

## Information Control, Career Concerns, and Corporate Governance

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### ABSTRACT

We examine corporate governance effectiveness when the CEO generates project ideas and the board of directors screens these ideas for approval. However, the precision of the board's screening information is controlled by the CEO. Moreover, both the CEO and the board have career concerns that interact. The board's career concerns cause it to distort its investment recommendation procyclically, whereas the CEO's career concerns cause her to sometimes reduce the precision of the board's information. Moreover, the CEO sometimes prefers a less able board, and this happens only during economic upturns, suggesting that corporate governance will be weaker during economic upturns.

*Behind every great fortune is a crime.*

—*Honoré de Balzac*

THE U.S. CORPORATE GOVERNANCE LANDSCAPE has been transformed in recent years by high-profile governance failures at Enron, WorldCom, Tyco, ImClone, Adelphia, Global Crossing, and others. In response, Congress passed the most important corporate governance legislation since the Securities Exchange Act of 1934: the Sarbanes-Oxley Act of 2002 (SOX hereafter).<sup>1</sup> SOX has four key features. First, it requires accurate, extensive, and timely information disclosures, mandating public firms to establish and maintain “an adequate internal control structure and procedures for financial reporting” with an annual assessment of the effectiveness of such internal controls that is attested to by external auditors. Second, SOX (along with the new listing standards of the New York Stock Exchange and the NASDAQ Stock Market) stipulates a measure of board independence, requiring that the board's audit committee consist entirely of directors that have no affiliation with the company (including its subsidiaries) and forbidding members of the committee from accepting “any consulting, advisory, or other compensatory fees” from the company other than for his or her board's service.<sup>2</sup> Third, SOX sets more stringent standards for executive

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<sup>1</sup> See <http://news.findlaw.com/hdocs/docs/gwbush/sarbanesoxley072302.pdf> for the detailed provisions of SOX.

<sup>2</sup> The new listing standards of The New York Stock Exchange and The NASDAQ Stock Market require companies to hold regular meetings of only nonmanagement directors.

compensation, and attempts to reduce the likelihood of financial misreporting to increase executive compensation. Finally, SOX broadens the definitions of corporate criminal fraud and increases corresponding penalties for such frauds. Executives who knowingly certify false financial reports may be fined up to \$5 million and/or imprisoned not more than 20 years.

Given the incidents of corporate abuse that inspired it, the emphasis of SOX on the accurate provision of information is not surprising. The question is: How effective will SOX be in improving the quality of information provided by executives to boards of directors and investors? We address this question theoretically in this paper, employing assumptions that we believe correspond to the way corporate governance works in practice.

The starting point of our analysis is that both the Chief Executive Officer (CEO) and the Board of Directors (board) care about the firm value and that both have career concerns. In a recent paper, Adams and Ferreira (2006) point out that it is important to recognize that the CEO, who has career concerns, controls the information made available to the board. In addition to these features, we assume that directors are not indifferent to how the value of their human capital is perceived. The argument is that the compensation as well as opportunities for appointments to other boards depend on assessments of the value of the advisory services that the director provides to the CEO.<sup>3</sup> The CEO, in turn, recognizes that the board is composed of agents who have career concerns, and that these affect the way in which the board uses any information the CEO puts in its hands. This has the potential to affect not only firm value directly but also the CEO's incentives to provide information to the board, given the CEO's own career concerns. The board recognizes the CEO's incentives, and this interaction has a potentially significant effect on corporate governance.

To fix concepts, we consider a project selection setting in which there is a CEO and a board. The CEO is primarily responsible for generating project ideas, and her ability for doing this is unknown to others a priori. The board, in its advisory capacity, is responsible for evaluating the project ideas generated by the CEO, and the board's ability to do so is unknown to others. The CEO is also responsible for providing the board with the information necessary to evaluate project ideas, and we assume that the CEO can control the precision of the information received by the board. The CEO as well as the board have career concerns that interact and affect the behavior of both in economically significant ways, generating various inefficiencies. These inefficiencies are related to the precision of the information disclosed by the CEO to the board, the CEO's decision about board composition, and the board's project choice recommendations.

More specifically, we find that during an economic downturn, when the project outlook is bearish, the CEO is willing to disclose high-precision information to the board. Moreover, if the CEO can select the board, she selects the most talented board available. On the other hand, during an economic upturn, when the project outlook is bullish, the CEO is willing to disclose only low-precision

<sup>3</sup> Fama and Jensen (1983a) conjecture that "outside directors have incentives to develop reputations as experts in decision control" and that the directors "use their directorships to signal to internal and external markets for decision agents that they are experts."

information to the board, and she prefers a less talented board. Turning to the board, it sometimes overaccepts and sometimes overrejects projects. The CEO and board inefficiencies compound the effect of each other. The CEO's provision of low-precision information not only directly diminishes the board's ability to screen project ideas, but also exacerbates the project recommendation distortion of the board as career concerns are stronger when the board is faced with less precise information. The board's project recommendation policy is procyclical, as its career concerns cause it to overinvest during economic upturns and underinvest during economic downturns; it is this inefficiency that worsens when the board's information is less precise. Moreover, the CEO's selection of a less talented board also worsens the board's project recommendation inefficiency.

The specification that the board has career concerns that interact with the CEO's career concerns is critical for our results. If we assume that the board does not have career concerns as in previous studies in the literature, then the CEO in our model is always willing to disclose high-precision information to the board and prefers the most talented board available. The board always makes its project choice recommendation based on its signal and never overaccepts or overrejects projects. That is, all the inefficiencies that we encounter with economic upturns disappear.

Our analysis employs three key assumptions that we believe correspond closely with practice. First, we assume that an important role of the board is to act on the behalf of the shareholders as an advisor to the CEO. In our model, this role takes the form of screening the project ideas proposed by the CEO. As is well known, the other important role of the board is to monitor the CEO's performance and decide when she should be replaced (see, e.g., Lorsch and MacIver (1989), Hermalin and Weisbach (1998, 2003)). However, as Adams and Ferreira (2006) point out, boards infrequently hire or fire CEOs. Rather, the normal operation of the board involves advising the CEO about the deployment of the firm's resources (see also Monks and Minnow (1996)). Second, we assume that the CEO controls the information received by the board, which affects the board's judgment. In many of the scandals leading up to the enactment of SOX, information flowing from management to the board was heavily distorted, and in some cases even falsified. WorldCom categorized billions of dollars of operating costs in 2001 as capital expenditures, allowing it to report a \$662 million loss as a \$2.4 billion profit. While the internal controls mandated by SOX should address fraudulent information disclosure, there is little doubt that management still retains considerable discretion, within the constraints of truthful reporting, to manipulate the precision of the information that it provides the board.<sup>4</sup> Third, acknowledged as a practical reality (see Mace (1971), Demb and Neubauer (1992), and Hermalin and Weisbach (1998, 2003)), we assume that the CEO may be the one who chooses the members of the board of directors, even if they are completely independent in their actions. We further

<sup>4</sup> Concerns have already been raised that management's ability to manipulate the information it provides the board can reduce the effectiveness of the internal controls mandated by SOX. For example, Burns (2004) quotes former SEC chairman Richard Breeden as saying that he is "very concerned that this (the internal control system) will be turned into process rather than substance."

assume that not all directors are equally skilled at screening the ideas proposed by the CEO. This is consistent with the estimate that “no more than 40% of public company directors are familiar with the financial and accounting concepts they should be in order to be effective at their jobs.”<sup>5</sup>

Our analysis has numerous implications regarding the effectiveness of corporate governance. First, although much of the current policy debate on improving the effectiveness of corporate governance focuses on the “independence” of directors, our analysis suggests that the interaction of the CEO’s and board’s career concerns could render even independent directors ineffective. That is, our analysis highlights a second factor beyond independence that determines the board’s effectiveness. Second, although major securities regulations over the past 300 years have typically followed market crashes (Banner (1997)), our analysis suggests that it is during economic upturns that we need greater corporate governance vigilance. Third, our analysis suggests that the board selection is more efficient during economic downturns than during economic upturns. Fourth, we show that posterior assessments of the CEO’s ability, and hence the CEO’s compensation, depend on who evaluates the CEO and who evaluates the board. We find that posterior assessments of the CEO’s ability are maximized when the shareholders assess the CEO’s ability and the CEO assesses the board’s ability. This points toward another determinant of CEO compensation beyond board ownership structure examined empirically (e.g., Core, Holthausen, and Larcker (1999)). Finally, despite the fact that both the CEO and the board have career concerns and thus are not solely motivated to maximize firm value, we find somewhat surprisingly that shareholder welfare is not maximized by having the shareholders directly assess the abilities of the board and the CEO and hence their compensation and appointments.

It is useful to note that our analysis has no implications for corporate governance designed to address excessive perquisites consumption or outright stealing of corporate resources by executives (e.g., Shleifer and Vishny (1997)), nor do we examine problems associated with insider-dominated boards or board members who behave as if they are beholden to the CEO. In a sense, we view these as the most basic problems of corporate governance, and our analysis is not intended to add anything to the existing literature about how these problems should be resolved using incentive contracts, monitoring, and the appropriate carrots and sticks (see, e.g., Shleifer and Vishny (1997)). Rather, we focus on the more subtle problem of career concerns that is likely to be inherently more difficult to resolve since it is somewhat heroic to believe that appropriately designed incentive contracts can be used to make agents stop caring about how their human capital is valued (see Holmstrom (1999) for a discussion of this and related issues). That said, we discuss below how our results might be affected if we were to introduce the possibility of private control benefits for the CEO and corporate resource diversion for personal gain.

This paper is related to the literature on corporate governance and information disclosure. Starting with the seminal work of Berle and Means (1932)

<sup>5</sup> “Back to School” by Joann Lublin, *The Wall Street Journal* special report on corporate governance, June 21, 2004.

on the separation of ownership and control in modern corporations, the literature on corporate governance has focused, by and large, on agency problems between shareholders and managers. See, for example, the important early contributions of Coase (1937), Jensen and Meckling (1976), and Fama and Jensen (1983a,b); Shleifer and Vishny (1997) provide an excellent survey of corporate governance research from this agency perspective. We differ from this literature in terms of the source and nature of the inefficiencies associated with the separation of ownership and control, especially in terms of our focus on the interaction between the career concerns of the CEO and the board. There is also a related literature on information disclosure that examines issues such as firms' voluntary information disclosure incentives and optimal disclosure regulations (Admati and Pfleiderer (2000), Boot and Thakor (2001)), as well as information spillover effects (Bhattacharya and Chiesa (1995), Yosha (1995)). While this literature focuses on disclosure to shareholders, we focus on the internal communication from the CEO to the board, not all of which is for public consumption.

More closely related to our work are numerous recent papers on corporate governance, particularly those that take seriously the corporate governance practical realities that the CEO often selects the board and determines the information the board sees.<sup>6</sup> Hermalin and Weisbach (1998, 2003) and Hermalin (2005) recognize that the CEO appoints the board and focus on the related consequences. The key message is that the effectiveness of the board depends on its independence, which in turn depends on the CEO's bargaining power relative to the board. This bargaining power derives from the CEO's perceived ability relative to the potential successors. Hence, if the board is sufficiently independent, it should be effective in its role in hiring (firing) the CEO. In contrast, we focus on the advisory role of the board,<sup>7</sup> and show that even an independent board could be ineffective due to its career concerns. Perhaps most closely related to our paper is the interesting recent contribution of Adams and Ferreira (2006), which also recognizes that the CEO controls the information the board sees. The key result of that paper is that it may be optimal for the board to not monitor the CEO very intensely, thereby decreasing the probability that the board will fire the CEO and increasing the CEO's incentive to share her information with the board. Also related to our work is Almazan and Suarez (2003), which finds that CEO entrenchment and severance pay are substitutes for incentive compensation in motivating the CEO to expend effort and not block efficient replacement of the CEO. Both these papers imply that boards that are not highly effective in monitoring the CEO may sometimes be good for shareholders. In contrast, we introduce career concerns on the part of the board and show that the interaction of these career concerns with the CEO's career concerns determines when the board will be effective and when it will

<sup>6</sup> Recent attention has also been paid to director compensation. See, for example, Ryan and Wiggins (2004) and Yermack (2004).

<sup>7</sup> Hermalin and Weisbach (1998) admit that "one limitation of our model is that it focuses solely on the monitoring role of boards. The institutional literature emphasizes that boards also play important roles providing information and advice to management, and serving as a training ground for future CEOs. A richer model of boards should take into account these roles as well" (p. 112).

not, as well as the magnitude of the inefficiencies that result. That is, we focus on the behavioral incentives of independent boards and highlight the various inefficiencies related to information provision and investment policy that have not been discussed previously.

The rest of the paper is structured as follows. Section I describes our basic model. The analysis is contained in Section II. Section III discusses model robustness, key implications, and predictions of our analysis. Section IV concludes. All proofs are relegated to the Appendix.

## I. The Model

### A. *The Economic Environment*

We consider a two-period (three-date) model in which the firm may see a project at date  $t = 0$ . The arrival of the project is stochastic, with its probability depending on the ability of the CEO to generate project ideas, which we characterize in detail in Section I.B. If it arrives, the project can be one of two types, namely, good ( $G$ ) and bad ( $B$ ). The common prior belief is that with probability  $\theta \in [0, 1]$  the project is good and with probability  $[1 - \theta]$  the project is bad. Both types of projects require an investment  $I > 0$  at date  $t = 1$ . The payoff on the project is realized and observed by all at date  $t = 2$  only if the project is accepted. A good project generates a payoff  $M > I$  for sure, while a bad project always pays zero.

### B. *The Agents and Information Structure*

There are three agents: the CEO, the board, and the shareholders. The CEO's job is to come up with project ideas and the board's job is to monitor the quality of these ideas to decide which to accept on the shareholders' behalf. The evaluation by the board is independent of any direct influence by the CEO. We view the board as a monolithic agent in our analysis, so potential disagreement among board members is ruled out. We assume that no cost is incurred in the board's evaluation. The CEO's ability, denoted by  $\eta$ , is the probability that she generates a project idea. That is,

$$\begin{aligned} \Pr(\text{Idea generated}) &= \eta \in [0, 1], \\ \Pr(\text{Idea not generated}) &= 1 - \eta. \end{aligned} \tag{1}$$

Let  $g$  be the probability density of  $\eta$ , with support  $[0, 1]$ . Denote by  $\mathbf{E}[\eta] \equiv \bar{\eta}$  the expected value of  $\eta$  and by  $\mathbf{Var}[\eta] \equiv \sigma^2$  the variance of  $\eta$ . Although the probability distribution of  $\eta$  is common knowledge, only the CEO herself knows  $\eta$  a priori.<sup>8</sup>

<sup>8</sup> Our results remain unchanged if a priori the CEO does not know  $\eta$  either. This is because the CEO's perceived ability depends on the information available to the agent who assesses her ability (the assessor), and even if the CEO knows her ability a priori, she cannot credibly convey such information to the assessor, that is, the Revelation Principle fails for reasons similar to those identified in Persons (1997).

We also permit unobservable heterogeneity in the board’s ability. Specifically, the board can be either talented ( $T$ ) or untalented ( $U$ ). The difference between  $T$  and  $U$  lies in the precision with which the board is able to evaluate the CEO’s project proposals; this is described below. The common prior knowledge is that with probability  $\beta \in [0, 1]$  the board is talented. However, only the board itself knows its true type. If the board evaluates the CEO’s project idea, it generates a privately observed informative signal about project quality at date  $t = 1$ . This signal is  $s \in \{s_G, s_B\}$ , where  $s_G$  is a good signal and  $s_B$  is a bad signal. However, the precision of the signal can be partially controlled by the CEO. For simplicity, we assume that there are two states of nature of information flow,  $\omega \in \{L, H\}$ , where  $L$  stands for the state of “information flow with low precision” and  $H$  stands for the state of “information flow with high precision.” Although it is commonly known that  $\omega = L$  with probability  $q \in [0, 1]$  and  $\omega = H$  with probability  $[1 - q]$ , only the CEO observes the realization of  $\omega$ . In each state  $\omega$ , the CEO can choose a disclosure strategy  $\xi \in \{n, f\}$ , where  $n$  represents “no or low disclosure” and  $f$  represents “full or high disclosure.” This strategy choice is unobservable to all except the CEO herself. When the state  $L$  is realized, the CEO has little information to disclose and the precisions of the signals received by the talented and untalented boards are given by

$$\begin{aligned} \Pr(s_G | G, T, L \wedge \xi) &= \Pr(s_B | B, T, L \wedge \xi) = 1 - \varepsilon_{LT}, \forall \xi \in \{n, f\}, \\ \Pr(s_G | G, U, L \wedge \xi) &= \Pr(s_B | B, U, L \wedge \xi) = 1 - \varepsilon_{LU}, \forall \xi \in \{n, f\}, \end{aligned} \tag{2}$$

where  $0 < \varepsilon_{LT} < \varepsilon_{LU} < 0.5$ . That is, the choice of  $\xi$  does not matter when  $\omega = L$ . When the state  $H$  is realized, the CEO has more precise information to disclose but she can strategically manipulate the precision of the information actually disclosed to the board by choosing  $\xi$  to be  $n$  or  $f$ . If she discloses all the information she has by choosing  $\xi = f$ , the precisions of the signals received by the talented and untalented boards are respectively,

$$\begin{aligned} \Pr(s_G | G, T, H \wedge f) &= \Pr(s_B | B, T, H \wedge f) = 1, \\ \Pr(s_G | G, U, H \wedge f) &= \Pr(s_B | B, U, H \wedge f) = 1 - \varepsilon_{HU}, \end{aligned} \tag{3}$$

where  $0 < \varepsilon_{HU} < \varepsilon_{LU}$ . The CEO can elect, however, not to disclose all her information by choosing  $\xi = n$ , in which case the precisions of the signals received by the talented and untalented boards are as characterized in equation (2). That is,  $\Pr(s_G | G, i, H \wedge n) = 1 - \varepsilon_{Li}, \forall i \in \{T, U\}$ . This means that the CEO can pretend that state  $L$  occurred when in fact state  $H$  occurred. To summarize, when the state is  $H$  and the CEO chooses  $\xi = f$ , a talented board sees a perfect signal, whereas an untalented board sees a noisy signal that is more informative than the signal it sees in state  $L$  or in state  $H$  with the CEO choosing  $\xi = n$ . When the state is  $L$ , or the state is  $H$  but the CEO chooses  $\xi = n$ , a talented board’s signal is noisy, but it is still more informative than that of an untalented board. Thus, by pretending that state  $L$  has occurred, the CEO can reduce the precision of the information available to the talented board from a perfect to a noisy signal. This construction is meant to capture the idea that even under

the information disclosure mandated by SOX, the CEO retains the flexibility about how much is disclosed to the board. We further assume that the precision of the information flowing from the CEO to the board is seen by the board but not by the shareholders. Since the board cannot observe  $\omega$  or  $\xi$  separately, what it sees is  $\omega \wedge \xi \equiv \tau$ ; but the shareholders do not even observe  $\tau$ .

