerns initiated by Holmstrom (1982/1999).

2.1.5 Monitoring Technology

The board monitors the manager with probability π, which we call its *monitoring intensity.* Monitoring has two elements. When the board monitors, it may get a direct signal of the manager's ability α and also a signal of firm conditions θ. It learns the true managerial ability α with probability t and the true firm conditions θ with probability 1. Both signals will be used in updating the board's beliefs about the manager's ability. For simplicity, we assume that the board does not observe any of the manager's other actions, including the decision concerning the project.[11]

Initially, the common prior on managerial ability is

$$\overline{\alpha} = q\alpha_H + (1-q)\,\alpha_L.$$

If the board observes θ but not α, it will update its beliefs about the manager if and only if it also observes the manager's signal s. In this case, the manager's signal matches the board's signal, i.e. $s = \theta$, with probability 1 if the manager is good and probability p if the manager is bad. Therefore, the unconditional probability of matching signals is $P(s = \theta) = q + (1-q)\,p$ and the posterior beliefs

[10] These conditions are actually stronger than we need. We make them for simplicity.

[11] This assumption can be relaxed without qualitative changes in the results. As long as the decision concerning project implementation does not fully reveal the manager's private information, the same trade-off persists if we allow the board to observe the manager's actions.

on the mean of α are

$$\begin{aligned}\alpha(s=\theta) &= \frac{q}{P(s=\theta)}\alpha_H + \frac{(1-q)\,p}{P(s=\theta)}\alpha_L, \\ \alpha(s\neq\theta) &= \alpha_L.\end{aligned}$$

Since the board would not have wanted to fire the manager at the beginning of the first period, when the manager's expected ability is $\overline{\alpha}$, the board will not fire the manager at the beginning of the second period unless it obtains new information through monitoring. We summarize the board's firing strategy formally in the following proposition.

Proposition 1 *(**Firing Rule**) The board will fire the manager if and only if:*

1. *It observes the manager's ability through monitoring (which happens with probability t) and learns that $\alpha = \alpha_L$, or*
2. *it does not observe the manager's ability directly, but learns that the manager's signal s does not match its own signal θ, i.e. $s \neq \theta$.*

When the board makes its recommendation concerning project implementation to the manager, it either knows the manager's signal s or not. We denote its information at this point by $i \in \{\theta_B, \theta_G, \emptyset\}$. We have that $i = s$ if the board learns the manager's signal s and $i = \emptyset$ if it does not learn.

Given the board's firing rule, the expected second period output when the board monitors, $M(i)$, will depend on its information i:

$$\begin{aligned}M(s) &= t\left[q\alpha_H + (1-q)\,\overline{\alpha}\right] + (1-t)\left\{P(s=\theta)\,\alpha(s=\theta) + \left[1-P(s=\theta)\right]\overline{\alpha}\right\}, \\ M(\emptyset) &= t\left[q\alpha_H + (1-q)\,\overline{\alpha}\right] + (1-t)\,\overline{\alpha}.\end{aligned}$$

Since

$$M(s) - M(\emptyset) = (1-t)\left\{q\alpha_H + (1-q)\,p\alpha_L + \left[(1-q)(1-p)-1\right]\overline{\alpha}\right\} > 0,$$

expected second period output is higher when monitoring is more informed, i.e. when the board learns s. We call the difference $N \equiv M(s) - M(\emptyset)$ the *gains from informed monitoring.*

2.1.6 Preferences

We will assume that when the board fires him, the manager retains his shares.[12] In addition, the manager receives control benefits of b if he remains in control at the end of the second period. Thus

[12] It does not alter the analysis much if he loses his shares and it simplifies some of the comparative statics. In fact managers do receive Golden Parachutes and if their shares are accumulated for their own accounts they cannot be taken away. Only if the manager is given phantom or restricted stock can his stock privileges be revoked.

the manager's utility function is given by

$$U_M = w(y_1 + y_2) + b\chi_{\text{Remain in control}}, \tag{2}$$

where

$$\chi_{\text{Remain in control}} = \begin{cases} 1 & \text{if the manager is not fired} \\ 0 & \text{if the manager is fired.} \end{cases} \tag{3}$$

Through his share in first period output the manager is interested in making a successful project implementation decision. However, he also cares about his job security because if he is fired he may lose his control benefits. In making his decision about whether to reveal, therefore, the manager faces the trade-off that revealing information increases expected output but is also costly because it may increase the probability that he is fired.

The board is risk-neutral. We will assume that the board cares only about increasing firm-value, $y = y_1 + y_2$. However, the extent to which the board can increase firm value is limited because, in order to analyze the trade-off to the manager induced by the board's dual role, we assume initially that the board's monitoring intensity π is fixed.

With probability π the board monitors, in which case expected second period output given its information is $M(i)$. With probability $1 - \pi$ the board does not monitor, in which case it does not fire the manager. Therefore, the board's expected utility function is given by:

$$EU_B = E\left[y_1 + \pi M(i) + (1 - \pi)\overline{\alpha}\right] \tag{4}$$

2.2 Analysis of the Model for a Fixed Monitoring Intensity π

This section analyses the model when the board's monitoring intensity π is fixed. In section 2.3 we relax this assumption.

At each of its information sets along the equilibrium path the board must behave optimally given its beliefs. It chooses whether or not to recommend project implementation and gathers information on firm specific conditions with monitoring intensity π. If the board monitors, it observes θ with probability 1 and updates its beliefs about the manager's ability if it also observes α or if it learns the manager's signal s. It then decides whether to fire the manager. The manager must decide whether or not to reveal his information and whether or not to implement the project given the board's recommendation.

We focus on strategy profiles and belief systems for the board and the manager that constitute perfect Bayesian equilibria. When the game is in its monitoring phase, the board's optimal behavior is fully characterized by its firing rule derived in Proposition 1. Therefore, in subsection 2.2.1 we only consider the effects of the players' behaviors on first-period output y_1. We then work backwards and analyze the manager's decision to share information in subsection 2.2.2.

2.2.1 Information and the Quality of Advice

This section describes the advice the board gives to the manager and the manager's optimal choice of whether to follow the board's advice or not.

To solve the problem, we start by analyzing the continuation games that arise after the manager's decision to share information is made.[13] There are only two possible types of continuation games at this stage: one in which the board learns the manager's signal s and one in which it does not. These continuation games can be seen as a variation of more standard strategic communication games (Crawford and Sobel, 1982). The board sends a message (a recommendation) to the manager, who has to take an action (decision about project implementation) that will affect the utilities of both parties. The peculiarities here are that both the sender (the board) and the receiver (the manager) may have private information about the project's profitability, and that the messages cannot fully transmit the board's expertise to the manager. It is important to notice that the board's and the manager's incentives are aligned in these continuation games, i.e. they both want to maximize expected y_1.

Cheap-talk games like these may have many equilibria. Our equilibrium selection procedure is to choose only equilibria that are not Pareto dominated by other equilibria (as in Crawford and Sobel, 1982), from an ex ante standpoint (i.e., at the beginning of the continuation game).[14] We call an equilibrium *fully informed* if it leads to the same action that a planner would have chosen if he had all the information available to both players. By construction, fully informed equilibria are never Pareto dominated. We will show below that fully informed equilibria always exist in the continuation games in which the board knows s. However, in continuation games in which the board does not know s, equilibria will not necessarily be fully informed.