Given its signal and the precision of the signal as represented by  $\tau \in \{h, l\}$ , where  $h$  represents high precision and  $l$  represents low precision,<sup>9</sup> the board updates its belief about project quality using Bayes' rule. Thus, if  $s_G$  is observed and the information has high precision, the talented and untalented boards' posterior assessments about project quality are, respectively

$$\begin{aligned}\Pr(G | s_G, T, h) &= 1, \\ \Pr(G | s_G, U, h) &= \frac{(1 - \varepsilon_{HU})\theta}{(1 - \varepsilon_{HU})\theta + \varepsilon_{HU}(1 - \theta)}.\end{aligned}\tag{4}$$

If  $s_G$  is observed and the information has low precision, the talented and untalented boards' posterior assessments about project quality are, respectively

$$\begin{aligned}\Pr(G | s_G, T, l) &= \frac{(1 - \varepsilon_{LT})\theta}{(1 - \varepsilon_{LT})\theta + \varepsilon_{LT}(1 - \theta)}, \\ \Pr(G | s_G, U, l) &= \frac{(1 - \varepsilon_{LU})\theta}{(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)}.\end{aligned}\tag{5}$$

If  $s_B$  is observed and the information has high precision, their posterior assessments are, respectively

$$\begin{aligned}\Pr(G | s_B, T, h) &= 0, \\ \Pr(G | s_B, U, h) &= \frac{\varepsilon_{HU}\theta}{\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)}.\end{aligned}\tag{6}$$

Finally, if  $s_B$  is observed and the information has low precision, their posterior assessments are, respectively

$$\begin{aligned}\Pr(G | s_B, T, l) &= \frac{\varepsilon_{LT}\theta}{\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)}, \\ \Pr(G | s_B, U, l) &= \frac{\varepsilon_{LU}\theta}{\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)}.\end{aligned}\tag{7}$$

The board makes an accept (reject) recommendation once it has updated its belief about project quality. This recommendation is only observable to the CEO, and not to the shareholders. The CEO then follows the board's recommendation, which is assumed to be binding.

To recapitulate, the CEO privately knows her own ability to generate project ideas, and the board privately knows its own ability to monitor the quality of any idea generated by the CEO. The CEO privately observes both her

<sup>9</sup> Note  $H \wedge f = h$  and  $L \wedge f = L \wedge n = H \wedge n = l$ .

choice of information disclosure to the board ( $\xi$ ) as well as the state of nature ( $\omega$ ) that determines the impact of this disclosure on the precision of the board's information for any fixed ability of the board. The board only observes  $\tau \equiv \omega \wedge \xi$ , representing the joint effect of the disclosure and the state of nature. The interaction of  $\tau$  with the board's ability determines the actual precision of the board's information about the project. The board then makes a recommendation about the project that only the CEO and the board observe. Shareholders observe whether the firm invested in the project as well as its terminal payoff if there was investment.

### *C. Preferences and Career Concerns*

We assume universal risk neutrality. We assume that the CEO as well as the board care about firm value and also have career concerns in the sense that they care about others' perceptions of their abilities. To define preferences in this context, we need to identify who assesses the CEO's ability and who assesses the board's ability, since preferences are defined taking career concerns into account. We examine four cases of ability assessments. In the first case, the shareholders assess the CEO's ability to generate project ideas and the CEO assesses the board's ability to screen these ideas. In the second case, the board assesses the CEO's ability and the CEO assesses the board's ability. In the third case, the board assesses the CEO's ability and the shareholders assess the board's ability. In the fourth case, the shareholders assess both the CEO's ability and the board's ability.

In all these cases, the utility of the CEO or the board depends both on perceptions of ability and on firm value. The component that depends on perceptions of ability is meant to capture all of the effects of how one's ability is perceived. These would primarily include the compensation and retention (firing) decisions. Our assumption then is that if agent  $x$  is assessing agent  $y$ 's ability, then it is agent  $x$  that determines agent  $y$ 's compensation and retention (reappointment).

We use the term "career concerns" to refer to an agent's concern with how her ability is perceived, since it is this perception that impinges on how the agent's human capital is valued by the market. In Holmstrom (1999), because there is a labor market for the agent's services and perceptions of the agent's ability determine her wage, it is transparent why one would refer to a concern about these perceptions as career concerns. In the real world, as well as in our model, it is more difficult to pin down exactly whose perceptions are most relevant for determining the "market value" of the human capital of a CEO or a board member. For this reason, we consider numerous cases that correspond to the different ways in which an agent's ability could be perceived. The key is that these ability perceptions affect the *same* features in our model that they affect in Holmstrom's (1999) model, namely, the agent's (future) compensation and possibly the employment continuation (termination) decision. That is, regardless of whether the agent's compensation and tenure are determined in a competitive labor market based on the market's (evolving) perceptions of her

ability (as in Holmstrom (1999)) or whether these are determined via a negotiation process in which outcomes are predicated on ability perceptions (as in our model), the effect on the agent is the same. She internalizes the potential impact of her actions on perceptions of her ability and may consequently distort her actions to make these perceptions more favorable. It is this proclivity to influence ability perceptions through action choices that we view as the essence of career concerns, in a manner consistent with the recent literature (e.g., Prendergast and Stole (1996), Prendergast (1999), Milbourn, Shockey, and Thakor (2001)).

*Case 1: The Shareholders Assess the CEO's Ability and the CEO Assesses the Board's Ability*

This case is meant to represent a situation in which decisions regarding things that matter to the CEO—her compensation and whether she continues as CEO—are made directly by the shareholders, but decisions regarding the compensation and composition of the board are made by the CEO. This may correspond to a governance setting in which a few large and prominent shareholders call the shots, with the board's role primarily advisory in the sense that it focuses mainly on screening the CEO's project proposals. Moreover, the CEO's perceptions of the board's ability matter the most for determining a board member's compensation and selection or reappointment.

The shareholders update their belief about the CEO's ability using Bayes' rule at both dates  $t = 1$  and  $t = 2$  when they observe the availability of the project. The shareholders' assessment of the CEO's ability depends only on the availability of the project, not its quality. If a project is not accepted at date  $t = 1$ , the shareholders cannot tell whether a project idea was generated at date  $t = 0$  by the CEO and killed at date  $t = 1$  by the board, or whether no idea was generated by the CEO in the first place.

The CEO's utility depends on the shareholders' posterior assessment of her ability, as well as the project payoff at date  $t = 2$ . That is,

$$U_C = \kappa_C \times (\mathbf{E}_0[\mathbf{E}_1(\eta | \mathcal{F}_{S1})]) + \delta_C \times \mathbf{E}_0[\mathbf{E}_2(\eta | \mathcal{F}_{S2})] + \pi, \quad (8)$$

where  $\kappa_C > 0$  is the weight the CEO attaches to her career concerns relative to firm value,  $\delta_C > 0$  is the CEO's intertemporal weighting factor attached to her perceived ability at date  $t = 2$  relative to that at date  $t = 1$ ,  $\pi$  is the expected project payoff, and  $\mathcal{F}_{S1}$  and  $\mathcal{F}_{S2}$  are the information sets of the shareholders at dates  $t = 1$  and  $t = 2$ , respectively. The set  $\mathcal{F}_{S1} = \{g(\eta), YES_S, NO_S\}$ , where  $g(\eta)$  is the shareholders' prior belief about the distribution of the CEO's ability,  $YES_S$  means that the shareholders see that the project is implemented (which implies that the project arrived and it was accepted by the board), and  $NO_S$  means that no project is visible to the shareholders (either because the project did not arrive or it arrived but was rejected). The set  $\mathcal{F}_{S2} = \{g(\eta), M, zero, NO_S\}$ , where  $M$  means that the project generated a payoff of  $M$  (good project) and  $zero$  means that the project generated a payoff of zero (bad project) at date  $t = 2$ . Since the CEO's ability depends only on project availability, the project

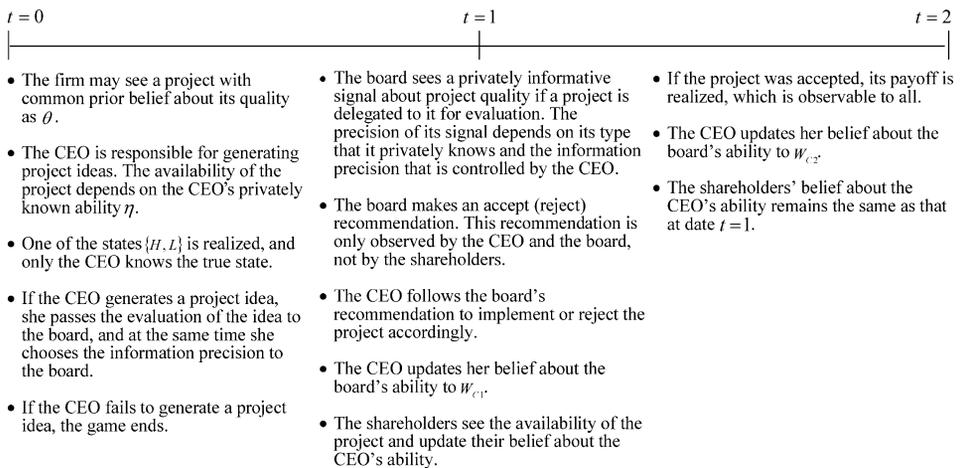
payoff information at date  $t = 2$  provides no further information to the shareholders regarding the CEO's ability. Thus, the shareholders' assessment about the CEO's ability at date  $t = 2$  is the same as that at date  $t = 1$ , that is,  $\mathbf{E}_0[\mathbf{E}_1(\eta | \mathcal{F}_{S1})] = \mathbf{E}_0[\mathbf{E}_2(\eta | \mathcal{F}_{S2})]$ . For concreteness, we denote  $\alpha_C \equiv \kappa_C[1 + \delta_C]$ , and express the CEO's utility hereafter as

$$U_C = \alpha_C \times \mathbf{E}_0[\mathbf{E}_1(\eta | \mathcal{F}_{S1})] + \pi. \tag{9}$$

The board's utility is assumed to be

$$U_B = \alpha_B \times [W_{C1} + \delta_B W_{C2}] + \pi, \tag{10}$$

where  $W_{Ct}$  is the board's reputational payoff at date  $t \in \{1, 2\}$ ,  $\delta_B > 0$  is its intertemporal weighting factor attached to  $W_{C2}$  relative to  $W_{C1}$ , and  $\alpha_B > 0$  is the weight the board attaches to its career concerns. We let  $W_{Ct} = \Pr(T_t | \mathcal{G}_{Ct})$ . The conditional probability (the probability that the board is talented) is the CEO's posterior assessment about the board's ability and  $\mathcal{G}_{Ct}$  is the CEO's information set at date  $t$ . At date  $t = 1$ , the CEO updates her belief of the board's ability to  $W_{C1}$  based on her prior belief about project quality ( $\theta$ ), her prior belief about the board's type ( $\beta$ ), and the board's acceptance (rejection) recommendation, assuming that the project idea is available in the first place. At date  $t = 2$ , the CEO observes the project payoff if the project is accepted, and updates her belief about the board's ability. Since the terminal payoff on a rejected project is not observable, the CEO's assessment of the board's ability will not be updated further from date  $t = 1$  to date  $t = 2$  if the project is rejected by the board at date  $t = 1$ . That is, with a rejection recommendation,  $W_{C1} = W_{C2}$ . The board makes its recommendation to maximize (10). Figure 1 summarizes the sequence of events.



**Figure 1. Sequence of events (the shareholders assess the CEO's ability and the CEO assesses the board's ability).**

*Case 2: The Board Assesses the CEO's Ability and the CEO Assesses the Board's Ability*

This case is meant to represent a situation that is more common than Case 1, given the corporate governance literature and actual practice. The board, acting as a delegated monitor on behalf of the shareholders, assesses the CEO's ability. Hence, it is this assessment that affects the CEO's compensation and retention. Further, consistent with what we see in practice, the CEO evaluates the board.

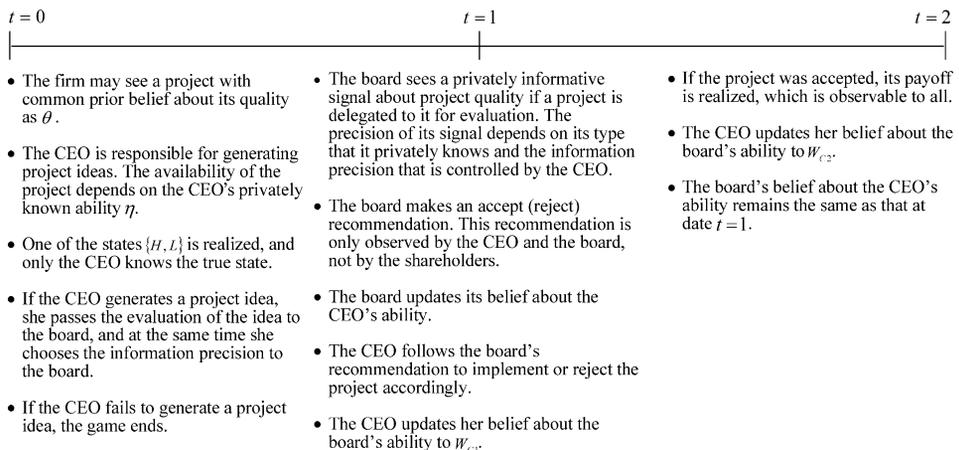
The board can unambiguously infer whether the CEO generated a project idea at date  $t = 1$  because the project, if available, must be evaluated by the board. The CEO's utility is

$$U_C = \alpha_C \times \mathbf{E}_0[\mathbf{E}_1(\eta | \mathcal{F}_{B1})] + \pi, \quad (11)$$

where  $\mathcal{F}_{B1} = \{g(\eta), YES_B, NO_B\}$  is the board's information set at date  $t = 1$ ;  $YES_B$  means that a project is available for evaluation and  $NO_B$  means that no project is available for evaluation. The board's utility is the same as that in (10). Figure 2 depicts the sequence of events.

*Case 3: The Board Assesses the CEO's Ability and the Shareholders Assess the Board's Ability*

This case is similar to Case 2, except that we now assume that decisions regarding the board's compensation and appointment are made directly by the shareholders. This may be less common in practice than the CEO appointing the board, but may be encountered in situations involving large, influential, and active shareholders who directly and indirectly control most board appointments.



**Figure 2. Sequence of events (the board assesses the CEO's ability and the CEO assesses the board's ability).**

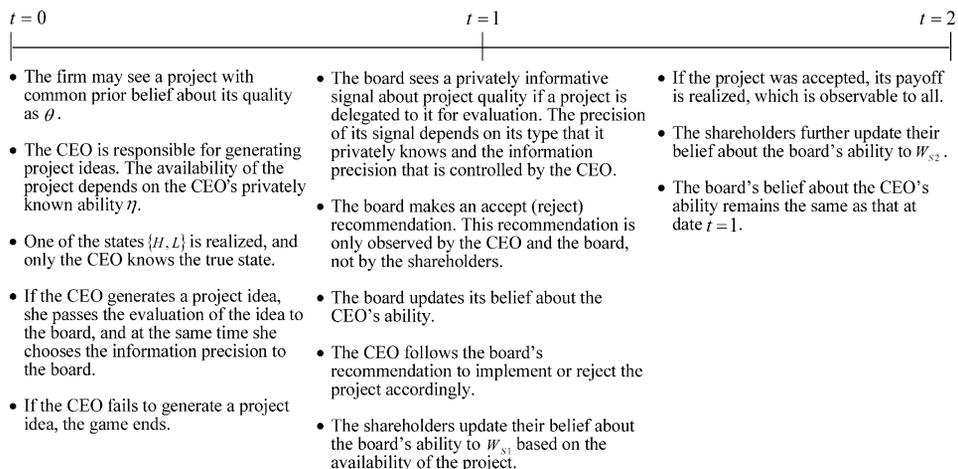
The board’s utility function is

$$U_B = \alpha_B \times [W_{S1} + \delta_B W_{S2}] + \pi, \tag{12}$$

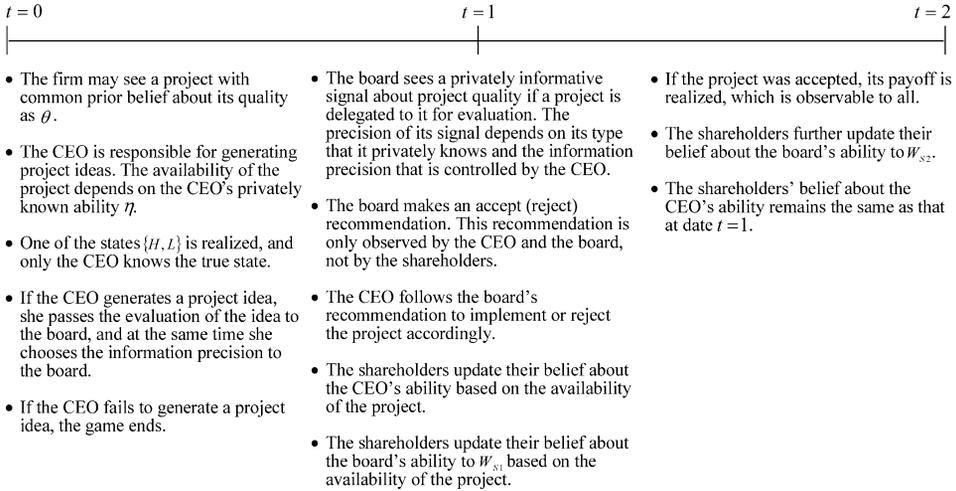
where  $W_{St} = \Pr(T_t | \mathcal{G}_{St})$ . Again, the conditional probability is the shareholders’ posterior assessment about the board’s ability and  $\mathcal{G}_{St}$  is the shareholders’ information set at date  $t$ . At date  $t = 1$ , the shareholders’ information set  $\mathcal{G}_{S1} = \{g(\eta), YES_S, NO_S\}$ . If  $YES_S$ , the shareholders understand that the CEO generated a project idea, and it was accepted by the board. If  $NO_S$ , the shareholders cannot distinguish between the two possibilities that either the CEO failed to generate a project idea or an idea was generated but rejected after evaluation. The shareholders update their belief about the board’s ability to  $W_{S1}$  based on  $\mathcal{G}_{S1}$ . At date  $t = 2$ , the shareholders’ information set  $\mathcal{G}_{S2} = \{g(\eta), M, zero, NO_S\}$ . The shareholders further update their belief about the board’s ability to  $W_{S2}$ . The CEO’s utility is the same as (11). The sequence of events is depicted in Figure 3.

*Case 4: The Shareholders Assess Both the CEO’s Ability and the Board’s Ability*

This case is likely to represent situations in which ownership is highly concentrated and owners are active in corporate governance. We include this case for completeness and because analyzing it can help determine whether the simultaneous resolution of agency problems between the CEO and the shareholders (as manifested in the CEO appointing directors who are either weak (incapable) or not independent) on the one hand and between the board and the shareholders (as manifested in the board not effectively screening the project ideas proposed by the CEO) on the other hand can eliminate all inefficiencies in corporate decisions.



**Figure 3. Sequence of events (the board assesses the CEO’s ability and the shareholders assess the board’s ability).**



**Figure 4. Sequence of events (the shareholders assess both the CEO's ability and the board's ability).**

At date  $t = 1$ , the shareholders assess both the CEO's ability and the board's ability based on the availability of the project. At date  $t = 2$ , the shareholders further update their belief about the board's ability based on the observed project payoff. The CEO's and the board's utilities are the same as in (9) and (12), respectively. The sequence of events is depicted in Figure 4.