Let $a \in \{0, 1\}$ be the board's *recommended action*, where $a = 0$ means rejection and $a = 1$ means acceptance of the project. In a (possibly mixed-strategy) equilibrium, given its expertise ε and the information i it obtains from the manager, the board recommends $a = 1$ with probability $\mu(\varepsilon, i)$. The manager will then decide whether to undertake the project or not, given the board's advice a, his own

[13] The concept of perfect Bayesian equilibrium requires that the strategies yield a Bayesian Nash equilibrium for every "continuation game" starting in each period t, given any possible history of the game. These continuation games are not proper subgames because they do not start from a singleton information set (see Fudenberg and Tirole, 1991, chapter 8).

[14] For a critique of this equilibrium selection procedure in cheap talk games, see Farrell and Rabin (1996). However, our results do not depend on this criterion. We show in the proofs of our theorems that we can restrict ourselves to equilibria that are *neologism-proof*, in the sense of Farrell (1993).

information about firm conditions s and the information i he revealed to the board.

When the manager's and the board's strategies constitute an equilibrium, we denote the manager's expectation of the first period outcome given his signal s when he reveals his information to the board (i.e. $i = s$) by $E[y_1 \mid s, i = s]$. Similarly, when the manager does not reveal his information to the board (i.e. $i = \emptyset$), this expectation is $E[y_1 \mid s, i = \emptyset]$. Implicitly in the definition of these expectations we are assuming Bayesian updating of probabilities along the equilibrium path.

We define the *advisory benefits from information sharing* as

$$R(s) = E[y_1 \mid s, i = s] - E[y_1 \mid s, i = \emptyset].$$

In the next proposition, we show that in any given equilibrium $R(s)$ is non-negative for all s. Intuitively, by sharing his information with the board the manager guarantees that the first-best action will be implemented. Furthermore, we show that at least one of $R(\theta_B)$ and $R(\theta_G)$ is strictly positive. Therefore, from an ex ante standpoint (i.e., when s is unknown even to the manager) sharing information strictly increases expected first-period output.

Proposition 2 ***(Information Sharing Implies Better Advice)*** *Consider any equilibrium profile of strategies for each continuation game indexed by either $i = s$ or $i = \emptyset$. Then,*

1. *the advisory benefits from information sharing are non-negative for all s:*

$$R(s) \geq 0;$$

2. *at least one of $R(\theta_B)$ and $R(\theta_G)$ is strictly positive:*

$$\max\{R(\theta_G), R(\theta_B)\} > 0.$$

The main implications of our model depend only on these two properties of the function $R(s)$. Therefore, we do not need to fully characterize the equilibria of each continuation game in order to show our results; our results will hold no matter what the equilibrium strategies are. However, implicit in proposition 2 is the assumption that there exists at least one equilibrium for each possible continuation game. If no equilibrium exists, the function $R(s)$ is not well-defined. Thus, in the next proposition, we show that equilibria always exist so that we can apply proposition 2 in the rest of our analysis.

Proposition 3 ***(Existence of Equilibrium)*** *For each continuation game $(s, i = s), (s, i = \emptyset)$, there exists at least one perfect Bayesian equilibrium.*

2.2.2 The Decision to Share Information

Here we analyze the first-period decision problem for the manager. To decide his strategy the manager compares his expected utilities from revealing and not revealing his information. The expected utility for the manager when the board learns his information is given by

$$\begin{aligned} EU_M(s, i = s) &= wE[y_1 \mid s, i = s] + \pi w M(s) + (1 - \pi) w\overline{\alpha} + b \\ &\quad - \pi \{t(1 - q) + (1 - t)[q + (1 - q)(1 - p)]\} b. \end{aligned}$$

If the board does not learn s, the manager's expected utility is given by

$$EU_M(s, i = \emptyset) = wE[y_1 \mid s, i = \emptyset] + \pi w M(\emptyset) + (1 - \pi) w\overline{\alpha} + b - \pi t(1 - q) b.$$

The *monitoring benefits from information sharing* are given by $\pi w (M(s) - M(\emptyset)) = \pi w N$. We define the *costs from information sharing* to be

$$C = \pi (1 - t)[q + (1 - q)(1 - p)] b.$$

It is important to note that the costs from information revealing increase both with the monitoring intensity π and with the private benefits of control b. To simplify notation, we define

$$\kappa \equiv (1 - t)[q + (1 - q)(1 - p)]$$

We now characterize the equilibrium when the monitoring intensity π is fixed. For simplicity, we assume that when the manager is indifferent between revealing or not revealing his signal to the board in equilibrium, he will choose to reveal.

Define π' as

$$\pi' \equiv \frac{w \max\{R(\theta_G), R(\theta_B)\}}{\kappa b - wN}.$$

We have the following result:

Proposition 4 ***(Monitoring Intensity and Information Sharing)*** *The equilibrium is such that:*

1. *if $\kappa b > wN$, and*
   (a) *if $\pi \leq \pi'$, the manager always reveals s;*
   (b) *if $\pi > \pi'$, the manager never reveals s.*
2. *If $\kappa b \leq wN$, the manager always reveals s.*

According to this proposition, there exist equilibria in which managers will not share information with the board. Since firm value is higher when the manager does share his information, this proposition provides the motivation for boards who take their fiduciary duties seriously to find instruments with which they can increase the manager's net gain to sharing information. When it is too costly for a firm's board to affect the manager's incentives to share information, this proposition explains why the shareholders will change their board in order to find one with which the manager will communicate.

2.3 Endogenizing the Board's Monitoring Intensity

In the previous section, we argue that when the board's preference for monitoring is fixed, managers may not share their information with a board that has a dual role in equilibrium, depending on whether $\pi > \pi'$ or not. Here we discuss the equilibria that arise when the board commits to a choice of monitoring intensity ex ante in order to maximize shareholder value. We will assume that it costs the board $d(\pi)$ to change its monitoring intensity π.[15] We assume $d(0) = 0, d' > 0, d'' > 0, \lim_{\pi \to 0} d'(\pi) = 0, \lim_{\pi \to 1} d'(\pi) = \infty$.

For the sake of brevity, we assume from now on that $\kappa b > wN$, so that only part 1 of Proposition 4 is relevant. If this assumption does not hold, the problem is still well defined. However, the monitoring benefits from information sharing would always be larger than the costs from information sharing, implying that the manager faces no trade-off between revealing and not revealing. We therefore focus on the more interesting case in which this trade-off is present, which is more likely to occur when private benefits of control b are high and managerial shareholdings w are low.

Let $m(s, \pi)$ be the message the manager sends to the board when his private information is s and the monitoring intensity is π. From proposition 4, we have that

$$m(s, \pi) = \begin{cases} s, \text{ if } \pi \leq \pi' \\ \emptyset, \text{ if } \pi > \pi'. \end{cases}$$

Messages affect first period outcomes through their effect on the quality of the advice the board can offer to the manager:

$$E[y_1 \mid m(s, \pi)] = \begin{cases} \frac{1}{2} E[y_1 \mid s = \theta_G, i = s] + \frac{1}{2} E[y_1 \mid s = \theta_B, i = s], \text{ if } m(s, \pi) = s \\ \frac{1}{2} E[y_1 \mid s = \theta_G, i = \emptyset] + \frac{1}{2} E[y_1 \mid s = \theta_B, i = \emptyset], \text{ if } m(s, \pi) = \emptyset. \end{cases}$$

Messages affect second-period outcomes through their effect on the quality of the board's monitoring $M[m(s, \pi)]$.

[15] For example, this could be a result of coordination costs (e.g. Yermack, 1996).