## II. Equilibrium Analysis

### A. First-Best Analysis: Neither the CEO Nor the Board Has Career Concerns

In a first-best world, neither the CEO nor the board has career concerns because the CEO's ability to generate project ideas and the board's information signal as well as its ability to screen project ideas are common knowledge. In the first best, the CEO always prefers that the board's information be of high precision. This is because the precision of the board's information does not alter perceptions of the CEO's ability (since this is common knowledge), and the choice of a high precision reduces errors in the board's project recommendations, thereby increasing the expected project payoff.

### B. Second-Best Case 1: The Shareholders Assess the CEO's Ability and the CEO Assesses the Board's Ability

We proceed in four steps. First, we analyze the board's equilibrium recommendation strategies in both states of information precision,  $\tau \in \{h, l\}$ . Then we characterize the shareholders' equilibrium beliefs about the CEO's ability when the CEO's career concerns interact with the board's career concerns. Third, we examine the CEO's equilibrium disclosure strategy,  $\xi$ . Finally, we study the CEO's board selection strategy.

B.1. The Board's Equilibrium Recommendation Strategy

We assume here that the project idea is available for sure, that is, we assume away the CEO's career concerns in this step of the analysis and focus on the board's career concerns.

DEFINITION 1 (The Bayesian Perfect Nash Equilibrium):

1. *Knowing the information precision  $\tau$  and privately informed about its own ability, the board decides whether to recommend acceptance or rejection of the project based on its private signal  $s \in \{s_G, s_B\}$  to maximize (10).*
2. *The CEO follows the board's recommendation to either accept or reject the project and updates her prior belief about the board's ability using the information set  $\mathcal{G}_{C1}$ . The reputation payoff  $W_{C1}$  is then determined.*
3. *After observing the payoff on an accepted project at date  $t = 2$ , the CEO again updates her belief about the board's ability using the information set  $\mathcal{G}_{C2}$ . The reputation payoff  $W_{C2}$  is then determined.*

The following proposition characterizes the board's equilibrium recommendation strategy. For expositional ease, define for case number  $c \in \{1, 2, 3, 4\}$  and information precision  $\tau \in \{h, l\}$  the following three sets of states:  $\Theta_A^{(c)}(\tau) \equiv [0, \theta_{\tau-}^{(c)})$ ,  $\Theta_B^{(c)}(\tau) \equiv [\theta_{\tau-}^{(c)}, \theta_{\tau+}^{(c)}]$ , and  $\Theta_C^{(c)} \equiv (\theta_{\tau+}^{(c)}, 1]$ . In the analysis that follows, whenever the board recommends in accordance with its signal—acceptance when  $s = s_G$  and rejection when  $s = s_B$ —we refer to the recommendation as a “truthful recommendation strategy.” If the board recommends something other than what its signal indicates, we refer to it as a “nontruthful recommendation strategy.”

PROPOSITION 1: *The following strategies and beliefs constitute, for each of the two information precisions  $\tau \in \{h, l\}$ , a unique Bayesian Perfect Nash Equilibrium.*

1. *A talented board always follows a truthful recommendation strategy for all precisions.*
2. *For an untalented board, for each precision  $\tau$ , there is a region of intermediate prior beliefs,  $\Theta_B^{(1)}(\tau)$ , such that whenever the prior probability that the project is good lies in this region, the untalented board follows a truthful recommendation strategy. If prior beliefs lie outside the truth-telling region, the untalented board behaves as follows:*
  - *For low prior probabilities that the project is good ( $\theta \in \Theta_A^{(1)}(\tau)$ ), the untalented board overrejects projects, recommending rejection whenever  $s = s_B$  is observed, and recommending rejection with probability  $\gamma_{\tau R}^{(1)}$  and acceptance with probability  $[1 - \gamma_{\tau R}^{(1)}]$ , whenever  $s = s_G$  is observed.*
  - *For high prior probabilities that the project is good ( $\theta \in \Theta_C^{(1)}(\tau)$ ), the untalented board overaccepts projects, recommending acceptance whenever  $s = s_G$  is observed, and recommending acceptance with probability  $\gamma_{\tau A}^{(1)}$  and rejection with probability  $[1 - \gamma_{\tau A}^{(1)}]$ , whenever  $s = s_B$  is observed.*

3. Taking the equilibrium strategy of the board as given, the CEO updates her beliefs about the board's ability using Bayes' rule. There are no out-of-equilibrium moves by any board type.

An untalented board's truth-telling region with low-precision information  $\tau = l$  lies strictly within its truth-telling region with high-precision information  $\tau = h$ , that is,  $\Theta_B^{(1)}(l) \subset \Theta_B^{(1)}(h)$ .

The result is readily interpretable: Only the untalented board distorts its project choice recommendations. When project quality is relatively low, as represented by relatively low values of prior beliefs about the probability of a good project, an untalented board is more likely than a talented board to see a good signal, whether the information precision ( $\tau$ ) is high or low. Since a talented board always recommends acceptance whenever the signal is good and recommends rejection whenever the signal is bad, the talented board is prone to reject more than the untalented board. To mimic the talented board, the untalented board sometimes rejects the project even when it sees a good signal. When project quality is relatively high, an untalented board is more likely than a talented board to see a bad signal, regardless of whether the information precision ( $\tau$ ) is high or low. Since a talented board again recommends honestly based on its signal, it is prone to accept more than the untalented board; an untalented board mimics by sometimes accepting the project even when it sees a bad signal. Moreover, the untalented board's truth-telling region is narrower when the information precision is low than when it is high, because in the former case, an untalented board's signal is less precise than in the later case.

This proposition suggests that the board's project recommendation behavior will tend to make the firm's investments procyclical. During economic upturns,  $\theta$  is likely to be high due to an abundance of good projects, and the board will overinvest on average. During economic downturns,  $\theta$  is likely to be low due to a paucity of good projects, and the board will underinvest on average.

### B.2. The Shareholders' Equilibrium Beliefs about the CEO's Ability

We now assume that the project idea is not always available, so that the CEO also has career concerns and these interact with the board's career concerns. We start by characterizing the shareholders' equilibrium beliefs about the CEO's ability. The shareholders observe whether the project is implemented. However, the project payoff does not matter in the shareholders' revision of the CEO's ability because that ability is independent of the project payoff. There are two possible equilibrium outcomes,  $YES_S$  (project is implemented) and  $NO_S$  (project is not implemented), for each of the five regions of prior beliefs about project quality:  $\Theta_{L1}^{(1)} \equiv [0, \theta_{h-}^{(1)})$ ,  $\Theta_{L2}^{(1)} \equiv [\theta_{h-}^{(1)}, \theta_{l-}^{(1)})$ ,  $\Theta_M^{(1)} \equiv [\theta_{l-}^{(1)}, \theta_{l+}^{(1)}]$ ,  $\Theta_{H1}^{(1)} \equiv (\theta_{l+}^{(1)}, \theta_{h+}^{(1)})$ , and  $\Theta_{H2}^{(1)} \equiv (\theta_{h+}^{(1)}, 1]$ . Moreover, let  $\Theta_L^{(1)} \equiv \Theta_{L1}^{(1)} \cup \Theta_{L2}^{(1)}$  and  $\Theta_H^{(1)} \equiv \Theta_{H1}^{(1)} \cup \Theta_{H2}^{(1)}$ . This allows us to work for the most part with just three sets of megastates,  $\Theta_L^{(1)}$ ,  $\Theta_M^{(1)}$ , and  $\Theta_H^{(1)}$ , even though  $\theta$  itself lies in a continuum.

The shareholders' belief about the CEO's ability also depends on their belief about the CEO's disclosure strategy  $\xi$  for the various regions of  $\theta$ . The shareholders understand that  $\omega = L$  with probability  $q$ . Thus,  $\tau = l$  no matter what disclosure strategy the CEO chooses. Moreover,  $\omega = H$  with probability  $[1 - q]$ , in which case the CEO's disclosure strategy  $\xi$  determines the information precision  $\tau$ .

**DEFINITION 2** (The Bayesian Perfect Nash Equilibrium): *A Bayesian Perfect Nash Equilibrium consists of the CEO's choices of disclosure  $\xi \in \{n, f\}$  for different regions of prior beliefs about project quality ( $\theta$ ), and the shareholders' beliefs about the CEO's equilibrium choices such that:*

1. *The CEO's equilibrium choices of disclosure maximize her expected utility (specified in (9)). If  $\theta \in \Theta_L^{(1)} \cup \Theta_M^{(1)}$ , the CEO chooses  $\xi = f$ ; if  $\theta \in \Theta_H^{(1)}$ , the CEO chooses  $\xi = n$ .*
2. *The shareholders update their belief about the CEO's ability according to Bayes' rule and their belief about the CEO's choice of disclosure  $\xi$  coincides with the CEO's equilibrium choice. There is no out-of-equilibrium move by the CEO.*

We first characterize the shareholders' equilibrium belief about the CEO's ability. For each of the three sets of states,  $\Theta_L^{(1)}$ ,  $\Theta_M^{(1)}$ , and  $\Theta_H^{(1)}$ , there are two possible equilibrium outcomes,  $YES_S$  and  $NO_S$ . Lemma 1 shows the shareholders' posterior beliefs about the CEO's ability that correspond to these cases.

**LEMMA 1:** *When the project is implemented, that is,  $YES_S$ , the shareholders' equilibrium belief about the CEO's ability is*

$$\mathbf{E}[\eta | YES_S, \theta \in \Theta_L^{(1)} \cup \Theta_M^{(1)} \cup \Theta_H^{(1)}] = \bar{\eta} + \frac{\sigma^2}{\bar{\eta}}. \tag{13}$$

*When the project is not implemented, that is,  $NO_S$ , the shareholders' equilibrium beliefs about the CEO's ability that correspond to the three different sets of states are*

$$\mathbf{E}[\eta | NO_S, \theta \in \Theta_j^{(1)}] = \bar{\eta} - \frac{\sigma^2[1 - \Psi_j^{(1)}]}{1 - \bar{\eta}[1 - \Psi_j^{(1)}]}, \tag{14}$$

where  $j \in \{L, M, H\}$  and  $\Psi_j^{(1)}$  is the probability that an available project idea is rejected by the board for  $\theta \in \Theta_j^{(1)}$ . The probability  $\Psi_j^{(1)}$  varies across the different sets of states, as shown in the proof of this lemma in the Appendix. Moreover,  $\mathbf{E}[\eta | NO_S, \theta]$  is a continuously decreasing function of  $\theta$ .

This lemma can be understood as follows. First, when a project is implemented ( $YES_S$ ), the shareholders' posterior belief about the CEO's ability is always adjusted upward from its prior  $\bar{\eta}$  to the same level  $[\bar{\eta} + \frac{\sigma^2}{\bar{\eta}}]$ , regardless of whether the CEO's information precision ( $\tau$ ) is high or low and regardless of  $\theta$ .

The reason is that as long as the shareholders see the project being implemented, they can unambiguously infer that the CEO generated a project idea. Second, when no project is visible to the shareholders ( $NO_S$ ), the posterior beliefs of the shareholders about the CEO's ability are continuously decreasing in the prior belief about project quality. The reason is as follows. Conditional on the CEO generating an idea, the project is more likely to be rejected when  $\theta$  is low than when  $\theta$  is high because of two facts: (i) When  $\theta$  is lower, both the talented and untalented boards are more likely to see a bad signal than a good signal, and hence an available project is more likely to be rejected after evaluation, and (ii) when  $\theta$  is sufficiently low, the untalented board overrejects projects, whereas when  $\theta$  is sufficiently high, it overaccepts projects. Consequently, faced with the event that no project was implemented, the possibility that this was due to a project idea generated by the CEO that was rejected by the board is assigned greater weight by the shareholders when  $\theta$  is low than when  $\theta$  is high.<sup>10</sup> This is why the CEO's posterior perceived ability is higher when the prior belief of project quality is lower.

### *B.3. The CEO's Equilibrium Disclosure Strategy*

Having characterized the board's equilibrium recommendation strategy and the shareholders' equilibrium beliefs about the CEO's ability, we are ready to examine the CEO's equilibrium information disclosure strategy  $\xi$ .

We present our main result in the following proposition.

**PROPOSITION 2:** *Suppose the untalented board's career concerns are sufficiently strong and its reputational gain from misrepresentation is sufficiently high. Suppose further the CEO's career concerns are sufficiently strong. Then, under certain parametric conditions,<sup>11</sup> the CEO's equilibrium choices of disclosure  $\xi$  for different prior beliefs of project quality are as follows:*

1. *For relatively low prior beliefs of project quality ( $\theta \in \Theta_L^{(1)}$ ) and intermediate prior beliefs ( $\theta \in \Theta_M^{(1)}$ ), the CEO prefers full information disclosure ( $\xi = f$ ).*
2. *For relatively high prior beliefs of project quality ( $\theta \in \Theta_H^{(1)}$ ), the CEO prefers low information disclosure ( $\xi = n$ ).*

This proposition is striking. Conventional "wisdom" suggests that when the firm is doing poorly and the prior belief about project quality is low, the CEO is likely to be unwilling to disclose a lot of information to the board, whereas when the firm is doing well and the prior belief about project quality is high, the CEO is likely to be more forthcoming. The intuition for this is rooted in the inclination of CEOs to sweep things under the rug during bad times (e.g., Boot and Thakor (1993)) and dribble out bad news during good times, that is, when the impact of

<sup>10</sup> The other possibility that has positive weight in the shareholders' assessment is that the CEO did not generate a project idea in the first place.

<sup>11</sup> The sufficient parametric conditions are stated in the Appendix.

bad news can be minimized by mixing it in with good news. Proposition 2 turns this intuition on its head. The idea is as follows. When the prior belief of project quality is low, an untalented board overrejects projects, and it overrejects more projects when its information has low precision than when it has high precision. When the prior belief of project quality is high, an untalented board overaccepts projects, and it overaccepts more projects when its information has low precision than when it has high precision. Driven by her career concerns, the CEO always prefers project acceptance being recommended by the board. Thus, she prefers to disclose fully and provide high-precision information to the board when  $\theta$  is low, and to opt for less disclosure and hence the provision of low-precision information to the board when  $\theta$  is high.

#### *B.4. Board Selection*

Thus far we have not addressed the question: How does the board get selected? As we discuss in the Introduction, CEOs have considerable influence over the selection of their boards in practice, especially in the U.S. In keeping with this practice, we assume that the CEO selects the board. This is also consistent with the case we are examining, in which it is the CEO who assesses the board's ability. The question we are interested in is whether the CEO would prefer a talented or an untalented board, *a priori* she had some mechanism to distinguish among potential board members, even noisily. Formally, suppose that the CEO can distinguish between two groups of boards, group *S* (strong group rich in talented board members) and group *W* (weak group rich in untalented board members), where the probability of randomly drawing a talented board from the pool is higher for group *S* than for group *W*, that is,  $\beta_S > \beta_W$ . The shareholders, however, cannot distinguish between the two groups and they do not know that the CEO can distinguish between the two groups. Thus, the shareholders' prior belief about the probability that a board is talented is  $\beta_\Delta \in (\beta_W, \beta_S)$ , where  $\beta_\Delta$  denotes the proportion of talented boards for the entire group  $\Delta$  (group *S* + group *W*). The following proposition states the CEO's preference for board selection.

**PROPOSITION 3:** *When the CEO's career concerns are sufficiently strong, she prefers to select a board from group S when the prior belief of project quality is relatively low, and she prefers to select a board from group W when the prior belief of project quality is relatively high.*

This result may also seem surprising. It asserts that the CEO would *deliberately* prefer a weak board to a strong board when the firm is doing well. Such a board selection preference would further exacerbate the inefficiency arising from the interaction between the career concerns of the CEO and the board. Moreover, since the CEO's preference for a weak board occurs only when the firm is doing well, it implies that *corporate governance is weaker during economic upturns than during economic downturns*. This prediction is consistent with the rash of corporate governance failures that have come to light following

the bull market run of the 1990s, as well as the spectacular failures of corporate governance in the 1980s in the thrift industry following decades of profitability.

One should interpret the prediction of Proposition 3 with caution. The proposition does not imply that CEOs will change their boards in every phase of the business cycle; indeed, we typically do not observe such volatility in board composition. A practical impediment to such volatility may be institutional rigidities in director turnover, such as predetermined terms that directors are serving, major shareholder groups being represented by certain directors over whose appointments the CEO has little control, and so on. We do not model these rigidities. Hence, Proposition 3 should be interpreted as implying that whenever the CEO has an *opportunity* to appoint a director, she prefers a weak director when the business outlook is good and prefers a strong director when the business outlook is bad.

### C. Second-Best Case 2: The Board Assesses the CEO's Ability and the CEO Assesses the Board's Ability

#### C.1. The Board's Equilibrium Recommendation Strategy

We first conjecture that the CEO always prefers (at least weakly) full information disclosure ( $\xi = f$ ), and strictly prefers this disclosure when  $\omega = H$ , in this case in which her ability is assessed by the board. We verify this conjecture below. The board anticipates the CEO's preferences, and its equilibrium recommendation strategy is similar to that specified by Proposition 1. That is, the talented board always follows a truthful recommendation strategy, while the untalented board follows a truthful recommendation strategy for intermediate prior beliefs of project quality, overrejects for low prior beliefs, and overaccepts for high prior beliefs. However, since the CEO prefers low information disclosure for high prior beliefs of project quality in Case 1 (Proposition 2) and always prefers full disclosure in Case 2, the untalented board's signal is on average more precise in Case 2 than in Case 1 for high prior beliefs of project quality. Thus, one would expect that the untalented board distorts less in Case 2 than in Case 1. Formally, this is given by the following lemma:

LEMMA 2: *For high prior beliefs of project quality, the untalented board overaccepts less in Case 2 than in Case 1.*

#### C.2. The Board's Equilibrium Beliefs about the CEO's Ability

Since the CEO has to let the board evaluate the project, the board knows unambiguously whether the CEO generated a project idea. If a project is available for evaluation, that is,  $YES_B$ , the board's posterior belief about the CEO's ability is  $[\bar{\eta} + \frac{\sigma^2}{\eta}]$ ; if no project is available for evaluation, that is,  $NO_B$ , the board's posterior belief about the CEO's ability is  $[\bar{\eta} - \frac{\sigma^2}{1-\eta}]$ . Note that the board's equilibrium belief about the CEO's ability if it has no project to evaluate (Case 2) is always lower than the shareholders' equilibrium belief about the CEO's ability if they do not see project implementation (Case 1). This is because in Case 1

if there is no project being implemented, the shareholders always assign some weight to the possibility that a project idea generated by the CEO was rejected by the board, whereas in Case 2 if the board has no project to evaluate, it unambiguously concludes that the CEO did not generate a project idea.