The board's problem can then be written as

$$\max_{\pi} E\left[y_1 \mid m\left(s,\pi\right)\right] + \pi M\left[m\left(s,\pi\right)\right] + \left(1-\pi\right)\overline{\alpha} - d\left(\pi\right)$$

The next proposition describe the main properties of the equilibrium.

Proposition 5 ***(Optimal Choice of Monitoring)*** *The equilibrium is always unique (with respect to the choice of π) and it is of one of the following three types:*

1. *The optimal monitoring intensity π^* is $\pi^f < \pi'$ and the manager shares his information $m\left(s,\pi^*\right) = s$. Furthermore, the board chooses the first-best level of monitoring and both first- and second-period outputs are at their first-best levels.*
2. *The optimal monitoring intensity is $\pi^* = \pi'$ and the manager shares his information $m\left(s,\pi^*\right) = s$. Although the first-best level of outcome is achieved in period one, the same is not true for the second period outcome, since there is too little monitoring.*
3. *The optimal monitoring intensity π^* is $\pi^n > \pi'$ and the manager does not share his information $m\left(s,\pi^*\right) = \emptyset$. Neither the first- nor the second-period outputs are at their first-best levels.*

In the first equilibrium the manager's revelation constraint is not binding. In the second equilibrium the manager's revelation constraint is binding but the value of the manager's information is high enough that the board will optimally commit to a smaller monitoring intensity than the first best level to induce the manager to reveal it.[16] In the third equilibrium the manager's revelation constraint is binding but it is too costly to induce the manager to reveal. Since, the board's preferred monitoring intensity is highest when there is full communication (since the option value of firing the manager is highest when he reveals), we define the board's preference for less than first best monitoring to be *management friendliness.*

2.4 Comparative Statics on the Board's Preferred Monitoring Intensity

Because empirical proxies are most readily available for the manager's shareholdings and his private benefits, we will discuss here only the most straightforward results linking cross sectional differences in monitoring intensity π to these elements of the manager's incentive system.

As the manager's shareholdings increase, his net gain to revealing his information increases. Thus, the optimal monitoring intensity in a sample of firms differing in the amount of managerial ownership will vary non-linearly as follows:

[16] The argument that in certain situations too much information may hurt the principal has been studied in other contexts. For example, Aghion and Tirole (1997) discuss how a principal may choose to delegate formal authority to an agent when the agent's private benefits are high or when the principal cannot refrain from hurting the agent. With more formal authority, the agent will participate more in the organization (e.g. communicate information). Similarly, Burkhart, Gromb and Panunzi (1997) consider the trade-off between more initiative by management and more control through monitoring by shareholders.

Proposition 6 ***(Relation between equilibrium monitoring and managerial ownership)*** *There exists levels of managerial ownership w^f and w^n where $0 < w^n < w^f$ such that:*

1. *the monitoring intensity of the board is at its first-best level π^f if managerial ownership is greater than w^f ;*
2. *the optimal monitoring intensity of the board is $\pi^* = \pi'$ if managerial ownership is between w^f and w^n;*
3. *the optimal monitoring intensity of the board is $\pi^* = \pi^n$ if managerial ownership is below w^n.*

As we illustrate in Figure 2, the optimal monitoring intensity is a non-monotonic function of w. When w is very low, boards monitor with intensity π^n. Beyond w^n, monitoring initially drops then rises again. At w^n there is a discrete jump in the board's monitoring intensity due to the fact that the manager makes a discrete choice to reveal or not.

-insert Figure 2 here-

As the manager's concern about being fired increases, he is less likely to reveal his information. Thus as b increases it will become more costly to induce him to reveal. Since firm value is independent of the manager's private benefits b, the analysis of the optimal monitoring intensity as a function of b is similar to the analysis for ownership. As a function of his private benefits, optimal monitoring varies non-linearly as follows:

Proposition 7 ***(Relation between equilibrium monitoring and managerial private benefits)*** *There exists levels of private control benefits b^f and b^n where $0 < b^f < b^n$ such that:*

1. *the monitoring intensity of the board is at the first-best level π^f if private benefits are less than b^f;*
2. *the optimal monitoring intensity of the board is $\pi^* = \pi'$ if private benefits are between b^f and b^n;*
3. *the optimal monitoring intensity of the board is $\pi^* = \pi^n$ if private benefits are above b^n.*

As is the case for ownership, the optimal monitoring intensity is a non-monotonic function of b. As we illustrate in Figure 2, when b is low, boards monitor with the first best intensity π^f. Beyond b^f, monitoring decreases then jumps up again to π^n.[17]

In summary, the model implies a (roughly) "U"-shaped relation between board monitoring and both managerial incentive alignment and private benefits, i.e. monitoring decreases then increases with these characteristics of the manager's incentive structure. Thus, while it would be difficult to test the model's implications concerning the extent to which managers share information with their boards, the implied cross-sectional relationships between monitoring and both incentive alignment and private benefits can, in principle, be examined empirically.

[17] As shown in Figure 2, π' is a convex function of both w and b.

3 Separating the Roles of Monitor and Advisor

In this section we make a simple modification of our model to discuss what happens when shareholders have an additional mechanism at their disposal: the assignment of the right to fire the manager to a monitor who does not have a dual role. In practice, many governance mechanisms exist that have a pure monitoring function, for example, takeovers. Also, managers often rely on advisors (such as consultants) who play no role in evaluating them. It is instructive, therefore, to think about situations in which it is optimal to separate the two roles rather than combine them in one institution such as the board.

This idea is particularly relevant for the choice of board structure. While boards in the United States combine the two roles to varying degrees, this is not necessarily true in other countries. In Table 1, we classify all countries for which we could obtain information according to their type of board structures. As is evident from the table, the sole board structure is by no means the dominant board structure type. Thus, an analysis of board structure as the choice between a board that combines monitoring and advising (a *sole* or *unitary* board) and one that separates the two roles (a *dual* or *two-tier* board) may help us understand cross-country variations in governance.[18]

Before discussing the trade-off shareholders face in deciding between a sole and a dual board system, we first reinterpret our model in order to characterize the equilibrium in a dual board system. We assume that the management board has some expertise and is therefore solely responsible for advising the manager.[19] The supervisory board has no specialized knowledge and has sole authority to fire the manager, thus the management board has no incentives to monitor the manager. In addition we assume that the management board does not communicate information it obtains from the CEO to the supervisory board. If both boards communicated perfectly there would be no real difference between the dual and the sole board.

With this separation of tasks we obtain the following equilibrium in our model as an immediate corollary of proposition 5:[20]

Proposition 8 ***(Dual Board Equilibrium)*** *In a dual board system,*

[18] Although the dual board structure allows for the cleanest separation between the board's two roles, of course there may be other ways of separating the board's roles, for example, through the use of board committees.

[19] According to the Korn/Ferry survey (1998, p.13): "the supervisory board may allow for greater breadth of expertise." The management board generally has more specialized knowledge.

[20] This proposition holds if we assume $\kappa b > wN$, i.e. the manager's cost of being fired due to monitoring is greater than the gain in the value of his shares due to monitoring. If not, the manager would also choose to reveal to the supervisory board and the supervisory board would choose the first-best monitoring intensity.