### *C.3. The CEO's Equilibrium Disclosure Strategy*

In Case 1, the CEO had an incentive to manipulate the precision of the information available to the board through her choice of disclosure strategy because the CEO cared about how the *shareholders* perceived her ability. Things change when we assume instead that it is the board's perception of the CEO's ability that the CEO cares about, because the board knows more than the shareholders do. Since the board can unambiguously tell whether the CEO generated a project idea, the CEO's choice of disclosure does not influence the board's perception of her ability. Moreover, greater disclosure by the CEO increases the board's signal precision and hence the expected project payoff. Thus, the CEO always prefers to maximize the precision of the board's information through her disclosure choice. Furthermore, how the CEO's ability is perceived is independent of the board's ability, so the CEO's preference over the board's type is driven solely by considerations of firm value. Because the signal precision of a talented board is strictly greater than that of an untalented board, the CEO strictly prefers the board to be talented in this case. Formally, we have the following result:

PROPOSITION 4: *If the CEO's ability is assessed by the board, she prefers full information disclosure  $\xi = f$ , and she prefers to select a board from group S.*

## *D. Second-Best Case 3: The Board Assesses the CEO's Ability and the Shareholders Assess the Board's Ability*

### *D.1. The Board's Equilibrium Recommendation Strategy*

Recalling the set notation,  $\Theta_j^{(c)}(\tau)$ ,  $j \in \{A, B, C\}$ , introduced in Section II.B, the board's equilibrium recommendation strategy is given below.

PROPOSITION 5: *In the case in which the board assesses the CEO's ability and the shareholders assess the board's ability, a talented board always follows a truthful recommendation strategy. The untalented board follows a truthful recommendation strategy for intermediate prior beliefs that the project is good ( $\theta \in \Theta_B^{(3)}(\tau)$ ), and a nontruthful recommendation strategy otherwise that is similar to that in Proposition 1; it overrejects for low priors ( $\theta \in \Theta_A^{(3)}(\tau)$ ), and overaccepts for high priors ( $\theta \in \Theta_C^{(3)}(\tau)$ ). Moreover, compared to the case in which the CEO assesses the board's ability (Proposition 1), the untalented board distorts more with low priors and distorts less with high priors, that is, with low priors the rejection probability conditional on  $s = s_G$  is higher here than in Proposition 1, and with high priors the acceptance probability with  $s = s_B$  is lower here than in Proposition 1.*

The intuition is as follows. When  $\theta$  is relatively low, a priori a talented board is expected to reject more than accept. Thus, an untalented board attempts to masquerade as a talented board by sometimes recommending rejection when its signal is good. When it is the CEO who assesses the board's ability, the only state in which the board's recommendation matters for ability assessment is that in which a project is available. Clearly, the CEO can distinguish between the state in which no project idea was generated by her and the state in which an idea was generated but rejected by the board. The shareholders, in contrast, cannot distinguish between these two states. Hence, by being able to condition on the state in which the board actually received an idea to evaluate, the CEO expects a lower probability of no project implementation given a talented board than do the shareholders, who cannot condition in that manner. That is, a priori the shareholders attach a greater difference (than the CEO does) between the talented and untalented boards in terms of the probability with which no project investment will occur with the two types of boards when  $\theta$  is low. Consequently, because shareholders expect a talented board is more likely to reject a project when  $\theta$  is low, accepting a project is reputationally more costly for the untalented board when  $\theta$  is low and the shareholders are assessing its ability than when the CEO is assessing its ability. This leads to greater project recommendation distortions and underinvestment with low  $\theta$  when the shareholders are assessing the board's ability.

This effect turns out to be beneficial for the shareholders when  $\theta$  is high. In this case, the inefficiency in the untalented board's recommendation arises from its inclination to overaccept projects because shareholders expect a talented board to be more likely to accept a project when  $\theta$  is high, and the untalented board seeks to enhance its reputation by mimicking its talented counterpart. The difference between the case in which the CEO assesses the board's ability and the case in which the shareholders assess the board's ability is that in the former case, the CEO expects a higher probability of project implementation with a talented board than do the shareholders when they assess the board's ability. This causes the shareholders to attach a priori a smaller difference (than the CEO does) between the talented and untalented boards in terms of the probability with which project investment will occur when  $\theta$  is high. Consequently, the untalented board needs to overaccept less to masquerade as a talented board when the shareholders assess the board's ability than when the CEO assesses the board's ability. That is, shifting from the CEO assessing the board's ability to the shareholders assessing it attenuates the untalented board's overacceptance inefficiency in the case of high  $\theta$ . This contrasts with the worsening of the underinvestment inefficiency with low  $\theta$  when the shareholders assess the board.

#### *D.2. The Board's Equilibrium Beliefs about the CEO's Ability*

The board's equilibrium beliefs about the CEO's ability are the same as in Case 2. That is, if the board has a project to evaluate, its equilibrium belief about the CEO's ability is  $[\bar{\eta} + \frac{\sigma^2}{\bar{\eta}}]$ ; if the board has no project to evaluate, its equilibrium belief about the CEO's ability is  $[\bar{\eta} - \frac{\sigma^2}{1-\bar{\eta}}]$ .

D.3. The CEO's Equilibrium Disclosure Strategy

Since the board now is assumed to assess the CEO's ability, we are back to Case 2 as far as the CEO's behavior is concerned. The CEO's equilibrium disclosure strategy and preference over board type are described in Proposition 4.

E. Second-Best Case 4: The Shareholders Assess Both the CEO's Ability and the Board's Ability

The final case we examine involves analyzing the board's project recommendation strategy and the CEO's information disclosure strategy when the shareholders assess the abilities of both the board and the CEO.

E.1. The Board's Equilibrium Recommendation Strategy

Since the shareholders possess the least information, we should expect the reporting incentives of the CEO as well as the recommendation incentives of the board to be affected relative to the previous cases. As before, the talented board always follows a truthful recommendation strategy, whereas the untalented board follows a truthful recommendation strategy for intermediate project quality prior beliefs ( $\theta \in \Theta_B^{(4)}(\tau)$ ), overrejects for low priors ( $\theta \in \Theta_A^{(4)}(\tau)$ ), and overaccepts for high priors ( $\theta \in \Theta_C^{(4)}(\tau)$ ). However, Lemma 3 shows that the intensity of the untalented board's project choice recommendation distortion is different from that in Case 1.

LEMMA 3: Compared to Case 1 in which the CEO assesses the board's ability, the untalented board overrejects more for low prior beliefs of project quality and overaccepts less for high prior beliefs of project quality in Case 4.

The intuition for this is similar to that for the comparison of the untalented board's project-choice recommendation distortions between Cases 1 and 3 (Proposition 5). That is, the result is driven by the fact that the shareholders possess less information than the CEO in assessing the board's ability.

E.2. The Shareholders' Equilibrium Beliefs about the CEO's Ability

The shareholders' equilibrium beliefs about the CEO's ability are similar to those characterized in Lemma 1 for Case 1. That is, if the project is implemented, the shareholders' posterior belief about the CEO's ability is adjusted upward from its prior  $\bar{\eta}$  to  $[\bar{\eta} + \frac{\sigma^2}{\bar{\eta}}]$ , whereas if there is no project implementation, the shareholders' posterior belief about the CEO's ability is adjusted downward to  $[\bar{\eta} - \frac{\sigma^2[1 - \Psi_j^{(4)}]}{1 - \bar{\eta}[1 - \Psi_j^{(4)}]}]$ , where  $\Psi_j^{(4)}$  is the probability that an available project idea is rejected by the board in Case 4 for  $\theta \in \Theta_j^{(4)}, j \in \{A, B, C\}$ . Note that

$$\mathbf{E}[\eta | NO_S, \theta \in \Theta_A^{(4)}(\tau), \{\text{Shareholders}\}] > \mathbf{E}[\eta | NO_S, \theta \in \Theta_A^{(1)}(\tau), \{\text{CEO}\}], \quad (15)$$

$$\mathbf{E}[\eta | NO_S, \theta \in \Theta_C^{(4)}(\tau), \{\text{Shareholders}\}] > \mathbf{E}[\eta | NO_S, \theta \in \Theta_C^{(1)}(\tau), \{\text{CEO}\}], \quad (16)$$

where  $\{\text{Shareholders}\}$  mean that the shareholders assess the board's ability and  $\{\text{CEO}\}$  means that the CEO assesses the board's ability. When no project investment is observed and  $\theta$  is relatively low, the shareholders' posterior belief about the CEO's ability is higher in the case in which the shareholders assess the board's ability than in the case in which the CEO assesses the board's ability. This is because the untalented board's overrejection probability is higher in the former case (Lemma 3). Consequently, when no project investment is observed, the possibility that this is due to a project idea generated by the CEO that has been rejected by the board is assigned a greater weight by the shareholders when they assess the board's ability than when the CEO assesses it. This is why the CEO's expected posterior perceived ability is higher when the shareholders assess the board's ability than when the CEO assesses it. Similarly, when no project investment is observed and  $\theta$  is relatively high, since the untalented board's overacceptance probability is lower in the case when the shareholders assess the board's ability than when the CEO assesses it (Lemma 3), the possibility that this is due to a project idea generated by the CEO that has been rejected by the board is assigned a greater weight by the shareholders. This is why the CEO's expected posterior perceived ability, conditional on no project being implemented, is higher when the shareholders assess the board's ability than when the CEO assesses it. Note that this does not necessarily mean that the CEO always prefers to have the shareholders rather than herself assess the board's ability: The CEO's preference for who assesses the board's ability also depends on the probability of the project being implemented. This is discussed further in Section II.F.

### *E.3. The CEO's Equilibrium Disclosure Strategy*

We now examine the CEO's information disclosure strategy and compare this strategy with that in Case 1.

**PROPOSITION 6:** *Compared to the case in which the CEO assesses the board's ability and the shareholders assess the CEO's ability (Case 1), the CEO's equilibrium disclosure strategy differs as follows:*

1. *For a relatively low prior belief of project quality ( $\theta$ ), the CEO has a stronger preference for full information disclosure ( $\xi = f$ ) in Case 4 than in Case 1.*
2. *For a relatively high prior belief of project quality ( $\theta$ ), the CEO has a weaker preference for low information disclosure ( $\xi = n$ ) in Case 4 than in Case 1.*

This proposition says that the CEO's equilibrium choice of information disclosure to the board is more efficient when the shareholders assess the board's ability than when the CEO assesses it. To see the intuition, consider first the case of low priors about project quality. We know from Lemma 3 that the untalented

board's overrejection tendency is stronger when it is assessed by the shareholders (Case 4) than when it is assessed by the CEO (Case 1). Since overrejection is reputationally costly for the CEO and greater information disclosure (precision) diminishes the untalented board's overrejection tendency, the CEO has a stronger preference for full information disclosure in Case 4. Of course, since the CEO prefers full information disclosure in Case 1 for low priors, what this proposition indicates is that the improvement in information disclosure efficiency in Case 4 relative to Case 1 is largely confined to values of the project quality prior belief that are above some cutoff. When the project quality prior is high, the untalented board's overacceptance probability is lower in Case 4 than in Case 1 (Lemma 3). Thus, although low information disclosure increases the untalented board's overacceptance probability and hence is reputationally beneficial to the CEO, its effect is weaker in Case 4 than in Case 1. Further, since the untalented board's overacceptance generates a loss in firm value, the CEO's overall preference for low information disclosure is weaker in Case 4 than in Case 1.

#### *F. Which Governance Arrangement Does the CEO Prefer?*

Our analysis indicates that the expected posterior assessments of the CEO's ability differ across the four cases we examine. Now assume that the CEO's compensation and the probability of the CEO's continued tenure are increasing in posterior assessments of her ability.<sup>12</sup> Then the CEO prefers the governance regime that maximizes the expected posterior assessment of her ability. To see to which case the most preferred governance regime corresponds, we first provide a summary of all four cases along with a pairwise comparison of the cases.

In Table I, we summarize our key results for the four cases, which we now discuss. We use Case 1 as our benchmark case. Let us first compare Cases 1 and 2. The key difference between these cases arises when the project quality prior belief is high. In Case 1, the CEO chooses low information disclosure to manipulate the shareholders' posterior assessment of her ability, whereas in Case 2 she chooses full information disclosure because her disclosure strategy does not affect the board's posterior assessment of her ability. In Case 1, the CEO chooses to distort information disclosure for high project quality priors despite the deleterious effect of this on firm value that the CEO cares about; she does this because low disclosure is better for her reputation than a situation in which she adopts full disclosure and the shareholders also know as much as the board does. Thus, the room the CEO has to manipulate the shareholders' perception of her ability by distorting the information she provides to the board in Case 1 compared to the lack of such room to influence the board's perception in Case 2 leads to a higher reputation for the CEO in Case 1.

<sup>12</sup> This assumption is reasonable in a setting in which CEO compensation is competitively set and higher ability CEOs have higher competitively set wages.

**Table I**  
**Summary of Key Results**

Case Number	Case Description	CEO's Information Disclosure Strategy	Board's Project Choice Recommendation
Case 1	<ul style="list-style-type: none"> <li>• Shareholders assess the CEO</li> </ul>	<ul style="list-style-type: none"> <li>• Full information disclosure to the board for low and intermediate project quality prior beliefs</li> </ul>	<ul style="list-style-type: none"> <li>• Overrejection for low project quality prior beliefs</li> </ul>
	<ul style="list-style-type: none"> <li>• CEO assesses the board</li> </ul>	<ul style="list-style-type: none"> <li>• Low information disclosure to the board for high project quality prior beliefs</li> </ul>	<ul style="list-style-type: none"> <li>• Overacceptance for high project quality prior beliefs</li> <li>• No distortion for intermediate project quality prior beliefs</li> </ul>
Case 2	<ul style="list-style-type: none"> <li>• Board assesses the CEO</li> </ul>	<ul style="list-style-type: none"> <li>• Full information disclosure to the board always</li> </ul>	<ul style="list-style-type: none"> <li>• Overrejection for low project quality prior beliefs</li> </ul>
	<ul style="list-style-type: none"> <li>• CEO assesses the board</li> </ul>		<ul style="list-style-type: none"> <li>• Overacceptance for high project quality prior beliefs, but less so than in Case 1</li> <li>• No distortion for intermediate project quality prior beliefs</li> </ul>
Case 3	<ul style="list-style-type: none"> <li>• Board assesses the CEO</li> </ul>	<ul style="list-style-type: none"> <li>• Full information disclosure to the board always</li> </ul>	<ul style="list-style-type: none"> <li>• More overrejection than in Case 1 for low project quality prior beliefs</li> </ul>
	<ul style="list-style-type: none"> <li>• Shareholders assess the board</li> </ul>		<ul style="list-style-type: none"> <li>• Less overacceptance than in Case 1 for high project quality prior beliefs</li> </ul>
Case 4	<ul style="list-style-type: none"> <li>• Shareholders assess the CEO</li> </ul>	<ul style="list-style-type: none"> <li>• Stronger preference for full information disclosure than in Case 1 for low project quality prior beliefs</li> </ul>	<ul style="list-style-type: none"> <li>• More overrejection than in Case 1 for low project quality prior beliefs</li> </ul>
	<ul style="list-style-type: none"> <li>• Shareholders assess the board</li> </ul>	<ul style="list-style-type: none"> <li>• Weaker preference for low information disclosure than in Case 1 for high project quality prior beliefs</li> </ul>	<ul style="list-style-type: none"> <li>• Less overacceptance than in Case 1 for high project quality prior beliefs</li> </ul>

The comparison between Cases 1 and 3 is similar. In Case 3, the CEO again follows a full disclosure strategy because she cannot influence the board's perception of her ability through her disclosure strategy and full disclosure is the best for firm value. Thus, the CEO's reputation is higher in Case 1.

Finally, the key difference between Cases 1 and 4 is that when the project quality prior is high, the CEO has a weaker preference for low disclosure to the board in Case 4 than in Case 1, and when the prior is low, she has a stronger preference for full disclosure in Case 4 than in Case 1. Consequently, the board overrejects more and overaccepts less in Case 4 than in Case 1, leading to a lower posterior assessment of the CEO's ability by the shareholders in Case 4 than in Case 1. This leads to the following result:

**PROPOSITION 7:** *The highest posterior assessment of the CEO's ability is in Case 1, where the shareholders assess the CEO's ability and the CEO assesses the board's ability.*

Much has been written about how the lack of board independence affects CEO compensation. What we show is that even when the board is independent and the CEO is not entrenched, the CEO's compensation depends on the corporate governance arrangement that determines who evaluates the CEO and who evaluates the board. Hermalin (2005) argues that increased board vigilance leads to higher CEO compensation. Our analysis points out the relevance of the interaction between the career concerns of the CEO and the board in the determination of CEO compensation, and thus highlights a dimension of board effectiveness and CEO compensation that goes beyond the independence and vigilance of the board.

### **III. Model Robustness, Implications, and Predictions**

#### *A. Modeling Choices and Robustness*

With regard to modeling choices, there is an unavoidable level of complexity in our model because we are dealing with two interacting sets of career concerns as well as two sets of state-contingent decisions in terms of information provision and investment choices. We have also attempted to retain as much generality as possible by letting prior beliefs about project quality ( $\theta$ ) as well as prior beliefs about the CEO's ability ( $\eta$ ) take values in  $[0, 1]$ . Notwithstanding, for much of the analysis, we can think of this as a three-state model in terms of  $\theta$ , with information provision or project choice inefficiencies encountered only in the low- $\theta$  and high- $\theta$  states and not in the middle- $\theta$  state.<sup>13</sup>

With regard to robustness, it is interesting to ask how our analysis would be affected if we were to permit the CEO to extract private benefits at the expense of firm value; this is a basic corporate governance problem that we have not modeled. The standard assumption in models of managerial private benefits is that these are increasing in firm size or are available to the manager only when the firm actually invests in the project (see Aghion and Bolton (1992)). This means that we could allow the CEO to extract private benefits, say  $\beta > 0$ , when the firm invests in the project, and no private benefits when the firm rejects the project. This would strengthen the CEO's desire to overinvest, so that private benefits worsen the investment distortions encountered with career concerns. Moreover, since the CEO's board selection inefficiency (see Proposition 3) is also driven by her desire to overinvest for reasons related to her career concerns, this inefficiency would also be greater when managerial private benefit extraction is joined with the CEO's career concerns.<sup>14</sup> An interesting open question is what would happen if  $\beta$  were a priori unknown and CEOs were developing

<sup>13</sup> Of course, this is not the same as literally going to a three-state model because the identities of these three states change depending on which case we are considering and what information precision state we observe.

<sup>14</sup> To the extent that the CEO's reputation provides her with benefits that transcend her compensation from the firm, reputation building by the CEO that is linked to being at the helm of the firm and that occurs at the expense of firm value may also be viewed as a sort of private benefit of control, although such an interpretation would be quite different from the usual exogenous  $\beta$ .

a reputation for low private benefits in addition to a reputation for finding projects.

Another feature of our analysis is that the CEO develops a reputation for generating project ideas, but project quality is independent of her ability. Since this seems like a rather special structure, we examine the implication of assuming that the CEO develops a reputation both for generating project ideas and for generating *good* ideas. Formally, we assume that there are two components of the CEO's ability, namely, the ability to generate a project idea in the first place ( $\eta$ , the *quantity* component) and the ability to generate a good project idea ( $\lambda$ , the *quality* component). Assume that project quality (if the project is available) is determined by  $\theta = \lambda$ . Only the CEO knows the true value of  $\eta$  and  $\lambda$ , that is, only she knows the availability and the true quality of the project. Let  $r$ , which is commonly known, be the probability density of  $\lambda$ , with support  $[0, 1]$ . Denote  $\mathbf{E}[\lambda] \equiv \bar{\lambda}$  as the expected value of  $\lambda$  and  $\mathbf{Var}[\lambda] \equiv v^2$  as the variance of  $\lambda$ . We assume  $\eta$  and  $\lambda$  are independent random variables. The CEO's utility function is

$$U_C = \alpha_C \times \mathbf{E}_0[\mathbf{E}_1(\eta | \mathcal{F}_1)] + \kappa_C \times \mathbf{E}_0[\mathbf{E}_2(\lambda | \mathcal{F}_2)] + \pi, \quad (17)$$

where  $\alpha_C$  and  $\kappa_C$  are the weights the CEO attaches to the quantity component and the quality component of her career concerns, respectively. We now have the following result.