1. *managers always reveal their information to the management board, so first period output is always at the first-best level;*

2. *the supervisory board always monitors with intensity π^n, so second period output is not at the first-best level, since there is too little monitoring.*

Since in the dual board system first-period output is always maximized but second period output is not, proposition 8 implies that the first-best choice of board structure is the sole board structure, in which output in both periods can be maximized. It is important to note that the reason the sole board structure may be better than the dual board structure is, therefore, because a sole board can take advantage of information obtained during the advisory process to improve its inferences from the monitored signal.

However, there will exist a set of firms for which managerial shareholdings and private benefits are such that shareholders prefer to separate the two roles of the board into a dual board structure rather then choosing a more management friendly sole board. In particular, if the value of the manager's information is sufficiently high such that the board would choose to monitor with intensity π' to induce the manager to reveal it (assuming his incentives are otherwise low), but $\pi' < \pi^n$, shareholders prefer a dual board system. Thus we have the following corollary to proposition 8:

Corollary 1 *There exists a level of managerial ownership w^D where $0 < w^n < w^D < w^f$ such that shareholders prefer a sole board system for all $w \geq w^D$ and a dual board system for all $w < w^D$. Similarly, there exists a level of managerial private benefits b^D where $b^n > b^D > b^f > 0$ such that shareholders prefer a sole board system for all $b \leq b^D$ and a dual board system for all $b > b^D$.*

When making their decision about board structure, this proposition shows that shareholders must decide whether using information obtained as part of the advisory process to evaluate the manager is sufficiently important given the trade-off the manager faces. When the gain to using the manager's information is sufficiently high and the manager's incentives are not too weak, shareholders may prefer a management friendly sole board to a dual board system. However as managerial incentives weaken, shareholders may prefer a dual board system.

Clarke and Bostock (1997, p. 244) describe the German dual board system: "In many companies the flow of information from managers to supervisors is sparse." However in their analysis, this is a source of criticism of the dual board structure. Contrary to their view, corollary 1 shows that there may be situations in which it is optimal to limit the flow of information between the manager and the monitor. Given that job markets in other countries are often less liquid than in the United States, it is not unreasonable to assume that in those countries managerial concerns about job security are fairly high. Thus, managerial incentives to share information may be sufficiently weak to make the choice of a dual board system optimal.[21] More research needs to be done in this area, yet this result is suggestive.

4 Final Remarks and Policy Implications

The question of when advisors should have the authority to simultaneously evaluate their advisees or when monitors should have the authority to participate in decision-making is an interesting question, and one that has, to our knowledge, not been raised before. It is particularly relevant for the study of corporate boards because we observe both the combination of the two roles of advising and monitoring management in the sole board system as in the United States, and the separation of the two roles in the dual board system, such as in Germany.[22] Given the recent emphasis on governance reform by Congress, the NYSE and NASDAQ (amongst others) in the United States and by the *High Level Group of Company Law* in Europe, we believe our analysis of the interaction between the board's advising and monitoring roles is especially topical because it has several relevant policy implications.

The first implication of our model is that emphasizing director independence may have adverse consequences in the sole board system. The reason is that managers are less inclined to share information with a sole board as its monitoring intensity increases. In contrast, enhancing the independence of supervisory boards will not affect the incentives of managers to share information. Thus, proposals aimed at increasing the independence of sole boards (such as those by the NYSE and NASDAQ) may decrease shareholder value, while those aimed at increasing the independence of supervisory boards may increase shareholder value.

Since information generated during the advisory process can enhance the monitoring process, our model implies that the first-best system is the sole board system. Thus, as long as firms can design managerial incentive structures appropriately, the sole board system dominates. However, if it is too costly for firms to align CEO incentives sufficiently, our model implies that it is better to give firms the choice of board structure as the *High Level Group* recommends. In this case firms that might otherwise be forced to choose a management-friendly sole board because CEO incentives are otherwise low may prefer to move to a dual board structure where monitoring is higher. This implies that the debate about which type of system to have has some merit and that governance in the United States may also be

[21] It is suggestive that managerial turnover is very low in Germany and Austria and that both these countries also have a dual board structure (Korn/Ferry, 1998).

[22] Other examples of relationships exist in which advising and monitoring co-exist. For example, venture capitalists provide explicit advisory services to entrepreneurs in addition to monitoring them. Until recently auditing firms also bundled consulting and monitoring services. Central banks might also be deemed to provide advisory services to banks in their function as bank supervisors.

enhanced by moving to a system that allows firms to choose between board structures.

However, there is also a drawback to allowing firms to choose their board structure. In some cases the dual board structure is better for managers in our model, since the probability that they are fired may be lower than in the sole board system. This implies that if managers have more power they may want to implement a dual board structure even when the sole board structure is optimal from the perspective of shareholders. Thus policies that allow firms to switch board structure types may not be unambiguously better than policies that mandate one type of structure. When firms switch board structure types, it is important to understand who has influence over the decision in order to evaluate whether the change is value-enhancing.

Finally, our model implies that, regardless of how the board is structured, shareholders are always better off by having a board that advises as well as monitors the manager. This implies that when evaluating board effectiveness and composition, it is important to also consider the board's advisory role. In addition, investigating circumstances in which it is optimal to have a board that does not monitor too much has implications for the interaction between monitoring by boards and monitoring by other governance mechanisms. When a management friendly board is optimal, one should expect other governance mechanisms to pick up the slack.

5 Appendix

Proof. (**Proposition 1**) Since $P(s=\theta) = q + (1-q)p < 1$, $\frac{q}{P(s=\theta)} > q$ (and $\frac{(1-q)p}{P(s=\theta)} = 1 - \frac{q}{P(s=\theta)} < 1-q$). Therefore

$$\alpha(s=\theta) = \frac{q}{P(s=\theta)}\alpha_H + \frac{(1-q)p}{P(s=\theta)}\alpha_L$$

gives more weight to α_H than $\overline{\alpha}$ does, which implies that $\alpha(s=\theta) > \overline{\alpha} > \alpha(s \neq \theta) = \alpha_L$. Therefore the board will retain the manager if and only if it learns that the manager is of high ability or the manager's signal matches its own signal, i.e. $s = \theta$. ■

In order to prove Proposition 2 and Proposition 3, we first show the following:

Claim 1 ***(Existence of Fully Informed Equilibria Under Full Information)*** *Fully informed equilibria always exist in the continuation games in which the board knows s.*

Proof. Let $\beta(s,i,a) : \{\theta_B, \theta_G\} \times \{\theta_B, \theta_G, \emptyset\} \times \{0,1\} \to [0,1]$ be the probability that the manager implements the project in equilibrium when his first-period signal is s, the board's information is i and the board's recommended action is a.

To simplify notation, let

$$\psi_G = E[\theta \mid s = \theta_G] = q\theta_G + (1-q)[p\theta_G + (1-p)\theta_B]$$
$$\psi_B = E[\theta \mid s = \theta_B] = q\theta_B + (1-q)[p\theta_B + (1-p)\theta_G]$$

Consider the board's strategy in which

$$\mu(\varepsilon, i = s) = \begin{cases} 1 \text{ if } \psi_s + \varepsilon \geq c \\ 0 \text{ otherwise} \end{cases}$$

and the manager's strategy in which

$$\beta(s, i = s, a) = \begin{cases} 1 \text{ if } a = 1 \\ 0 \text{ otherwise.} \end{cases}$$

If the board deviates from its strategy, the manager will sometimes implement the project when it has negative expected value from the board's perspective $(\psi_s + \varepsilon - c < 0)$ and sometimes not implement it when it has positive expected value $(\psi_s + \varepsilon - c > 0)$. Therefore, the board has no incentives to deviate.

For each s, the manager's expected value from implementing the project whenever $a = 1$ is

$$\psi_s + E[\varepsilon \mid \varepsilon \geq c - \psi_s] - c > 0$$

which strictly dominates not implementing (in which case he gets 0). The manager's expected value from implementing the project whenever $a = 0$ is

$$\psi_s + E[\varepsilon \mid \varepsilon \leq c - \psi_s] - c < 0,$$

which is strictly dominated by not implementing (in which case he gets 0). Therefore, the strategy profile $\{\beta(s, i = s, a), \mu(\varepsilon, i = s)\}$ is an equilibrium.

Furthermore, since the resulting choice to implement the project is the same that a fully informed planner would make, this equilibrium maximizes expected first period output. ■

Proof. (Proposition 2)

Since expected first period output is maximized when the board learns s by our equilibrium selection criterion and claim 1, the first part of this proposition follows immediately, i.e. $R(s) \geq 0$.

Suppose now that an equilibrium exists, with the strategy profile $\{\beta(s, i = \emptyset, a), \mu(\varepsilon, i = \emptyset)\}$ when the board does not learn the manager's signal, in which both $R(\theta_G) = 0$ and $R(\theta_B) = 0$. In this case the manager's expectation of first-period output is:

$$E\left[y_1 \mid s, i=\emptyset\right] = \int_{-\infty}^{\infty} \mu\left(\varepsilon, i=\emptyset\right)\beta\left(s, i=\emptyset, a=1\right)\left[\psi_s+\varepsilon-c\right]dF\left(\varepsilon\right) + \int_{-\infty}^{\infty}\left[1-\mu\left(\varepsilon, i=\emptyset\right)\right]\beta\left(s, i=\emptyset, a=0\right)\left[\psi_s+\varepsilon-c\right]dF\left(\varepsilon\right).$$

If $s=\theta_G$, we can write this expectation as

$$\int_{-\infty}^{c-\psi_G}\left\{\mu\left(\varepsilon,\emptyset\right)\beta\left(\theta_G,\emptyset,1\right)+\left[1-\mu\left(\varepsilon,\emptyset\right)\right]\beta\left(\theta_G,\emptyset,0\right)\right\}\left[\psi_G+\varepsilon-c\right]dF\left(\varepsilon\right) + \int_{c-\psi_G}^{\infty}\left\{\mu\left(\varepsilon,\emptyset\right)\beta\left(\theta_G,\emptyset,1\right)+\left[1-\mu\left(\varepsilon,\emptyset\right)\right]\beta\left(\theta_G,\emptyset,0\right)\right\}\left[\psi_G+\varepsilon-c\right]dF\left(\varepsilon\right).$$

Since the first term is negative by construction,

$$E\left[y_1 \mid \theta_G, i=\theta_G\right]-E\left[y_1 \mid \theta_G, i=\emptyset\right]=0$$

iff

$$\mu\left(\varepsilon,\emptyset\right)\beta\left(\theta_G,\emptyset,1\right)+\left[1-\mu\left(\varepsilon,\emptyset\right)\right]\beta\left(\theta_G,\emptyset,0\right)=0, \text{ for } \varepsilon<c-\psi_G$$

and

$$\mu\left(\varepsilon,\emptyset\right)\beta\left(\theta_G,\emptyset,1\right)+\left[1-\mu\left(\varepsilon,\emptyset\right)\right]\beta\left(\theta_G,\emptyset,0\right)=1, \text{ for } \varepsilon\geq c-\psi_G.$$

There are only two possible combinations of strategies that satisfy both of these conditions: $\beta\left(\theta_G,\emptyset,0\right)=0$, $\beta\left(\theta_G,\emptyset,1\right)=1$, $\mu\left(\varepsilon,\emptyset\right)=0$ for $\varepsilon<c-\psi_G$, $\mu\left(\varepsilon,\emptyset\right)=1$ for $\varepsilon\geq c-\psi_G$ or $\beta\left(\theta_G,\emptyset,0\right)=1$, $\beta\left(\theta_G,\emptyset,1\right)=0$, $\mu\left(\varepsilon,\emptyset\right)=1$ for $\varepsilon<c-\psi_G$, $\mu\left(\varepsilon,\emptyset\right)=0$ for $\varepsilon\geq c-\psi_G$.

Without loss of generality, we consider the first combination. Then since $c-\psi_G<c-\psi_B$, $\mu\left(\varepsilon,\emptyset\right)=0$ for $\varepsilon<c-\psi_G$ and $\mu\left(\varepsilon,\emptyset\right)=1$ for $\varepsilon\geq c-\psi_G$, we can write

$$\begin{aligned} E\left[y_1 \mid s=\theta_B, i=\emptyset\right] &= \int_{-\infty}^{c-\psi_G}\beta\left(\theta_B,\emptyset,0\right)\left[\psi_B+\varepsilon-c\right]dF\left(\varepsilon\right)+ \\ &\int_{c-\psi_B}^{c-\psi_G}\beta\left(\theta_B,\emptyset,1\right)\left[\psi_B+\varepsilon-c\right]dF\left(\varepsilon\right)+ \\ &\int_{c-\psi_B}^{\infty}\beta\left(\theta_B,\emptyset,1\right)\left[\psi_B+\varepsilon-c\right]dF\left(\varepsilon\right). \end{aligned}$$

But a necessary condition for this to equal $E[y_1 \mid s=\theta_B, i=s]$ (so that $R(\theta_B)=0$) is that $\beta(\theta_B,\emptyset,1)=1$, but this implies that $E[y_1 \mid s=\theta_B, i=\emptyset] < E[y_1 \mid s=\theta_B, i=s]$ since $\psi_B+\varepsilon-c<0$ on a set of strictly positive measure (since $F(\varepsilon)$ is continuous and $c-\psi_B > c-\psi_G$) which is a contradiction. Therefore

$$\max\{R(\theta_G), R(\theta_B)\} > 0.$$

■

Proof. (Proposition 3) For the continuation games in which the board learns the manager's signal, $(s=\theta_B, i=s), (s=\theta_G, i=s)$, we have already shown in claim 1 that a fully informed equilibrium exists. This equilibrium also seems to be the only reasonable one: in any other possible equilibrium, if the players can talk and coordinate, they will agree to deviate.

Therefore, we only need to show that there also exists at least one equilibrium for the continuation games $(s=\theta_j, i=\emptyset)$, $j=B,G$. It is important to notice here that we are assuming that whenever the board does not learn $i=\emptyset$, it assumes that the manager is equally likely to have received either message θ_B or θ_G. This case happens when both types choose not to reveal their information to the board.

There is an easy way of proving existence, if one is willing to consider totally uninformative (or "babbling") equilibria as admissible. For readers unwilling to accept babbling equilibria as solutions of cheap talk games, we also provide a longer proof that equilibria in the form of "cut-off strategies" also always exist. We argue that, unlike babbling equilibria, these cut-off equilibria are reasonable and survive equilibrium refinements such as Farrell's *neologism-proofness* (1993).

Consider the following "babbling" strategy for the board:

$$\mu(\varepsilon, i=\emptyset) = \overline{\mu}$$

where $\overline{\mu}$ is a fixed probability (invariant to ε), and the manager's strategy in which

$$\beta(s, i=\emptyset, a) = \begin{cases} 1, & \text{if } \psi_s + E[\varepsilon] - c \geq 0 \\ 0, & \text{otherwise} \end{cases}.$$

It is easy to show that this is indeed an equilibrium: given that the board's recommendation is uninformative, the manager's best response is to ignore the board's recommendation and to choose the action that maximizes expected first period outcome given his own private information s. But since the manager ignores the board's recommendation, any strategy for the board is a best response, thus it may choose $\overline{\mu}$.