**PROPOSITION 8:** *Suppose the CEO develops a reputation for both the quantity and quality of project ideas. Then, when the CEO's true ability for quality ( $\lambda$ ) is either above or just a little bit below its prior ( $\bar{\lambda}$ ), or the CEO attaches a sufficiently high weight to the quantity component ( $\alpha_C$ ) relative to the quality component ( $\kappa_C$ ) of her career concerns, all the results in our base model (in which only the quantity component is relevant for the CEO's career concerns) remain unaltered. If the CEO's true ability for quality is much lower than its prior, or just a little bit lower than its prior but the CEO attaches a sufficiently high weight to the quality component of her career concerns, then the CEO may prefer low information disclosure for low project quality prior beliefs and full information disclosure for high project quality prior beliefs in Cases 1 and 4.*

This result can be understood as follows. When the CEO's true ability for generating good project ideas is higher than what it was perceived to be a priori, she would like the agent who assesses her ability to learn, and this is achieved by increasing the likelihood of project acceptance. This exacerbates the potential inefficiencies in our base model in which only quantity is relevant, strengthening our results. In contrast, when the CEO's true ability for generating good project ideas is lower than its prior, she has an incentive to decrease the likelihood of project acceptance to prevent others from learning her true ability for project quality. Thus, introducing career concerns related to project quality could change our results in special circumstances. To see this, note that when the CEO's incentive to prevent learning is sufficiently strong (either because her true ability for project quality is much lower than its prior,

or that ability is just a little bit lower than the prior but the CEO attaches a sufficiently high weight on the quality component), she adopts disclosure strategies in Cases 1 and 4, which are the opposites of those predicted by the base model. However, as long as the CEO's true ability for project quality is not too much lower than its prior or she attaches a sufficiently high weight to the quantity component relative to the quality component of her career concerns, the CEO still has an incentive to overinvest and all our results continue to hold. That is, our results are robust to the mere introduction of project quality career concerns.

### *B. Implications and Predictions*

Our analysis has numerous implications in a setting in which both the CEO and the board of directors care about maximizing firm value but also have career concerns. First, when the CEO's ability is assessed directly by the shareholders and the board's ability is assessed by the CEO, there are distortions both in the provision of information by the CEO to the board and in the board's project choice, particularly during economic upturns (corresponding to high  $\theta$ ). The CEO provides less precise information than she could to the board, and the board overinvests (Propositions 1 and 2). Moreover, there is also an inefficiency in the selection of the board by the CEO in this case; she deliberately staffs the board with less talented board members than she could (Proposition 3).

Second, even when board members have career concerns, our analysis provides a justification for having the board rather than the shareholders assess the CEO's ability, and hence indirectly rationalizes the delegation of the CEO's assessment to the board by the shareholders. To see this, note that Proposition 4 indicates that the inefficiencies associated with information provision by the CEO to the board as well as the selection of the board by the CEO that are present when the CEO is evaluated by the shareholders disappear when the CEO is evaluated by the board. In fact, our analysis implies that during economic upturns (high  $\theta$ ), the best corporate governance arrangement for the shareholders is likely to be one in which the CEO's ability is evaluated by the board and the board's ability is evaluated by the shareholders (Case 3). In this case, there is no inefficiency in the CEO's information provision to the board or in her selection of the board, and there is lower inefficiency in the board's project choice relative to the case in which the CEO evaluates the board (Proposition 5). The significance of this result is that it points out that the optimal solution to corporate governance failures is not necessarily to have the shareholders be in charge of assessing the CEO as well as the board. That is, it is not efficient for the shareholders to be directly responsible for determining the compensation and appointment of the board and the CEO, despite the fact that any other agent they could delegate this task to would have career concerns in addition to their desire to maximize firm value.

Third, the board's project choice tends to make the firm's investment policy procyclical since the board tends to overinvest during economic upturns and underinvest during economic downturns (see, e.g., Propositions 1 and 5).

Fourth, even though independence of the board from the CEO has been widely discussed as an important element of good corporate governance, our analysis shows that career concerns can make even an independent board distort decisions. In our analysis, the board's project recommendation distortion does not arise from any desire on the board's part to do what the CEO would like—it exists even though the board acts independently of the CEO.

Finally, our analysis has something to say about the potential effectiveness of SOX. The establishment of tougher internal control systems and greater accountability for the veracity of information disclosures are considered pivotal components of SOX.<sup>15</sup> However, fraud is not the only problem with information disclosure. Even when information disclosure is truthful, as it is in our model, its precision is within the CEO's control. In practice, as in our model, it may sometimes be impossible to determine *ex post* whether more precise information could have been provided. Our analysis shows that the CEO does have incentives to lower the precision of the information provided to the board, and this has two pernicious effects. First, it directly makes the board less effective by putting in its hands relatively inferior decision-relevant information. Second, it worsens the inefficiency in the board's project choice recommendation that is driven by the board's own career concerns. Recall Proposition 1, which says that the board's project-choice distortion is greater when the precision of its information is lower. Thus, there are instances in which the interaction of the career concerns of the board and the CEO leads to worse outcomes for the shareholders than if career concerns existed only with the CEO or only with the board. We do not believe that SOX addresses these distortions.

#### **IV. Conclusion**

We develop a model in which the CEO generates project ideas that are screened by the board. A twist is that the CEO controls the quality of the information available to the board for screening the ideas proposed by the CEO. Moreover, the CEO and the board both have career concerns and these interact with each other. We show that such interacting career concerns could render even an independent board ineffective in its role as a delegated monitor of the projects proposed by the CEO. Moreover, this inefficiency is compounded by a preference on the CEO's part for an inefficient board during economic upturns.

Corporate governance is thus potentially plagued by three layers of inefficiency even when directors are independent and they have firm value maximization in their utility functions, and CEOs have no direct utility from expropriating corporate resources and they have firm value maximization in their utility functions. The three potential inefficiencies are: (i) The CEO may

<sup>15</sup> In part, this is because there have been numerous instances of fraudulent information being provided by corporations, with ineffective oversight by both boards and the SEC. For example, Deutsch (2003) reports, "... boards will howl when quarterly numbers are depressed, yet shut their eyes when the numbers are squishy or even fraudulent." An example of lax SEC oversight is that the SEC had not reviewed Enron's annual reports since 1997.

deliberately select a weak board, (ii) the CEO may provide less precise project-evaluation information to the board than the CEO has available, and (iii) the board may overinvest or underinvest in projects. We believe that the issues we examine cut to the heart of corporate governance in relatively well-managed companies in which CEO entrenchment, outright theft by executives, and CEO-board cronyism are not problems. While recent corporate governance reforms such as SOX and the revised listing standards adopted by the New York Stock Exchange and NASDAQ address important issues such as stronger internal controls, minimization of fraudulent reporting, and board independence, the issues arising from career concerns that we identify appear to deserve further attention.

### **Appendix: Proofs**

*Proof of Proposition 1:* The proof is in five steps. The first two steps establish that the talented board never misreports in equilibrium using either a pure strategy or a mixed strategy. The third–fifth steps derive the CEO’s posterior beliefs in various states and verify the misreporting incentives of the untalented board as well as the different regions of prior beliefs about project quality that are distinguished by the reporting incentives of the untalented board.

1. *The talented board does not misreport in equilibrium as part of a pure strategy:* First, observe that we cannot have an equilibrium in which the talented board follows a pure strategy of making recommendations that go against its signal. If for a low  $\theta$  and the signal  $s_G$ , the talented board recommends rejection regardless of the signal, then the untalented board would have two choices. One choice is that it also always recommends rejection because recommending acceptance would perfectly reveal its type to the CEO and the related loss in the reputational payoff would outweigh the gain in the project payoff (the project payoff is zero if it always rejects, while if it accepts, the project payoff could be positive). Given this, the talented board would not always recommend rejection because acceptance would increase both its reputational payoff (recommending acceptance distinguishes it from the untalented board) and its project payoff. The untalented board’s second choice is that it does not always reject, because the gain in the project payoff outweighs its reputational loss (recommending acceptance perfectly reveals its type). Given this, the talented board would also prefer not to always recommend rejection because the marginal gain in project payoff from recommending acceptance outweighs the marginal loss in the reputational payoff (the talented board fails to distinguish itself from the untalented board by recommending acceptance). This is because the gain in project payoff for the talented board is higher than that for the untalented board, as the talented board sees a more precise signal. The same argument holds for high  $\theta$  and the signal  $s_B$ .
2. *The talented board does not misreport in equilibrium as part of a mixed strategy:* Second, we can establish that the talented board does not follow

a mixed strategy in equilibrium. To see this, again consider a low- $\theta$  project and the signal  $s_G$ , and assume counterfactually that the talented board is indifferent between acceptance ( $A$ ) and rejection ( $R$ ) so it randomizes between the two. It follows that the untalented board strictly prefers to recommend rejection. That is, the noisy signal makes recommending acceptance strictly worse for the untalented board than for the talented board; recommending rejection gives both types of boards the same intertemporal utility. Hence, once the talented board chooses to randomize, the untalented board strictly prefers to reject. What this implies is that only the talented board ever recommends acceptance, hence  $W_{C1}(\theta, R) < W_{C1}(\theta, A)$  and  $W_{C1}(\theta, A) = W_{C2}(\theta, A, s_G, T) = \mathbf{E}[W_{C2}(\theta, A, s_G, T)]$  (only the talented board recommends acceptance, thus there is no further updating of beliefs over type by the CEO after date  $t = 1$ ), where  $W_{C1}(\theta, i)$ ,  $i \in \{A, R\}$  represents the board's date-1 wage,  $A$  and  $R$  stand for acceptance and rejection, respectively, and  $W_{C2}(\theta, i, s_j, \tau)$  represents the type- $\tau \in \{T, U\}$  board's expected date-2 wage, conditional upon its recommendation  $i \in \{A, R\}$  and its signal  $s_j$  for  $j \in \{G, B\}$ . We now have  $\alpha_B[(1 + \delta_B)W_{C1}(\theta, R)] < \alpha_B[W_{C1}(\theta, A) + \delta_B \mathbf{E}(W_{C2}(\theta, A, s_G, T))] + \pi$ , where  $\pi$  is the expected project payoff following the acceptance recommendation. However, this contradicts the conjectured indifference of the talented board between recommending rejection and acceptance. Thus, the equilibrium cannot be one in which the talented board plays a mixed strategy. A similar proof holds for high  $\theta$  and the signal  $s_B$ .

Observe also that for signals that "match" the priors of the board, no misreporting occurs. That is, recommendations are always in accordance with the signal when  $\theta$  is relatively low and the signal is  $s_B$ , or when  $\theta$  is relatively high and the signal is  $s_G$ .

Before we can characterize the equilibrium (distorted) choices of the untalented board, we need to examine how the board's reputation evolves. Since the untalented board's conjectured equilibrium behavior depends on the CEO's prior belief about project quality  $\theta$ , we first derive separately for  $\tau \in \{h, l\}$  the CEO's posterior assessments about the board's ability at dates  $t = 1$  and  $t = 2$  for  $\theta < \theta_{\tau-}^{(1)}$  and  $\theta > \theta_{\tau+}^{(1)}$ , with  $0 < \theta_{\tau-}^{(1)} < \theta_{\tau+}^{(1)} < 1$ .

3. *The CEO's posterior belief about the board's ability in the conjectured equilibrium:*

(a) *Projects for which  $\theta \in \Theta_A^{(1)}(\tau)$ :* For these projects, we know that the talented board recommends in accordance with its signal, whereas the untalented board is conjectured to always recommend rejection when  $s = s_B$  is observed, and to recommend rejection with probability  $\gamma_{\tau R}^{(1)}$  and acceptance with probability  $[1 - \gamma_{\tau R}^{(1)}]$  if  $s = s_G$  is observed, if the information precision from the CEO is  $\tau \in \{h, l\}$ . We discuss the cases  $\tau = h$  and  $\tau = l$  separately.

- *The CEO's information precision is high, that is,  $\tau = h$ .*

If the board recommends rejection of the project, the posterior assessment of its ability at both dates  $t = 1$  and  $t = 2$  is given by (recall

that rejected projects produce no additional information regarding the board's ability)

$$\Pr(T_1 | R) = \frac{\beta(1 - \theta)}{\beta(1 - \theta) + (1 - \beta) \left\{ \begin{array}{l} [\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)] \\ + [(1 - \varepsilon_{HU})\theta + \varepsilon_{HU}(1 - \theta)]\gamma_{hR}^{(1)} \end{array} \right\}}. \quad (A1)$$

If the board recommends acceptance, the posterior assessment of its ability at date  $t = 1$  is given by

$$\Pr(T_1 | A) = \frac{\beta\theta}{\beta\theta + (1 - \beta)[(1 - \varepsilon_{HU})\theta + \varepsilon_{HU}(1 - \theta)](1 - \gamma_{hR}^{(1)})}. \quad (A2)$$

At date  $t = 2$ , its reputation varies based on whether the project pays off a positive amount  $M$  or zero. These two reputations are given by

$$\Pr(T_2 | A, M) = \frac{\beta}{\beta + (1 - \beta)(1 - \varepsilon_{HU})(1 - \gamma_{hR}^{(1)})}, \quad (A3)$$

and

$$\Pr(T_2 | A, zero) = 0. \quad (A4)$$

- *The CEO's information precision is low, that is,  $\tau = l$ .*

If the board recommends rejection of the project, the posterior assessment of its ability at both dates  $t = 1$  and  $t = 2$  is given by

$$\Pr(T_1 | R) = \frac{\beta[\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)]}{\left\{ \begin{array}{l} \beta[\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)] \\ + (1 - \beta) \left\{ \begin{array}{l} [\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)] \\ + [(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)]\gamma_{lR}^{(1)} \end{array} \right\} \end{array} \right\}}. \quad (A5)$$

If the board recommends acceptance, the posterior assessment of its ability at date  $t = 1$  is given by

$$\Pr(T_1 | A) = \frac{\beta[(1 - \varepsilon_{LT})\theta + \varepsilon_{LT}(1 - \theta)]}{\left\{ \begin{array}{l} \beta[(1 - \varepsilon_{LT})\theta + \varepsilon_{LT}(1 - \theta)] \\ + (1 - \beta)[(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)](1 - \gamma_{lR}^{(1)}) \end{array} \right\}}. \quad (A6)$$

At date  $t = 2$ , its reputation varies based on whether the project pays off a positive amount  $M$  or zero. These two reputations are given by

$$\Pr(T_2 | A, M) = \frac{\beta(1 - \varepsilon_{LT})}{\beta(1 - \varepsilon_{LT}) + (1 - \beta)(1 - \varepsilon_{LU})(1 - \gamma_{lR}^{(1)})}, \quad (A7)$$

and

$$\Pr(T_2 | A, zero) = \frac{\beta \varepsilon_{LT}}{\beta \varepsilon_{LT} + (1 - \beta) \varepsilon_{LU} (1 - \gamma_{lR}^{(1)})}. \tag{A8}$$

(b) *Projects for which  $\theta \in \Theta_C^{(1)}(\tau)$* : For these projects, the talented board recommends in accordance with its signal, whereas the untalented board is conjectured to always recommend acceptance when  $s = s_G$  is observed, and to recommend acceptance with probability  $\gamma_{\tau A}^{(1)}$  and rejection with probability  $[1 - \gamma_{\tau A}^{(1)}]$  if  $s = s_B$  is observed, if the information precision from the CEO is  $\tau \in \{h, l\}$ . We discuss the cases  $\tau = h$  and  $\tau = l$  separately.

- *The CEO's information precision is high, that is,  $\tau = h$ .*

If the board recommends rejection of the project, the posterior assessment of its ability at both dates  $t = 1$  and  $t = 2$  is given by

$$\Pr(T_1 | R) = \frac{\beta(1 - \theta)}{\beta(1 - \theta) + (1 - \beta)[\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)](1 - \gamma_{hA}^{(1)})}. \tag{A9}$$

If the board recommends acceptance, the posterior assessment of its ability at date  $t = 1$  is given by

$$\Pr(T_1 | A) = \frac{\beta\theta}{\beta\theta + (1 - \beta) \left\{ \begin{aligned} &[(1 - \varepsilon_{HU})\theta + \varepsilon_{HU}(1 - \theta)] \\ &+ [\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)]\gamma_{hA}^{(1)} \end{aligned} \right\}}. \tag{A10}$$

At date  $t = 2$ , its reputation varies based on whether the project pays off a positive amount  $M$  or zero. These two reputations are given by

$$\Pr(T_2 | A, M) = \frac{\beta}{\beta + (1 - \beta)(1 - \varepsilon_{HU} + \varepsilon_{HU}\gamma_{hA}^{(1)})}, \tag{A11}$$

and

$$\Pr(T_2 | A, zero) = 0. \tag{A12}$$

- *The CEO's information precision is low, that is,  $\tau = l$ .*

If the board recommends rejection of the project, the posterior assessment of its ability at both dates  $t = 1$  and  $t = 2$  is given by

$$\Pr(T_1 | R) = \frac{\beta[\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)]}{\left\{ \begin{aligned} &\beta[\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)] \\ &+ (1 - \beta)[\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)](1 - \gamma_{lA}^{(1)}) \end{aligned} \right\}}. \tag{A13}$$

If the board recommends acceptance, the posterior assessment of its ability at date  $t = 1$  is given by

$$\Pr(T_1 | A) = \frac{\beta[(1 - \varepsilon_{LT})\theta + \varepsilon_{LT}(1 - \theta)]}{\left\{ \begin{aligned} &\beta[(1 - \varepsilon_{LT})\theta + \varepsilon_{LT}(1 - \theta)] \\ &+ (1 - \beta) \left\{ \begin{aligned} &[(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)] \\ &+ [\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)]\gamma_{IA}^{(1)} \end{aligned} \right\} \end{aligned} \right\}}. \tag{A14}$$

At date  $t = 2$ , its reputation varies based on whether the project pays off a positive amount  $M$  or zero. These two reputations are given by

$$\Pr(T_2 | A, M) = \frac{\beta(1 - \varepsilon_{LT})}{\beta(1 - \varepsilon_{LT}) + (1 - \beta)(1 - \varepsilon_{LU} + \varepsilon_{LU}\gamma_{IA}^{(1)})}, \tag{A15}$$

and

$$\Pr(T_2 | A, zero) = \frac{\beta\varepsilon_{LT}}{\beta\varepsilon_{LT} + (1 - \beta)[\varepsilon_{LU} + (1 - \varepsilon_{LU})\gamma_{IA}^{(1)}]}. \tag{A16}$$

4. Verify the conjectured equilibrium behavior of the talented and untalented boards:

For the purpose of the proof, define  $v \in \{T_G, T_B, U_G, U_B\}$  as the set of “composite types,” where  $T$  and  $U$  indicate the type of the board, and  $G$  and  $B$  indicate the signal the board received (e.g.,  $T_G$  is a talented board that received a good signal  $s = s_G$ ).