Clearly, this type of babbling equilibrium is the least informative of all possible equilibria. Given our equilibrium selection procedure, it will never be chosen whenever other more informative equilibria also exist. However, the existence of these babbling equilibria is enough for our purposes.

Now we compute equilibrium strategy profiles that are not babbling. All equilibria we consider here assume a cut-off strategy for the board: the board recommends adoption iff $\varepsilon \geq \varepsilon^c$, for some cut-off value ε^c, i.e., the board strategy is such that:

$$\mu(\varepsilon, i = \emptyset) = \begin{cases} 1 \text{ if } \varepsilon \geq \varepsilon^c \\ 0 \text{ otherwise} \end{cases}$$

We consider five different possible parameter combinations and show that at least one equilibrium exist for each one of them.

Define $\varepsilon^* = c - \overline{\theta}$.

Case 1: Suppose that

$$\begin{aligned} E[\varepsilon \mid \varepsilon \geq \varepsilon^*] &\geq c - \psi_B \\ E[\varepsilon \mid \varepsilon < \varepsilon^*] &< c - \psi_G \end{aligned}$$

Consider a cut-off strategy for the board such that $\varepsilon^c = \varepsilon^*$ and a manager's strategy such that

$$\beta(s, i = \emptyset, a) = \begin{cases} 1 \text{ if } a = 1 \\ 0 \text{ otherwise} \end{cases}.$$

If the board deviates from its strategy, the manager will either implement the project with some positive probability when it has negative expected value from the board's perspective $\left(\overline{\theta} + \varepsilon - c < 0\right)$ or not implement it with some positive probability when it has positive expected value $\left(\overline{\theta} + \varepsilon - c > 0\right)$. Therefore, the board has no incentives to deviate.

When $s = \theta_B$, the manager's expected value from implementing the project whenever $a = 1$ is

$$\psi_B + E[\varepsilon \mid \varepsilon \geq \varepsilon^*] - c$$

which is non-negative by assumption, therefore it (weakly) dominates not implementing (in which case he gets 0). Because $\psi_G > \psi_B$, type θ_G also finds it optimal to implement the project whenever the board says $a = 1$. When $s = \theta_G$, the manager's expected value from implementing the project whenever $a = 0$ is

$$\psi_G + E[\varepsilon \mid \varepsilon \leq \varepsilon^*] - c$$

which is negative by assumption, therefore it is strictly dominated by not implementing (in which case he gets 0). Again, because $\psi_G > \psi_B$, type θ_B also finds it optimal not to implement the project whenever the board says $a = 0$. Therefore, the strategy profile we have described is an equilibrium.

We describe below the equilibrium strategy profiles for four other mutually exclusive combinations of parameters. Since these five cases exhaust all possibilities, we therefore show that cutoff equilibria always exist. Arguments similar to the ones we used in proving that strategies form an equilibrium in Case 1 can be shown to hold more generally for each of the other four cases. We omit these proofs for the sake of brevity, but detailed proofs are available upon request.

Case 2: Suppose that

$$E[\varepsilon \mid \varepsilon \geq \varepsilon^*] \geq c - \psi_B$$
$$c - \psi_G \leq E[\varepsilon \mid \varepsilon < \varepsilon^*] \leq c - \psi_B$$

A strategy for the board such that $\varepsilon^c = \varepsilon^*$and a manager's strategy such that

$$\beta(s, i = \emptyset, a) = \begin{cases} 1 \text{ if } a = 1 \\ 1 \text{ if } a = 0 \text{ and } s = \theta_G \\ 0 \text{ otherwise} \end{cases}$$

constitute an equilibrium.

Case 3: Suppose that

$$E[\varepsilon \mid \varepsilon \geq \varepsilon^*] \geq c - \psi_B$$
$$E[\varepsilon \mid \varepsilon < \varepsilon^*] \geq c - \psi_B$$

A strategy for the board such that $\varepsilon^c = \varepsilon^*$and a manager's strategy such that

$$\beta(s, i = \emptyset, a) = 1.$$

constitute an equilibrium.

Case 4: Suppose that

$$E[\varepsilon \mid \varepsilon \geq \varepsilon^*] < c - \psi_B$$
$$E[\varepsilon \mid \varepsilon < \varepsilon^*] > c - \psi_G$$

A strategy for the board such that $\varepsilon^c = \varepsilon^*$and a manager's strategy such that

$$\beta(s, i = \emptyset, a) = \begin{cases} 1 \text{ if } s = \theta_G \\ 0 \text{ otherwise} \end{cases}$$

constitute an equilibrium.

Case 5: Suppose that

$$E[\varepsilon \mid \varepsilon \geq \varepsilon^*] < c - \psi_B$$
$$E[\varepsilon \mid \varepsilon < \varepsilon^*] \leq c - \psi_G$$

Define $\varepsilon' = c - \psi_G$. A strategy for the board such that $\varepsilon^c = \varepsilon'$and a manager's strategy such that

$$\beta(s, i = \emptyset, a) = \begin{cases} 1 \text{ if } a = 1 \text{ and } s = \theta_G \\ 0 \text{ otherwise} \end{cases}$$

constitute an equilibrium.

We have shown that, for any given parameter combination, there exists at least one equilibrium in which the board recommends adoption iff $\varepsilon \geq \varepsilon^c$, for some cut-off value ε^c. Furthermore, the manager does interpret the messages from the board literally and correctly. The message "I recommend the project" ($a = 1$) is always interpreted by the manager as meaning "the board thinks the project is good." Unlike in babbling equilibria, board's messages *are* informative: they always affect the manager's expected payoffs. Because messages are meaningful and their meanings are interpreted literally, these equilibria are not ruled out by neologism-proofness considerations. ■

Proof. (Proposition 4) Assume $\kappa b > wN$. Let $\pi \leq \pi'$ and let $s' \in \arg\max R(s)$. By proposition 2, we know that $R(s') > 0$. The manager who receives a signal s' chooses to reveal his information if (assuming that the board assigns equal probabilities to both types whenever the manager does not reveal his information):

$$wR(s') \geq \pi(\kappa b - wN).$$

But this condition holds in this case from $\pi \leq \pi'$. Therefore, the manager will reveal his information if $s = s'$. Consider now a manager of type $s'' \neq s'$ and suppose the manager chooses not reveal his signal. The board, however, knowing that if the manager had a signal s' he would have chosen to reveal, correctly infers that $s = s''$. This makes the manager indifferent between revealing or not revealing his information when $s = s''$. Since we assume that ties are broken in favor of revealing, we conclude that the manager will choose to reveal his information when $s = s''$ as well.

Now let $\pi > \pi'$. In this case, both types of managers (θ_G or θ_B) prefer not to reveal their information, so this is an equilibrium.[23]

[23] There may exist other perfect Bayesian equilibria in this case, ones in which both types reveal their information, and when a deviation occurs and the manager does not reveal its type, the board believes that one of the types (either θ_B or θ_G) is more likely to be the one deviating, and assigns different probabilities to each type after a deviation. We argue that these equilibria are unreasonable, for they require that the manager's "right to remain silent" signals his information even

If $\kappa b \leq wN$, then pooling (non-revealing) equilibria do not exist, because the expected gain from revealing when your type is θ_s is

$$wR(s) + \pi(wN - \kappa b) \geq 0$$

with strict inequality for at least one of the types. If both types reveal their information, this is trivially an equilibrium. ■

Proof. (Proposition 5) Let π^f be such that

$$M(s) - \overline{\alpha} = d'\left(\pi^f\right).$$

π^f is well-defined because $M(s) - \overline{\alpha} > 0$ and we assumed that $d(.)$ satisfies certain regularity conditions.