There are just two possible actions: Recommend rejection ( $R$ ) or recommend acceptance ( $A$ ). We verify that  $U_G$  and/or  $U_B$  may randomize across these two actions depending on the value of the prior  $\theta$ , but  $T_G$  and  $T_B$  always prefer to follow their signal and hence adhere to a pure strategy. We prove this as follows. First, we identify the mixed strategy (randomization) for high and low values of  $\theta$ . Then we identify the  $\theta$  ranges.

- (a) *Type  $U_B$  randomizes for high values of  $\theta$ :* Assume  $T_G, T_B$ , and  $U_G$  follow their conjectured equilibrium strategies, and let  $U_B$  recommend acceptance with probability  $\gamma_{\tau A}^{(1)}$  and rejection with probability  $[1 - \gamma_{\tau A}^{(1)}]$  if the information precision from the CEO is  $\tau \in \{h, l\}$ . We discuss the cases  $\tau = h$  and  $\tau = l$  separately.

- *The CEO’s information precision is high, that is,  $\tau = h$ .*

In the conjectured equilibrium,  $U_B$  should be indifferent between recommending acceptance and rejection. Hence, we have

$$\begin{aligned} &\alpha_B \left\{ \Pr(T_1 | A) + \delta_B \left[ \Pr(M | s_B, U) \Pr(T_2 | A, M) \right. \right. \\ &\quad \left. \left. + \Pr(zero | s_B, U) \Pr(T_2 | A, zero) \right] \right\} + \pi(s_B, U, A) \\ &= \alpha_B \{ (1 + \delta_B) \Pr(T_1 | R) \} + \pi(s_B, U, R), \end{aligned} \tag{A17}$$

where

$$\Pr(M | s_B, U) = \frac{\varepsilon_{HU}\theta}{\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)}, \tag{A18}$$

$$\Pr(\text{zero} | s_B, U) = \frac{(1 - \varepsilon_{HU})(1 - \theta)}{\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)}, \tag{A19}$$

$$\pi(s_B, U, R) = 0, \tag{A20}$$

and

$$\pi(s_B, U, A) = \left[ \frac{\varepsilon_{HU}\theta}{\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)} \right] M - I, \tag{A21}$$

and  $\Pr(T_1 | R)$ ,  $\Pr(T_1 | A)$ ,  $\Pr(T_2 | A, M)$ , and  $\Pr(T_2 | A, \text{zero})$  are given by (A9), (A10), (A11), and (A12), respectively.

Note that the left-hand side (LHS) of (A17) is monotonically decreasing in  $\gamma_{hA}^{(1)}$ , while the right-hand side (RHS) is monotonically increasing in  $\gamma_{hA}^{(1)}$ . We now show that the equality in (A17) can only hold for an interior  $\gamma_{hA}^{(1)} \in (0, 1)$ , provided that  $\theta$  is sufficiently high, that is,  $\theta > \theta_{h+}^{(1)}$ . First, observe using (A9)–(A12), (A18), and (A19) that at  $\gamma_{hA}^{(1)} = 0$ ,  $\Pr(T_1 | A) > \Pr(T_1 | R)$ ,  $\Pr(M | s_B, U) \times \Pr(T_2 | A, M) > \Pr(T_1 | R)$ , and  $\pi(s_B, U, A) > \pi(s_B, U, R) = 0$  provided  $\theta$  is sufficiently high. Hence, the LHS of (A17) is strictly greater than the RHS. Thus, equality in (A17) requires that  $\gamma_{hA}^{(1)} > 0$ . Now, evaluate (A17) at  $\gamma_{hA}^{(1)} = 1$ . It immediately follows that the LHS of (A17) is strictly less than the RHS. Thus, we have  $\gamma_{hA}^{(1)} \in (0, 1)$ .

- *The CEO's information precision is low, that is,  $\tau = l$ .*

In the conjectured equilibrium,  $U_B$  should be indifferent between recommending acceptance and rejection. Hence, we have

$$\begin{aligned} & \alpha_B \left\{ \Pr(T_1 | A) + \delta_B \left[ \Pr(M | s_B, U) \Pr(T_2 | A, M) \right. \right. \\ & \quad \left. \left. + \Pr(\text{zero} | s_B, U) \Pr(T_2 | A, \text{zero}) \right] \right\} + \pi(s_B, U, A) \\ & = \alpha_B \{ (1 + \delta_B) \Pr(T_1 | R) \} + \pi(s_B, U, R), \end{aligned} \tag{A22}$$

where

$$\Pr(M | s_B, U) = \frac{\varepsilon_{LU}\theta}{\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)}, \tag{A23}$$

$$\Pr(\text{zero} | s_B, U) = \frac{(1 - \varepsilon_{LU})(1 - \theta)}{\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)}, \tag{A24}$$

$$\pi(s_B, U, R) = 0, \tag{A25}$$

and

$$\pi(s_B, U, A) = \left[ \frac{\varepsilon_{LU}\theta}{\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)} \right] M - I, \tag{A26}$$

and  $\Pr(T_1 | R)$ ,  $\Pr(T_1 | A)$ ,  $\Pr(T_2 | A, M)$ , and  $\Pr(T_2 | A, zero)$  are given by (A13), (A14), (A15), and (A16), respectively. By a similar argument as above, we can show that  $\gamma_{lA}^{(1)} \in (0, 1)$ .

- (b) *Types  $T_G, T_B$ , and  $U_G$  recommend according to their respective signals for high values of  $\theta$ :* Given equalities in (A17) and (A22) for  $U_B$ , it is easy to show that  $T_B$  strictly prefers to follow its signal (i.e., recommend rejection). This immediately follows from the fact that  $\Pr(M | s_B, T) < \Pr(M | s_B, U)$  and  $\pi(s_B, U, A) > \pi(s_B, T, A)$ . Thus,  $T_B$  has strictly less to gain from recommending acceptance than  $U_B$ . For  $T_G$  and  $U_G$ , it is easy to show that they always recommend acceptance (observe that  $\Pr(M | s_G, T) > \Pr(M | s_G, U) > \Pr(M | s_B, U)$  and  $\pi(s_G, T, A) > \pi(s_G, U, A) > \pi(s_B, U, A)$ ).
- (c) *Type  $U_G$  randomizes for low values of  $\theta$ :* The proof of this case mirrors the previous arguments. We discuss the cases  $\tau = h$  and  $\tau = l$  separately.

- *The CEO's information precision is high, that is,  $\tau = h$ .*

$U_G$  now recommends rejection with probability  $\gamma_{hR}^{(1)}$ , and this is in the interior of  $(0, 1)$  if  $\theta$  is sufficiently low. In the conjectured equilibrium we have

$$\begin{aligned} \alpha_B \left\{ \Pr(T_1 | A) + \delta_B \left[ \frac{\Pr(M | s_G, U) \Pr(T_2 | A, M)}{+ \Pr(zero | s_G, U) \Pr(T_2 | A, zero)} \right] \right\} + \pi(s_G, U, A) \\ = \alpha_B \{ (1 + \delta_B) \Pr(T_1 | R) \} + \pi(s_G, U, R), \end{aligned} \tag{A27}$$

where

$$\Pr(M | s_G, U) = \frac{(1 - \varepsilon_{HU})\theta}{(1 - \varepsilon_{HU})\theta + \varepsilon_{HU}(1 - \theta)}, \tag{A28}$$

$$\Pr(zero | s_G, U) = \frac{\varepsilon_{HU}(1 - \theta)}{(1 - \varepsilon_{HU})\theta + \varepsilon_{HU}(1 - \theta)}, \tag{A29}$$

$$\pi(s_G, U, R) = 0, \tag{A30}$$

and

$$\pi(s_G, U, A) = \left[ \frac{(1 - \varepsilon_{HU})\theta}{(1 - \varepsilon_{HU})\theta + \varepsilon_{HU}(1 - \theta)} \right] M - I, \tag{A31}$$

and  $\Pr(T_1 | R)$ ,  $\Pr(T_1 | A)$ ,  $\Pr(T_2 | A, M)$ , and  $\Pr(T_2 | A, zero)$  are given by (A1), (A2), (A3), and (A4), respectively. Following arguments analogous to those above, we can show that  $\gamma_{hR}^{(1)} \in (0, 1)$ .

- *The CEO's information precision is low, that is,  $\tau = l$ .*

$U_G$  now recommends rejection with probability  $\gamma_{lR}^{(1)}$ , and this is in the interior of  $(0, 1)$  if  $\theta$  is sufficiently low. In the conjectured equilibrium we have

$$\alpha_B \left\{ \Pr(T_1 | A) + \delta_B \left[ \frac{\Pr(M | s_G, U) \Pr(T_2 | A, M)}{\Pr(zero | s_G, U) \Pr(T_2 | A, zero)} \right] \right\} + \pi(s_G, U, A) = \alpha_B \{(1 + \delta_B) \Pr(T_1 | R)\} + \pi(s_G, U, R), \tag{A32}$$

where

$$\Pr(M | s_G, U) = \frac{(1 - \varepsilon_{LU})\theta}{(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)}, \tag{A33}$$

$$\Pr(zero | s_G, U) = \frac{\varepsilon_{LU}(1 - \theta)}{(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)}, \tag{A34}$$

$$\pi(s_G, U, R) = 0, \tag{A35}$$

and

$$\pi(s_G, U, A) = \left[ \frac{(1 - \varepsilon_{LU})\theta}{(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)} \right] M - I, \tag{A36}$$

and  $\Pr(T_1 | R)$ ,  $\Pr(T_1 | A)$ ,  $\Pr(T_2 | A, M)$ , and  $\Pr(T_2 | A, zero)$  are given by (A5), (A6), (A7), and (A8), respectively. Following arguments analogous to those above, we can show that  $\gamma_{lR}^{(1)} \in (0, 1)$ .

- (d) *Types  $T_G, T_B$ , and  $U_B$  follow their respective signals for low values of  $\theta$ :* Again, arguments similar to those under (b) verify this claim. Given the equalities for  $U_G$  in (A27) for  $\tau = h$  and (A32) for  $\tau = l$ ,  $T_G$  strictly prefers to recommend acceptance given that  $\Pr(M | s_G, T) > \Pr(M | s_G, U)$  and  $\pi(s_G, T, A) > \pi(s_G, U, A)$ . Similarly,  $T_B$  always recommends rejection since  $\Pr(M | s_B, U) > \Pr(M | s_B, T)$  and  $\pi(s_G, U, A) > \pi(s_B, T, A)$ , and  $U_B$  always recommends rejection since  $\Pr(M | s_B, U) < \Pr(M | s_G, U)$  and  $\pi(s_B, U, A) < \pi(s_G, U, A)$ .

5. *Establishing the distinct  $\theta$  range:*

Define  $\theta = \theta_{h+}^{(1)}$  as the value of  $\theta$  for which (A17) holds for  $\gamma_{hA}^{(1)} = 0$  and define  $\theta = \theta_{l+}^{(1)}$  as the value of  $\theta$  for which (A22) holds for  $\gamma_{lA}^{(1)} = 0$ . Similarly, define  $\theta = \theta_{h-}^{(1)}$  as the value of  $\theta$  for which (A27) holds for  $\gamma_{hR}^{(1)} = 0$  and define  $\theta = \theta_{l-}^{(1)}$  as the value of  $\theta$  for which (A32) holds for  $\gamma_{lR}^{(1)} = 0$ . First, we can show after some algebra that  $\frac{\partial \gamma_{\tau A}^{(1)}}{\partial \theta} > 0$  and  $\frac{\partial \gamma_{\tau R}^{(1)}}{\partial \theta} < 0$ . Also, from (A17), (A22), (A27), and (A32), we see that in the limit as  $\theta \uparrow 1$ , we have  $\gamma_{\tau A}^{(1)} = 1$ , and as  $\theta \downarrow 0$ , we have  $\gamma_{\tau R}^{(1)} = 1$ . Thus, in the range  $\Theta_C^{(1)}(\tau)$ , we have excessive acceptance recommendations ( $\gamma_{\tau A}^{(1)} > 0$ ), and in the range  $\Theta_A^{(1)}(\tau)$ , we have excessive rejection recommendations ( $\gamma_{\tau R}^{(1)} > 0$ ). We now show that  $\theta_{\tau-}^{(1)} < \theta_{\tau+}^{(1)}$ , and hence a region  $\Theta_B^{(1)}(\tau)$  of positive measure exists in which there is no misreporting by the untalented board for the state  $\tau \in \{h, l\}$ . At  $\theta = \theta_{\tau-}^{(1)}$ , the equality (A27) is identical to (A17), and the equality (A32) is identical to (A22), except for the respective probabilities of  $\Pr(M | s_G, U)$  and  $\Pr(M | s_B, U)$ . Since  $\Pr(M | s_G, U) > \Pr(M | s_B, U)$ , we must have  $\theta_{\tau-}^{(1)} < \theta_{\tau+}^{(1)}$ .

Lastly, we show that  $\Theta_B^{(1)}(l) \subset \Theta_B^{(1)}(h)$ . Note that when  $\gamma_{hR}^{(1)} = 0$  and  $\theta = \theta_{h-}^{(1)}$ , (A27) achieves equality. However, when  $\gamma_{hR}^{(1)} = 0$  and  $\theta = \theta_{h-}^{(1)}$ , the LHS is smaller than the RHS for (A32). Since the LHS of (A32) is increasing in  $\theta$ , the RHS of (A32) is decreasing in  $\theta$ , and (A32) achieves equality when  $\gamma_{hR}^{(1)} = 0$  and  $\theta = \theta_{l-}^{(1)}$ , we must have  $\theta_{l-}^{(1)} > \theta_{h-}^{(1)}$ . Similarly, we can show  $\theta_{l+}^{(1)} < \theta_{h+}^{(1)}$ . Thus,  $\Theta_B^{(1)}(l) \subset \Theta_B^{(1)}(h)$  is established. Q.E.D.

*Proof of Lemma 1:* Denote  $\Psi_j^{(1)}$  as the probability that an available project idea is rejected by the board for  $\theta \in \Theta_j^{(1)}$ , where  $j \in \{L, M, H\}$ . Note:

$$\begin{aligned} g(\eta | YES_S, \theta \in \Theta_j^{(1)}) &= \frac{g(YES_S | \eta, \theta \in \Theta_j^{(1)})g(\eta)}{\int_0^1 g(YES_S | \eta, \theta \in \Theta_j^{(1)})g(\eta) d\eta} \\ &= \frac{\eta[1 - \Psi_j^{(1)}]g(\eta)}{\int_0^1 \eta[1 - \Psi_j^{(1)}]g(\eta) d\eta} = \frac{\eta g(\eta)}{\bar{\eta}}. \end{aligned}$$

Thus,

$$\mathbf{E}[\eta | YES_S, \theta \in \Theta_j^{(1)}] = \int_0^1 \eta g(\eta | YES_S, \theta \in \Theta_j^{(1)}) d\eta = \frac{\int_0^1 \eta^2 g(\eta) d\eta}{\bar{\eta}} = \bar{\eta} + \frac{\sigma^2}{\bar{\eta}},$$

that is,

$$\mathbf{E}[\eta | YES_S, \theta \in \Theta_L^{(1)} \cup \Theta_M^{(1)} \cup \Theta_H^{(1)}] = \bar{\eta} + \frac{\sigma^2}{\bar{\eta}}.$$

For the case of  $NO_S$ ,

$$\begin{aligned} g(\eta | NO_S, \theta \in \Theta_j^{(1)}) &= \frac{g(NO_S | \eta, \theta \in \Theta_j^{(1)})g(\eta)}{\int_0^1 g(NO_S | \eta, \theta \in \Theta_j^{(1)})g(\eta) d\eta} \\ &= \frac{[(1 - \eta) + \eta\Psi_j^{(1)}]g(\eta)}{\int_0^1 [(1 - \eta) + \eta\Psi_j^{(1)}]g(\eta) d\eta} = \frac{[1 - \eta(1 - \Psi_j^{(1)})]g(\eta)}{1 - \bar{\eta}[1 - \Psi_j^{(1)}]}. \end{aligned}$$

Thus,

$$\begin{aligned} \mathbf{E}[\eta | NO_S, \theta \in \Theta_j^{(1)}] &= \int_0^1 \eta g(\eta | NO_S, \theta \in \Theta_j^{(1)}) d\eta \\ &= \frac{\int_0^1 [\eta - \eta^2(1 - \Psi_j^{(1)})]g(\eta) d\eta}{1 - \bar{\eta}[1 - \Psi_j^{(1)}]} = \bar{\eta} - \frac{\sigma^2[1 - \Psi_j^{(1)}]}{1 - \bar{\eta}[1 - \Psi_j^{(1)}]}. \end{aligned}$$

The values of  $\Psi_j^{(1)}$  for the different states can be established as follows:

1. For  $\theta \in \Theta_L^{(1)}$ ,

$$\Psi_L^{(1)} = q \left\{ \beta[\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)] + (1 - \beta) \left[ \begin{array}{l} [\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)] \\ + [\varepsilon_{LU}(1 - \theta) + (1 - \varepsilon_{LU})\theta]\gamma_{LR}^{(1)} \end{array} \right] \right\} \\ + (1 - q) \left\{ \beta[1 - \theta] + (1 - \beta) \left[ \begin{array}{l} [\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)] \\ + 1_{\{\theta \in \Theta_{L1}^{(1)}\}}[\varepsilon_{HU}(1 - \theta) + (1 - \varepsilon_{HU})\theta]\gamma_{hR}^{(1)} \end{array} \right] \right\};$$

2. For  $\theta \in \Theta_M^{(1)}$ ,

$$\Psi_M^{(1)} = q\{\beta[\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)] + (1 - \beta)[\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)]\} \\ + (1 - q)\{\beta[1 - \theta] + (1 - \beta)[\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)]\};$$

3. For  $\theta \in \Theta_H^{(1)}$ ,

$$\Psi_H^{(1)} = \beta[\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)] + (1 - \beta)[\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)](1 - \gamma_{lA}^{(1)}).$$

The indicator function  $1_{\{\theta \in \Theta_{L1}^{(1)}\}}$  is defined as follows:  $1_{\{\theta \in \Theta_{L1}^{(1)}\}} = 1$  if  $\theta \in \Theta_{L1}^{(1)}$ , and 0 otherwise. Note that  $\mathbf{E}[\eta | NO_S, \theta \in \Theta_j^{(1)}]$  is increasing in  $\Psi_j^{(1)}$ , and  $\Psi_j^{(1)}$  is continuously decreasing in  $\theta$ . Thus,  $\mathbf{E}[\eta | NO_S, \theta]$  is continuously decreasing in  $\theta$ . Q.E.D.