Suppose first that $\pi^f \leq \pi'$. If the board chooses $\pi^* = \pi^f$, then by Proposition 2 the manager will choose to share his information. When there is information sharing, advising is optimal and expected first-period output is therefore maximized (see the proof of Proposition 3). But since π^f is the unconstrained best choice of monitoring for the board, second-period output (which depends only on monitoring) is at its first-best level. This is the equilibrium in item 1.

Suppose now that $\pi^f > \pi'$. Now, the first-best cannot be achieved anymore. If the board wants to induce revelation, it will choose $\pi^* = \pi'$. Otherwise, it will choose $\pi^* = \pi^n$ where π^n is such that

$$M(\emptyset) - \overline{\alpha} = d'(\pi^n)$$

π^n is well-defined because $M(\emptyset) - \overline{\alpha} > 0$. The board will prefer choosing $\pi^* = \pi'$ if

$$\begin{aligned} &E[y_1 \mid m = s] + \pi' M(s) + \left(1 - \pi'\right)\overline{\alpha} - d\left(\pi'\right) \\ &\geq E[y_1 \mid m = \emptyset] + \pi^n M(\emptyset) + (1 - \pi^n)\overline{\alpha} - d(\pi^n) \end{aligned}$$

and will choose $\pi^* = \pi^n$ otherwise. If it chooses $\pi^* = \pi'$, Proposition 2 implies that the manager will share his information $m(s, \pi^*) = s$. First-period output is maximized because the board learns the manager's information, but second-period output is not first-best because there is too little monitoring: $\pi^* < \pi^f$. This is the equilibrium in item 2.

If the board chooses $\pi^* = \pi^n$, Proposition 2 implies that the manager will not share his information $m(s, \pi^*) = \emptyset$. Expected first-period output is not maximized because the board does not learn the

though both types have incentives not to reveal. This case is analogous to the right-to-silence game analyzed in Farrell and Rabin (1996). Instead of remaining silent, the manager could say "you should not try to infer my information from the fact that I am not talking to you, because it is in my own interest not to reveal my information to you no matter what it is." This message, if believed, is credible. Assuming a rich common language (Farrell, 1993), these equilibria should be ruled out because they are not neologism-proof.

manager's information (see Proposition 2), second-period output is also not first-best because the gains from monitoring are lower when there is no information sharing: $M(\emptyset) < M(s)$. This is the equilibrium in item 3. ■

Proof. (Proposition 6) Since $\pi'(w)$ is a strictly increasing function of w, $\pi'(0) = 0$ and π^f does not depend on w, there exists a unique w^f such that $\pi'(w^f) = \pi^f$. Since for all $w \geq w^f$, $\pi'(w) \geq \pi^f$ the board will implement the first best level of monitoring by choosing to monitor with intensity π^f in this region by proposition 5 For all $w < w^f$, the first-best cannot be implemented anymore. Now consider the board's expected utility when $\pi = \pi'$ and the manager reveals. The derivative of the board's expected utility with respect to w is:

$$\frac{\partial EU_B}{\partial w} = \left(M(s) - \overline{\alpha} - d'\left(\pi'\right)\right)\frac{\partial \pi'}{\partial w}.$$

Since π^f was chosen to satisfy $M(s) - \overline{\alpha} - d'\left(\pi^f\right) = 0$ and $d'(\pi) > 0$, we have for all $w < w^f$ that $M(s) - \overline{\alpha} - d'(\pi') > 0$. Since $\frac{\partial \pi'}{\partial w} > 0$, the board's expected utility is strictly increasing in w. Since the board's expected utility when the manager does not reveal is independent of w, there exists a unique $w^n < w^f$, such that for all $w^f \geq w \geq w^n$ the board chooses to induce revelation by monitoring with intensity π' and for all $w < w^n$ the board chooses to monitor with intensity π^n.[24] Now suppose that $w = \widehat{w}$ is such that $\pi^n = \pi'$. In this case the board's expected utility is strictly greater when the manager reveals, therefore $\widehat{w} > w^n$ and there is a discontinuity in the board's strategy since at w^n, $\pi^n > \pi'$. ■

Proof. (Proposition 7) The proof is analogous to the proof for the manager's shareholdings except that $\pi'(b)$ is strictly decreasing in b and $\lim_{b \to \frac{wN}{\kappa}^+} \pi'(b) = \infty$, so there exists a unique b^f such that $\pi'(b^f) = \pi^f$ and the board can implement the first-best monitoring probability π^f for all $b \leq b^f$. Since for all $b > b^f$, $M(s) - \overline{\alpha} - d'(\pi') > 0$ but $\frac{\partial \pi'}{\partial b} < 0$, the board's expected utility is strictly decreasing in b in this region. Since the board's expected utility when the manager does not reveal is independent of b, there exists a unique $b^n > b^f$,such that for all $b^f \leq b \leq b^n$ the board chooses to induce revelation by monitoring with intensity π' and for all $b > b^n$ the board chooses to monitor with intensity π^n. Now suppose that $b = \widehat{b}$ is such that $\pi^n = \pi'$. In this case the board's expected utility is strictly greater when the manager reveals, therefore $\widehat{b} < b^n$ and there is a discontinuity in the board's strategy since at b^n, $\pi^n > \pi'$. ■

Proof. (Proposition 8) Let EU_B^{Sf} be the sole board's expected utility when the manager reveals

[24] We are assuming here that when $w = 0$ and the board chooses to induce revelation by monitoring at intensity $\pi' = 0$, the board's expected utility is smaller than when the manager does not reveal and the board monitors at π^n. If not, $w^n > 0$ does not exist but the remainder of the proposition still holds.

and $\pi = \pi^f$, $EU_B^{S\prime}$ be the sole board's expected utility when the manager reveals and $\pi = \pi'$ and EU_B^D be the dual board's expected utility. Since $EU_B^{S\prime}$ is strictly increasing in managerial shareholdings w and EU_B^D is independent of w, there is a cutoff level of shareholdings below which the dual board structure is optimal and above which the sole board structure is optimal. This cutoff is greater than w^n, since EU_B^D is greater than a sole board's expected utility when the manager does not reveal and $\pi = \pi^n$. Since $\Delta = EU_B^{Sf} - EU_B^D > 0$, there is still a range of shareholdings for which shareholders choose a management friendly sole board. Similarly, there is a cutoff level of career concerns above which the dual board structure is optimal and below which the sole board structure is optimal. ■