*Proof of Proposition 2:* First, consider the case in which the prior belief of project quality is relatively low,  $\theta \in \Theta_{L2}^{(1)}$ , in which case the untalented board does not misrepresent under  $\tau = h$ , but does misrepresent under  $\tau = l$ . In equilibrium, the shareholders' belief about the CEO's choice of information disclosure  $\xi \in \{n, f\}$  must coincide with the CEO's equilibrium choice. We conjecture that the CEO's equilibrium choice is  $\xi = f$  for this region. In equilibrium, the shareholders believe that the CEO chooses  $\xi = f$ . We now establish that this is indeed an equilibrium. If the CEO chooses  $\xi = f$ , her expected utility is

$$U_{C(f)} = \alpha_C \left\{ \eta(1 - \Psi_f) \left( \bar{\eta} + \frac{\sigma^2}{\bar{\eta}} \right) + [1 - \eta(1 - \Psi_f)] \left[ \bar{\eta} - \frac{\sigma^2(1 - \Psi_f)}{1 - \bar{\eta}(1 - \Psi_f)} \right] \right\} + \eta\pi_f, \tag{A37}$$

where

$$\Psi_f \equiv q \left\{ \beta[\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)] + (1 - \beta) \left[ \begin{array}{l} [\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)] \\ + [\varepsilon_{LU}(1 - \theta) + (1 - \varepsilon_{LU})\theta]\gamma_{LR}^{(1)} \end{array} \right] \right\} \\ + (1 - q)\{\beta(1 - \theta) + (1 - \beta)[\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)]\}, \\ \pi_f \equiv q \left\{ \begin{array}{l} \theta[\beta(1 - \varepsilon_{LT}) + (1 - \beta)(1 - \varepsilon_{LU})(1 - \gamma_{lR}^{(1)})](M - I) \\ + (1 - \theta)[\beta\varepsilon_{LT} + (1 - \beta)\varepsilon_{LU}(1 - \gamma_{lR}^{(1)})](-I) \end{array} \right\} \\ + (1 - q)\{\theta[\beta + (1 - \beta)(1 - \varepsilon_{HU})](M - I) + (1 - \theta)(1 - \beta)\varepsilon_{HU}(-I)\}.$$

If instead the CEO chooses  $\xi = n$ , her expected utility is

$$U_{C(n)} = \alpha_C \left\{ \eta(1 - \Psi_n) \left( \bar{\eta} + \frac{\sigma^2}{\bar{\eta}} \right) + [1 - \eta(1 - \Psi_n)] \left[ \bar{\eta} - \frac{\sigma^2(1 - \Psi_f)}{1 - \bar{\eta}(1 - \Psi_f)} \right] \right\} + \eta\pi_n, \tag{A38}$$

where

$$\begin{aligned} \Psi_n &\equiv \beta[\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)] + (1 - \beta) \left[ \frac{[\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)]}{+[\varepsilon_{LU}(1 - \theta) + (1 - \varepsilon_{LU})\theta]\gamma_{LR}^{(1)}} \right], \\ \pi_n &\equiv \theta[\beta(1 - \varepsilon_{LT}) + (1 - \beta)(1 - \varepsilon_{LU})(1 - \gamma_{LR}^{(1)})](M - I) \\ &\quad + (1 - \theta)[\beta\varepsilon_{LT} + (1 - \beta)\varepsilon_{LU}(1 - \gamma_{LR}^{(1)})](-I). \end{aligned}$$

We need to show  $U_{C(f)} > U_{C(n)}$ , so that in equilibrium the CEO prefers to choose  $\xi = f$ . Note:

$$\begin{aligned} U_{C(f)} - U_{C(n)} &= (1 - q)\eta \left\{ \theta \left[ \frac{\beta\varepsilon_{LT} + (1 - \beta)(1 - \varepsilon_{HU})}{-(1 - \beta)(1 - \varepsilon_{LU})(1 - \gamma_{LR}^{(1)})} \right] (M - I) \right. \\ &\quad \left. - (1 - \theta)I[(1 - \beta)[\varepsilon_{HU} - \varepsilon_{LU}(1 - \gamma_{LR}^{(1)})] - \beta\varepsilon_{LT}] \right\} \\ &\quad + \eta\alpha_C\sigma^2(\Psi_n - \Psi_f) \left[ \frac{1}{\bar{\eta}} + \frac{1 - \Psi_f}{1 - \bar{\eta}(1 - \Psi_f)} \right]. \end{aligned} \tag{A39}$$

A sufficient condition for  $U_{C(f)} > U_{C(n)}$  is that

$$\Psi_n > \Psi_f,$$

that is,

$$\gamma_{LR}^{(1)} > \frac{(1 - 2\theta)[\beta\varepsilon_{LT} + (1 - \beta)(\varepsilon_{LU} - \varepsilon_{HU})]}{(1 - \beta)[\varepsilon_{LU}(1 - \theta) + (1 - \varepsilon_{LU})\theta]}. \tag{A40}$$

Note that  $\gamma_{LR}^{(1)}$  is determined by equation (A32), which can be written in expanded form as

$$\begin{aligned} \alpha_B &\left\{ \frac{\beta[(1 - \varepsilon_{LT})\theta + \varepsilon_{LT}(1 - \theta)]}{\beta[(1 - \varepsilon_{LT})\theta + \varepsilon_{LT}(1 - \theta)] + (1 - \beta)[(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)](1 - \gamma_{LR}^{(1)})} \right. \\ &\quad + \delta_B \left[ \frac{(1 - \varepsilon_{LU})\theta}{(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)} \cdot \frac{\beta(1 - \varepsilon_{LT})}{\beta(1 - \varepsilon_{LT}) + (1 - \beta)(1 - \varepsilon_{LU})(1 - \gamma_{LR}^{(1)})} \right. \\ &\quad \left. \left. + \frac{\varepsilon_{LU}(1 - \theta)}{(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)} \cdot \frac{\beta\varepsilon_{LT}}{\beta\varepsilon_{LT} + (1 - \beta)\varepsilon_{LU}(1 - \gamma_{LR}^{(1)})} \right] \right\} \end{aligned}$$

$$\begin{aligned}
 & + \left[ \frac{(1 - \varepsilon_{LU})\theta}{(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)} \right] M - I \\
 & = \frac{\alpha_B(1 + \delta_B)\beta[\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)]}{\beta[\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)] + (1 - \beta) \left\{ \begin{aligned} & [\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)] \\ & + [(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)]\gamma_{LR}^{(1)} \end{aligned} \right\}}.
 \end{aligned}
 \tag{A41}$$

The RHS of (A41) is decreasing in  $\gamma_{LR}^{(1)}$  while the LHS of (A41) is increasing in  $\gamma_{LR}^{(1)}$ . To obtain (A40), it is sufficient to require that when  $\gamma_{LR}^{(1)} = \frac{(1 - 2\theta)[\beta\varepsilon_{LT} + (1 - \beta)(\varepsilon_{LU} - \varepsilon_{HU})]}{(1 - \beta)[\varepsilon_{LU}(1 - \theta) + (1 - \varepsilon_{LU})\theta]}$ , the LHS is strictly less than the RHS for (A41). When we substitute  $\gamma_{LR}^{(1)} = \frac{(1 - 2\theta)[\beta\varepsilon_{LT} + (1 - \beta)(\varepsilon_{LU} - \varepsilon_{HU})]}{(1 - \beta)[\varepsilon_{LU}(1 - \theta) + (1 - \varepsilon_{LU})\theta]}$  into (A41), the RHS of (A41) becomes

$$\frac{\alpha_B(1 + \delta_B)\beta[\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)]}{\beta(1 - \theta) + (1 - \beta)[\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)]},$$

and the LHS of (A41) becomes

$$\begin{aligned}
 & \alpha_B \left\{ \frac{\beta[(1 - \varepsilon_{LT})\theta + \varepsilon_{LT}(1 - \theta)]}{\beta[(1 - \varepsilon_{LT})\theta + \varepsilon_{LT}(1 - \theta)] + (1 - \beta)[\theta + \varepsilon_{HU} - 2\varepsilon_{HU}\theta] - \beta\varepsilon_{LT}(1 - 2\theta)} \right. \\
 & + \delta_B \left[ \frac{\beta\theta(1 - \varepsilon_{LT})}{\beta \left[ (1 - \varepsilon_{LT})\theta + \varepsilon_{LU} \left( \frac{1 - \varepsilon_{LT}}{1 - \varepsilon_{LU}} \right) (1 - \theta) \right] + (1 - \beta)[\theta + \varepsilon_{HU} - 2\varepsilon_{HU}\theta] - \beta\varepsilon_{LT}(1 - 2\theta)} \right. \\
 & \left. \left. + \frac{\beta\varepsilon_{LT}(1 - \theta)}{\beta \left[ \varepsilon_{LT} \left( \frac{1 - \varepsilon_{LU}}{\varepsilon_{LU}} \right) \theta + \varepsilon_{LT}(1 - \theta) \right] + (1 - \beta)[\theta + \varepsilon_{HU} - 2\varepsilon_{HU}\theta] - \beta\varepsilon_{LT}(1 - 2\theta)} \right] \right\} \\
 & + \left[ \frac{(1 - \varepsilon_{LU})\theta}{(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)} \right] M - I \\
 & < \frac{\alpha_B(1 + \delta_B)\beta[(1 - \varepsilon_{LT})\theta + \varepsilon_{LT}(1 - \theta)]}{2\beta\theta + (1 - \beta)[\theta + \varepsilon_{HU} - 2\varepsilon_{HU}\theta]} + \left[ \frac{(1 - \varepsilon_{LU})\theta}{(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)} \right] M - I.
 \end{aligned}$$

Thus, it is sufficient to require

$$\begin{aligned}
 & \frac{\alpha_B(1 + \delta_B)\beta[(1 - \varepsilon_{LT})\theta + \varepsilon_{LT}(1 - \theta)]}{2\beta\theta + (1 - \beta)[\theta + \varepsilon_{HU} - 2\varepsilon_{HU}\theta]} + \left[ \frac{(1 - \varepsilon_{LU})\theta}{(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)} \right] M - I \\
 & < \frac{\alpha_B(1 + \delta_B)\beta[\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)]}{\beta(1 - \theta) + (1 - \beta)[\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)]}.
 \end{aligned}$$

That is,

$$\left[ \frac{(1 - \varepsilon_{LU})\theta}{(1 - \varepsilon_{LU})\theta + \varepsilon_{LU}(1 - \theta)} \right] M - I < \alpha_B(1 + \delta_B)\beta \left[ \begin{array}{c} \frac{\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)}{\beta(1 - \theta) + (1 - \beta)[\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)]} \\ - \frac{(1 - \varepsilon_{LT})\theta + \varepsilon_{LT}(1 - \theta)}{2\beta\theta + (1 - \beta)[\theta + \varepsilon_{HU} - 2\varepsilon_{HU}\theta]} \end{array} \right]. \quad (A42)$$

Note:

$$\begin{aligned} \text{RHS of (A42)} &> \alpha_B(1 + \delta_B)\beta \left[ \begin{array}{c} \frac{\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)}{\beta(1 - \theta) + (1 - \beta)[\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)]} \\ - \frac{(1 - \varepsilon_{LT})\theta + \varepsilon_{LT}(1 - \theta)}{\beta\theta + (1 - \beta)[\theta + \varepsilon_{HU} - 2\varepsilon_{HU}\theta]} \end{array} \right] \\ &= \alpha_B(1 + \delta_B)\beta \left[ \begin{array}{c} \left[ \frac{\theta[\varepsilon_{LT} - (1 - \beta)\varepsilon_{HU}] + (1 - \theta)[(1 - \varepsilon_{LT}) - \beta - (1 - \beta)(1 - \varepsilon_{HU})]}{[\beta\theta + (1 - \beta)[\theta + \varepsilon_{HU} - 2\varepsilon_{HU}\theta]]} \right] \\ \left[ \times [1 - [\beta\theta + (1 - \beta)[\theta + \varepsilon_{HU} - 2\varepsilon_{HU}\theta]]] \right] \end{array} \right]. \quad (A43) \end{aligned}$$

Since  $\theta < \theta_{l-}^{(1)} < \frac{1}{2}$  (let's say that  $\theta_{l-}^{(1)}$  is bounded above by a  $\Delta < \frac{1}{2}$ , that is,  $\theta_{l-}^{(1)} \leq \Delta$ , then  $\theta < \Delta < \frac{1}{2}$ ), a sufficient condition for (A42) to hold is that

$$\left[ \frac{(1 - \varepsilon_{LU})\Delta}{(1 - \varepsilon_{LU})\Delta + \varepsilon_{LU}(1 - \Delta)} \right] M - I < 4\alpha_B(1 + \delta_B)\beta(2\Delta - 1)[\varepsilon_{LT} - (1 - \beta)\varepsilon_{HU}] \quad \text{and} \quad \varepsilon_{LT} < (1 - \beta)\varepsilon_{HU}. \quad (A44)$$

The sufficiency condition (A44) will hold when  $\alpha_B$ ,  $\delta_B$ ,  $\beta$ , and  $\varepsilon_{HU}$  are sufficiently large (i.e., the untalented board's career concerns are sufficiently strong), and  $M$  is sufficiently small (i.e., untalented board's loss from the project payoff due to misrepresentation is smaller than its gain from the enhanced reputational payoff due to misrepresentation). It is obvious that under this parametric condition, if the shareholders believe that the CEO chooses  $n$ , the CEO will instead choose  $f$ , which does not constitute an equilibrium. Thus, the only equilibrium for a sufficiently low  $\theta$  is that the CEO chooses to disclose information with high precision. The case in which  $\theta \in \Theta_{L1}^{(1)}$  can be shown similarly.

Consider next the case in which the prior belief of project quality is relatively high, that is,  $\theta \in \Theta_{H1}^{(1)}$ , in which case the untalented board does not misrepresent under  $\tau = h$ , but does misrepresent under  $\tau = l$ . We conjecture that the CEO's equilibrium choice is  $\xi = n$  for this region. We now establish that this is indeed an equilibrium. If the CEO chooses  $\xi = n$ , her expected utility is

$$U_{C(n)} = \alpha_C \left\{ \eta(1 - \Psi_n) \left( \bar{\eta} + \frac{\sigma^2}{\bar{\eta}} \right) + [1 - \eta(1 - \Psi_n)] \left[ \bar{\eta} - \frac{\sigma^2(1 - \Psi_n)}{1 - \bar{\eta}(1 - \Psi_n)} \right] \right\} + \eta\pi_n, \quad (A45)$$

where

$$\begin{aligned} \Psi_n &\equiv \beta[\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)] + (1 - \beta)[\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)](1 - \gamma_{IA}^{(1)}), \\ \pi_n &\equiv \theta[\beta(1 - \varepsilon_{LT}) + (1 - \beta)(1 - \varepsilon_{LU} + \varepsilon_{LU}\gamma_{IA}^{(1)})](M - I) \\ &\quad + (1 - \theta)[\beta\varepsilon_{LT} + (1 - \beta)[\varepsilon_{LU} + (1 - \varepsilon_{LU})\gamma_{IA}^{(1)}]](-I). \end{aligned}$$

If instead the CEO chooses  $\xi = f$ , her expected utility is

$$U_{C(f)} = \alpha_C \left\{ \eta(1 - \Psi_f) \left( \bar{\eta} + \frac{\sigma^2}{\bar{\eta}} \right) + [1 - \eta(1 - \Psi_f)] \left[ \bar{\eta} - \frac{\sigma^2(1 - \Psi_n)}{1 - \bar{\eta}(1 - \Psi_n)} \right] \right\} + \eta\pi_f, \tag{A46}$$

where

$$\begin{aligned} \Psi_f &\equiv q\Psi_n + (1 - q)\{\beta(1 - \theta) + (1 - \beta)[\varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta)]\}, \\ \pi_f &\equiv q\pi_n + (1 - q)\{\theta[\beta + (1 - \beta)(1 - \varepsilon_{HU})](M - I) + (1 - \theta)(1 - \beta)\varepsilon_{HU}(-I)\}. \end{aligned}$$

We need to show  $U_{C(n)} > U_{C(f)}$ , so that in equilibrium the CEO prefers to choose  $\xi = n$ . Note:

$$\begin{aligned} U_{C(n)} - U_{C(f)} &= \eta\alpha_C\sigma^2(\Psi_f - \Psi_n) \left[ \frac{1}{\bar{\eta}} + \frac{1 - \Psi_n}{1 - \bar{\eta}(1 - \Psi_n)} \right] \\ &\quad + (1 - q)\eta \left\{ \begin{aligned} &\theta(M - I)[-\beta\varepsilon_{LT} + (1 - \beta)(\varepsilon_{HU} - \varepsilon_{LU} + \varepsilon_{LU}\gamma_{IA}^{(1)})] \\ &-(1 - \theta)I[\beta\varepsilon_{LT} + (1 - \beta)[\varepsilon_{LU} - \varepsilon_{HU} + (1 - \varepsilon_{LU})\gamma_{IA}^{(1)}]] \end{aligned} \right\}. \tag{A47} \end{aligned}$$

Now,  $U_{C(n)} > U_{C(f)}$  is equivalent to (we set  $q = 0$  to obtain the sufficient condition)

$$\gamma_{IA}^{(1)} > \frac{[\theta H + (2\theta - 1)(\alpha_C\sigma^2 - I)] \left[ (\varepsilon_{LU} - \varepsilon_{HU}) + \left( \frac{\beta}{1 - \beta} \right) \varepsilon_{LT} \right]}{[\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)](\alpha_C\sigma^2 - I) + \varepsilon_{LU}\theta H}. \tag{A48}$$

As  $\varepsilon_{LT} \downarrow 0$ , the above inequality can be approximated as

$$\gamma_{IA}^{(1)} > \frac{\left[ \frac{\theta H}{\alpha_C\sigma^2 - I} + (2\theta - 1) \right] (\varepsilon_{LU} - \varepsilon_{HU})}{\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)}. \tag{A49}$$

Note that  $\gamma_{IA}^{(1)}$  is determined by equation (A22). Assuming  $\varepsilon_{LT} \downarrow 0$ , equation (A22) can be written as

$$\begin{aligned}
 \alpha_B & \left\{ \frac{\beta\theta}{\beta\theta + (1-\beta)\{[(1-\varepsilon_{LU})\theta + \varepsilon_{LU}(1-\theta)] + [\varepsilon_{LU}\theta + (1-\varepsilon_{LU})(1-\theta)]\gamma_{IA}^{(1)}}} \right. \\
 & \left. + \delta_B \left[ \frac{\varepsilon_{LU}\theta}{\varepsilon_{LU}\theta + (1-\varepsilon_{LU})(1-\theta)} \cdot \frac{\beta}{\beta + (1-\beta)(1-\varepsilon_{LU} + \varepsilon_{LU}\gamma_{IA}^{(1)})} \right] \right\} \\
 & + \left[ \frac{\varepsilon_{LU}\theta}{\varepsilon_{LU}\theta + (1-\varepsilon_{LU})(1-\theta)} \right] M - I \\
 & = \alpha_B \left\{ \frac{(1 + \delta_B)\beta(1 - \theta)}{\beta(1 - \theta) + (1 - \beta)[\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)](1 - \gamma_{IA}^{(1)})} \right\}. \tag{A50}
 \end{aligned}$$