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Figure 1: Timeline

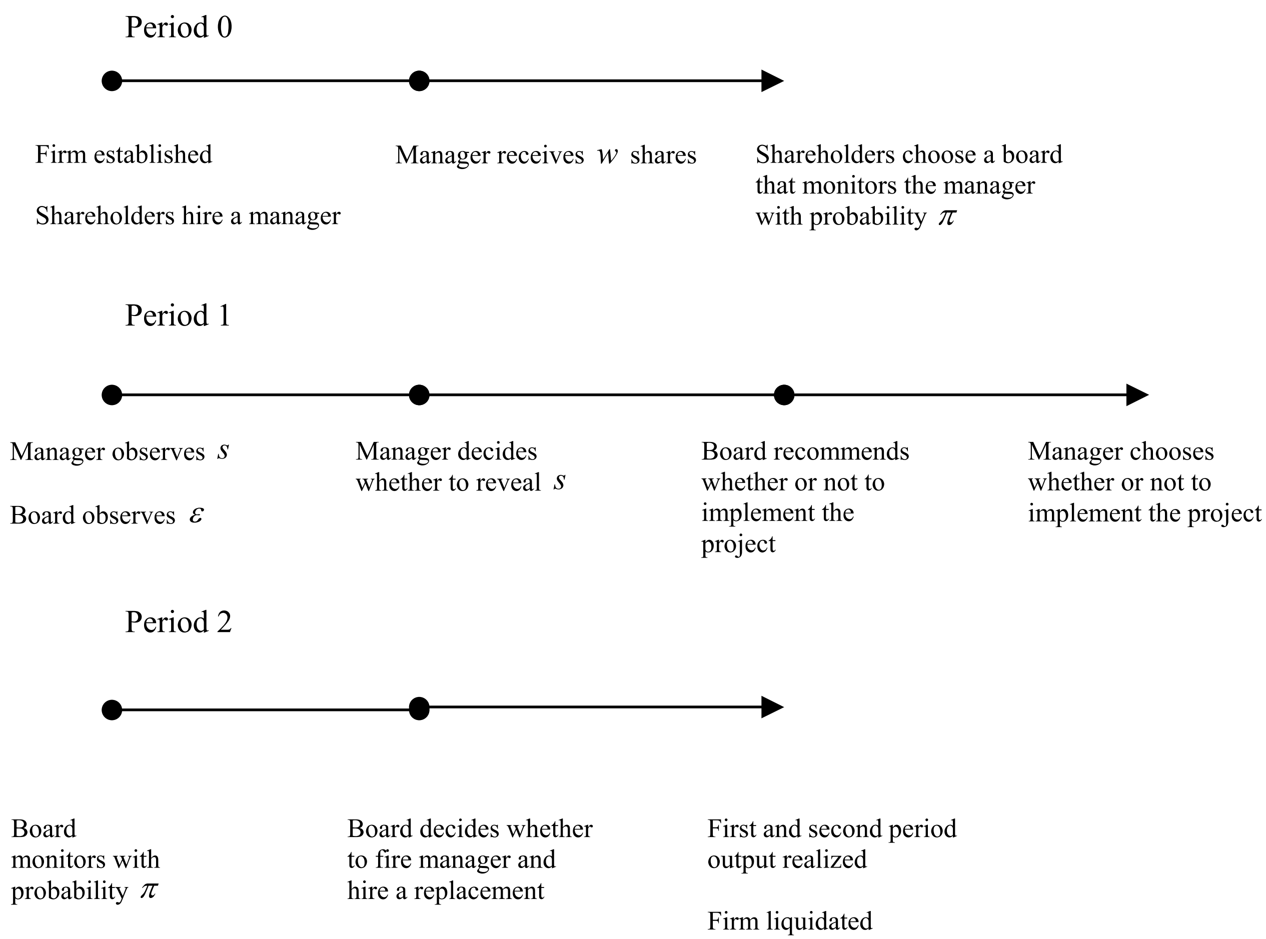

Figure 2: The optimal monitoring intensity as a function of managerial shareholdings and private benefits when monitoring is chosen ex ante

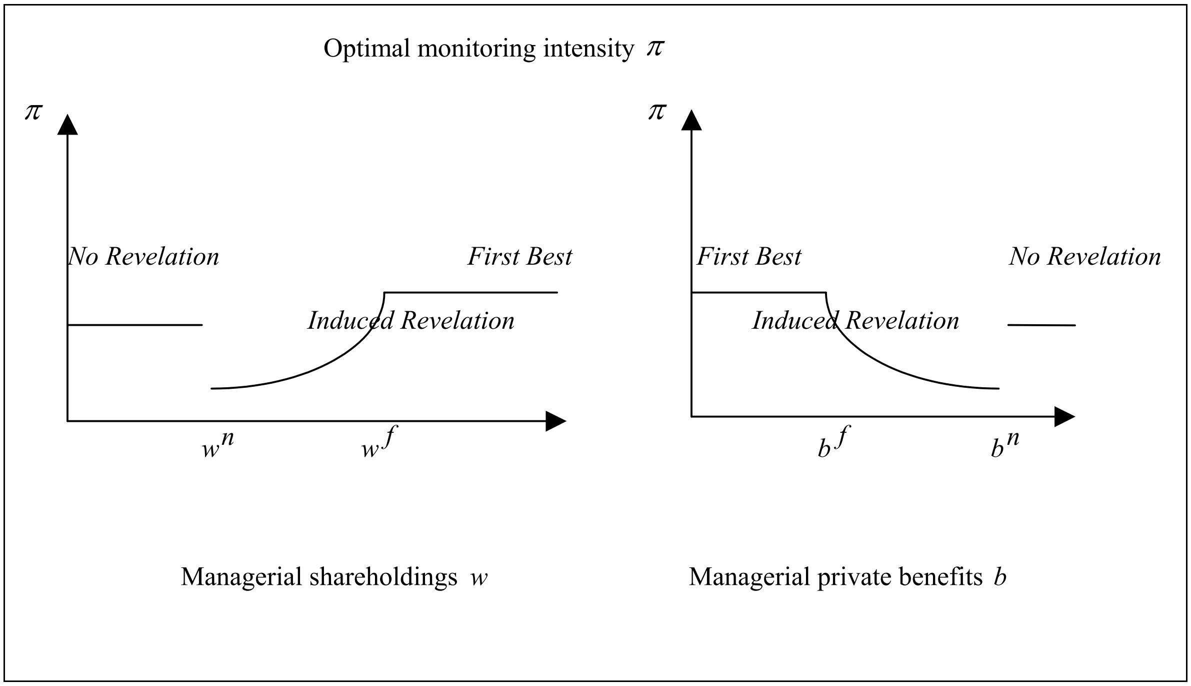

Table 1: Cross-Country Variation in Board Structure

Table 1 classifies 39 countries according to whether they have a sole board system, a dual board system or a mixed system. A country is considered to have a mixed system if different firms can have different types of board structures within that country. For example, in France and Bulgaria firms are allowed to choose between the sole and the dual board structure. In Switzerland banks must have a dual board structure. Data sources are Brefort, Tenev and Zhang (2002), the Institute of Directors (1994), Korn/Ferry International (1998), OECD (2001), World Bank and IMF (2001-2002). The dates of the data are from 2001-2003 in 24 cases, from 1998 in 12 cases, from 1997 in 1 case (Thailand) and from 1994 in 1 case (South Africa). In one case we were unable to verify the date of the data (Ukraine).

Board Structure Type	Country
Sole Board System	Australia, Brazil, Canada, Egypt, India, Italy , Japan, Malaysia, Norway, Philippines, Singapore, South Africa, South Korea, Thailand, Turkey, U.S., Ukraine, United Kingdom, Zimbabwe
Dual Board System	Austria, Belgium, China, Croatia, Czech Republic, Denmark, Estonia, Georgia, Germany , Holland, Indonesia, Latvia, Mauritius, Poland, Spain, Taiwan
Mixed Board Structures	Bulgaria, Finland, France, Switzerland