The LHS of (A50) is decreasing in  $\gamma_{IA}^{(1)}$ , while the RHS of (A50) is increasing in  $\gamma_{IA}^{(1)}$ . Thus, to obtain (A49), it is sufficient to require that when  $\gamma_{IA}^{(1)} = \frac{[\frac{\theta H}{\alpha_C \sigma^2 - I} + (2\theta - 1)(\varepsilon_{LU} - \varepsilon_{HU})]}{\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)}$ , the LHS of (A50) is strictly greater than the RHS of (A50). If we substitute  $\gamma_{IA}^{(1)} = \frac{[\frac{\theta H}{\alpha_C \sigma^2 - I} + (2\theta - 1)(\varepsilon_{LU} - \varepsilon_{HU})]}{\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)}$  into (A50), the RHS becomes

$$\frac{\alpha_B(1 + \delta_B)\beta(1 - \theta)}{\beta(1 - \theta) + (1 - \beta) \left[ \varepsilon_{HU}\theta + (1 - \varepsilon_{HU})(1 - \theta) - \frac{\theta H(\varepsilon_{LU} - \varepsilon_{HU})}{\alpha_C \sigma^2 - I} \right]},$$

and the LHS becomes

$$\begin{aligned}
 \alpha_B & \left\{ \frac{\delta_B \beta \theta}{\beta \left[ \theta + \left( \frac{1 - \varepsilon_{LU}}{\varepsilon_{LU}} \right) (1 - \theta) \right] + (1 - \beta) \left[ \theta(1 - \varepsilon_{HU}) + (1 - \theta) \left( (1 - \varepsilon_{LU}) \frac{1 - \varepsilon_{LU}}{\varepsilon_{LU}} - \varepsilon_{LU} + \varepsilon_{HU} \right) \right] + \frac{\theta H(\varepsilon_{LU} - \varepsilon_{HU})}{\alpha_C \sigma^2 - I}} \right. \\
 & \left. + \frac{\beta\theta}{\beta\theta + (1-\beta) \left[ \theta + \varepsilon_{HU} - 2\theta\varepsilon_{HU} + \frac{\theta H(\varepsilon_{LU} - \varepsilon_{HU})}{\alpha_C \sigma^2 - I} \right]} \right\} + \left[ \frac{\varepsilon_{LU}\theta}{\varepsilon_{LU}\theta + (1-\varepsilon_{LU})(1-\theta)} \right] M - I.
 \end{aligned}$$

So, to obtain (A49), it is sufficient to have

$$\left[ \frac{\varepsilon_{LU}}{\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)} \right] H - I > 4\alpha_B(1 + \delta_B)\beta(1 - \beta) \frac{H(\varepsilon_{LU} - \varepsilon_{HU})}{\alpha_C \sigma^2 - I}. \tag{A51}$$

Since  $\theta > \frac{1}{2}$ , the sufficiency condition above can be written as

$$(\alpha_C \sigma^2 - I) \frac{\varepsilon_{LU} H - I}{H(\varepsilon_{LU} - \varepsilon_{HU})} > 2\alpha_B(1 + \delta_B)\beta(1 - \beta). \tag{A52}$$

The idea is that the CEO's career concerns should be strong enough (big  $\alpha_C \sigma^2$ ) to outweigh the loss in the project payoff due to the low-signal precision. The case in which  $\theta \in \Theta_{H2}^{(1)}$  can be shown similarly.

Lastly, for intermediate prior beliefs of project quality,  $\theta \in \Theta_M^{(1)}$ , the untalented board does not misrepresent either under  $\tau = h$  or  $\tau = l$ , so the CEO prefers the information flow to the board to be of high precision, since high-precision information leads to a high expected project payoff. Q.E.D.

*Proof of Proposition 3:* First, when  $\theta$  is relatively low (in the untalented board's overrejection region), if the CEO chooses from group  $S$ , her expected utility is

$$U_{C(S)} = \alpha_C \left\{ \eta(1 - \Psi_S) \left( \bar{\eta} + \frac{\sigma^2}{\bar{\eta}} \right) + [1 - \eta(1 - \Psi_S)] \left[ \bar{\eta} - \frac{\sigma^2(1 - \Psi_\Delta)}{1 - \bar{\eta}(1 - \Psi_\Delta)} \right] \right\} + \eta\pi_S,$$

while if she chooses from group  $W$ , her expected utility is

$$U_{C(W)} = \alpha_C \left\{ \eta(1 - \Psi_W) \left( \bar{\eta} + \frac{\sigma^2}{\bar{\eta}} \right) + [1 - \eta(1 - \Psi_W)] \left[ \bar{\eta} - \frac{\sigma^2(1 - \Psi_\Delta)}{1 - \bar{\eta}(1 - \Psi_\Delta)} \right] \right\} + \eta\pi_W,$$

where  $\Psi_i$  is the probability that an available project is rejected by group  $i \in \{S, W, \Delta\}$  and  $\pi_j$  is the expected project payoff based on the evaluation by group  $j \in \{S, W\}$ . It is obvious that since  $\beta_S > \beta_W$ , we have  $\Psi_W > \Psi_S$  and  $\pi_W < \pi_S$ . Thus,  $U_{C(S)} > U_{C(W)}$ , that is, group  $S$  is preferred by the CEO.

Second, when  $\theta$  is relatively high (in the untalented board's overacceptance region),

$$U_{C(W)} - U_{C(S)} = \alpha_C \sigma^2 \eta (\Psi_S - \Psi_W) \left\{ \frac{1}{\bar{\eta}} + \frac{(1 - \Psi_\Delta)}{1 - \bar{\eta}(1 - \Psi_\Delta)} \right\} + \eta(\pi_W - \pi_S),$$

where

$$\begin{aligned} \Psi_S - \Psi_W &= [\varepsilon_{LT}\theta + (1 - \varepsilon_{LT})(1 - \theta)](\beta_S - \beta_W) \\ &\quad + [\varepsilon_{LU}\theta + (1 - \varepsilon_{LU})(1 - \theta)][(1 - \beta_S)(1 - \gamma_{LA}^{S(1)}) - (1 - \beta_W)(1 - \gamma_{LA}^{W(1)})], \end{aligned}$$

and  $\gamma_{LA}^{j(1)}$  is the untalented board's overacceptance rate for group  $j \in \{S, W\}$ . When the untalented board's career concerns are sufficiently strong, we have  $\Psi_S > \Psi_W$ , that is, an available project is more likely to be rejected by group  $S$ . When the CEO's career concerns are also strong enough (i.e.,  $\alpha_C \sigma^2$  is sufficiently large), the two effects compound each other and we have  $U_{C(W)} - U_{C(S)} > 0$ , that is, group  $W$  is preferred. Q.E.D.

*Proof of Lemma 2:* Note that for high prior beliefs of project quality,  $\tau = l$  for sure in Case 1 (since the CEO prefers  $\xi = n$ ), whereas in Case 2, with probability  $q$ ,  $\tau = l$ , and with probability  $[1 - q]$ ,  $\tau = h$  (since the CEO prefers  $\xi = f$ ). Denote the untalented board's overacceptance probability in Case 2 as  $\gamma_{\tau A}^{(2)}$ . It is clear that  $\gamma_{LA}^{(2)} = \gamma_{LA}^{(1)}$ , so we only need to show  $\gamma_{hA}^{(2)} < \gamma_{LA}^{(1)}$ . Note that  $\gamma_{LA}^{(1)}$  is determined by (A22) and  $\gamma_{hA}^{(2)}$  is determined by (A17) (with  $\gamma_{hA}^{(1)}$  in (A9)–(A11) replaced with  $\gamma_{hA}^{(2)}$ ). The untalented board's overacceptance probability  $\gamma_{LA}^{(1)}$  is chosen so that the LHS of (A22) equals the RHS of (A22). Suppose  $\gamma_{hA}^{(2)} = \gamma_{LA}^{(1)}$ ; it is easy to show that the LHS of (A17) is smaller than the LHS of (A22), whereas the RHS of (A17) is greater than the RHS of (A22). Note that the LHS of (A17) is decreasing, whereas the RHS of (A17) is increasing in  $\gamma_{hA}^{(2)}$ . Thus, in order for the equality in (A17) to hold, we must have  $\gamma_{hA}^{(2)} < \gamma_{LA}^{(1)}$ . Q.E.D.

*Proof of Proposition 4:* See the text. Q.E.D.

*Proof of Proposition 5:* The proof mirrors that of Proposition 1. We only demonstrate  $\gamma_{hR}^{(3)} > \gamma_{hR}^{(1)}$ . The proofs for  $\gamma_{hA}^{(3)} < \gamma_{hA}^{(1)}$ ,  $\gamma_{lR}^{(3)} > \gamma_{lR}^{(1)}$ , and  $\gamma_{lA}^{(3)} < \gamma_{lA}^{(1)}$  are similar to the proof of Proposition 1.

Consider  $\theta \in \Theta_A^{(3)}(h)$ . At date  $t = 1$ , the shareholders only see whether the project is implemented, that is,  $\mathcal{G}_{S1} = \{g(\eta), YES_S, NO_S\}$ . If  $YES_S$ , the shareholders know that the CEO generated an idea and the idea was accepted by the board. The posterior belief about the board's ability is

$$\Pr(T_1 | YES_S) = \frac{\beta\{(1-q)\theta + q[(1-\varepsilon_{LT})\theta + \varepsilon_{LT}(1-\theta)]\}}{1-\Psi}, \quad (A53)$$

where

$$\Psi \equiv q \left\{ \beta[\varepsilon_{LT}\theta + (1-\varepsilon_{LT})(1-\theta)] + (1-\beta) \left[ \begin{array}{l} [\varepsilon_{LU}\theta + (1-\varepsilon_{LU})(1-\theta)] \\ + [(1-\varepsilon_{LU})\theta + \varepsilon_{LU}(1-\theta)]\gamma_{lR}^{(3)} \end{array} \right] \right\} \\ + (1-q) \left\{ \beta(1-\theta) + (1-\beta) \left[ \begin{array}{l} [\varepsilon_{HU}\theta + (1-\varepsilon_{HU})(1-\theta)] \\ + [(1-\varepsilon_{HU})\theta + \varepsilon_{HU}(1-\theta)]\gamma_{hR}^{(3)} \end{array} \right] \right\}.$$

If  $NO_S$ , the shareholders cannot tell whether the idea was not available or whether it was generated by the CEO but rejected by the board. Thus, the shareholders first update their belief about the CEO's ability, that is, the probability that the project was available (see Lemma 1). Denote that probability as  $\hat{\eta} \equiv \mathbf{E}[\eta | NO_S] = \bar{\eta} - \frac{\sigma^2[1-\Psi]}{1-\bar{\eta}[1-\Psi]}$ , where  $\Psi$  is defined as above. Thus,

$$\Pr(T_1 | NO_S) = \frac{\beta\{(1-\hat{\eta}) + \hat{\eta}[(1-q)(1-\theta) + q[\varepsilon_{LT}\theta + (1-\varepsilon_{LT})(1-\theta)]]\}}{1-\hat{\eta}[1-\Psi]}. \quad (A54)$$

At date  $t = 2$ , the shareholders see the payoff for an accepted project, that is,  $\mathcal{G}_{S2} = \{g(\eta), M, zero, NO_S\}$ . It can be shown that

$$\Pr(T_2 | M) = \frac{\beta[1-q\varepsilon_{LT}]}{\beta[1-q\varepsilon_{LT}] + (1-\beta) \left[ \begin{array}{l} (1-q)(1-\varepsilon_{HU})(1-\gamma_{hR}^{(3)}) \\ + q(1-\varepsilon_{LU})(1-\gamma_{lR}^{(3)}) \end{array} \right]}, \quad (A55)$$

$$\Pr(T_2 | zero) = \frac{\beta[q\varepsilon_{LT}]}{\beta[q\varepsilon_{LT}] + (1-\beta)[(1-q)\varepsilon_{HU}(1-\gamma_{hR}^{(3)}) + q\varepsilon_{LU}(1-\gamma_{lR}^{(3)})]}, \quad (A56)$$

and

$$\Pr(T_2 | NO_S) = \Pr(T_1 | NO_S). \quad (A57)$$

When  $\tau = h$  (recall the board sees  $\tau$ ), the board is indifferent between recommending rejection and acceptance in equilibrium, that is,

$$\alpha_B\{\Pr(T_1 | YES_S) + \delta_B[\Pr(M | s_G, U, h) \Pr(T_2 | M) + \Pr(zero | s_G, U, h) \Pr(T_2 | zero)]\} + \pi(s_G, U, A, h) = \alpha_B\{(1 + \delta_B) \Pr(T_1 | NO_S)\} + \pi(s_G, U, R, h), \tag{A58}$$

where  $\Pr(M | s_G, U, h)$ ,  $\Pr(zero | s_G, U, h)$ ,  $\pi(s_G, U, R, h)$ ,  $\pi(s_G, U, A, h)$ ,  $\Pr(T_1 | YES_S)$ ,  $\Pr(T_1 | NO_S)$ ,  $\Pr(T_2 | M)$ , and  $\Pr(T_2 | zero)$  are given by (A28)–(A31) and (A53)–(A56), respectively.

When  $\tau = l$ , the board is indifferent between recommending rejection and acceptance in equilibrium, that is,

$$\alpha_B\{\Pr(T_1 | YES_S) + \delta_B[\Pr(M | s_G, U, l) \Pr(T_2 | M) + \Pr(zero | s_G, U, l) \Pr(T_2 | zero)]\} + \pi(s_G, U, A, l) = \alpha_B\{(1 + \delta_B) \Pr(T_1 | NO_S)\} + \pi(s_G, U, R, l), \tag{A59}$$

where  $\Pr(M | s_G, U, l)$ ,  $\Pr(zero | s_G, U, l)$ ,  $\pi(s_G, U, R, l)$ ,  $\pi(s_G, U, A, l)$ ,  $\Pr(T_1 | YES_S)$ ,  $\Pr(T_1 | NO_S)$ ,  $\Pr(T_2 | M)$ , and  $\Pr(T_2 | zero)$  are given by (A33)–(A36) and (A53)–(A56), respectively.

Now,  $\gamma_{hR}^{(3)}$  and  $\gamma_{lR}^{(3)}$  are jointly determined by (A58) and (A59). Note that when  $q = 0$  and  $\gamma_{lR}^{(3)} = 1$ , the mathematical form for the LHS of (A58) is exactly the same as that of (A27), which determines  $\gamma_{hR}^{(1)}$ . Note that the LHS of (A58) is increasing in  $\gamma_{\tau R}^{(3)}$  and decreasing in  $q$ , while the RHS of (A58) is decreasing in  $\gamma_{\tau R}^{(3)}$  and increasing in  $q$ . Thus, when we set  $q = 0$  and  $\gamma_{lR}^{(3)} = 1$ , the LHS of (A58) becomes greater than the RHS of (A58). Thus,  $\gamma_{hR}^{(3)}$  should be replaced by a  $\gamma < \gamma_{hR}^{(3)}$  to maintain the equality in (A58). If we can show  $\gamma > \gamma_{hR}^{(1)}$ , then we can establish  $\gamma_{hR}^{(3)} > \gamma_{hR}^{(1)}$ .

The LHS of (A58) is increasing in  $\gamma$  while the RHS of (A58) is decreasing in  $\gamma$ . Note that  $\gamma_{hR}^{(1)}$  is determined by (A27), which is identical to (A58), except that the RHS of (A27) is  $\frac{\alpha_B(1 + \delta_B)\beta(1 - \theta)}{\Psi}$ , while the RHS of (A58) is  $\frac{\alpha_B(1 + \delta_B)\beta(1 - \hat{\eta}\theta)}{1 - \hat{\eta}(1 - \Psi)}$ . To show that  $\gamma > \gamma_{hR}^{(1)}$ , we only need to show that

$$\frac{\alpha_B(1 + \delta_B)\beta(1 - \hat{\eta}\theta)}{1 - \hat{\eta}(1 - \Psi)} > \frac{\alpha_B(1 + \delta_B)\beta(1 - \theta)}{\Psi}, \tag{A60}$$

which is equivalent to showing

$$\gamma > \frac{\varepsilon_{HU}(1 - 2\theta)}{(1 - \varepsilon_{HU})\theta + \varepsilon_{HU}(1 - \theta)}. \tag{A61}$$

To show (A61), it is sufficient to show that when  $\gamma = \frac{\varepsilon_{HU}(1 - 2\theta)}{(1 - \varepsilon_{HU})\theta + \varepsilon_{HU}(1 - \theta)}$ , the LHS of (A58) is strictly less than the RHS of (A58). If  $\gamma = \frac{\varepsilon_{HU}(1 - 2\theta)}{(1 - \varepsilon_{HU})\theta + \varepsilon_{HU}(1 - \theta)}$ , the RHS of (A58) becomes  $\alpha_B\beta(1 + \delta_B)$  and the LHS becomes

$$\alpha_B\beta \left\{ 1 + \delta_B \frac{(1 - \varepsilon_{HU})\theta}{(1 - \varepsilon_{HU})\theta + \beta\varepsilon_{HU}(1 - \theta)} \right\} + \left[ \frac{(1 - \varepsilon_{HU})\theta}{(1 - \varepsilon_{HU})\theta + \varepsilon_{HU}(1 - \theta)} \right] M - I.$$

Thus, we only need

$$\alpha_B \beta \delta_B \left[ \frac{\beta \varepsilon_{HU}(1 - \theta)}{(1 - \varepsilon_{HU})\theta + \beta \varepsilon_{HU}(1 - \theta)} \right] - \left[ \frac{(1 - \varepsilon_{HU})\theta}{(1 - \varepsilon_{HU})\theta + \varepsilon_{HU}(1 - \theta)} \right] M + I > 0. \tag{A62}$$

Equation (A62) will hold if the board’s career concern is sufficiently strong (i.e., large  $\alpha_B, \beta, \delta_B$ ) compared to the project payoff  $M$ , so that the gain from the reputational payoff outweighs the loss from a diminished expected project payoff due to overrejection. Q.E.D.

*Proof of Lemma 3:* Denote the untalented board’s overrejection and over-acceptance probabilities in Case 4 as  $\gamma_{\tau R}^{(4)}$  and  $\gamma_{\tau A}^{(4)}$ , respectively. First, clearly  $\gamma_{\tau R}^{(4)} = \gamma_{\tau R}^{(3)}$ , since it is the shareholders who assess the board’s ability in Cases 3 and 4. The result  $\gamma_{\tau R}^{(4)} > \gamma_{\tau R}^{(1)}$  follows from  $\gamma_{\tau R}^{(3)} > \gamma_{\tau R}^{(1)}$  (Proposition 5). Second, for high project quality prior beliefs, note three things: (i) The probability of having  $\tau = h$  is higher in Case 3 than in Case 4, since the CEO always prefers full disclosure in Case 3, while in Case 4 she does not (as is established in Proposition 6); (ii)  $\gamma_{\tau A}^{(4)} = \gamma_{\tau A}^{(3)}$  for  $\forall \tau \in \{h, l\}$ ; and (iii)  $\gamma_{hA}^{(c)} < \gamma_{lA}^{(c)}$  for  $c \in \{3, 4\}$  (the proof of this is similar to that of Lemma 2). Thus, we have  $\gamma_{hA}^{(4)} < \gamma_{lA}^{(4)} = \gamma_{lA}^{(3)} < \gamma_{lA}^{(1)}$  (the last inequality is from Proposition 5). Since  $\tau = l$  for sure in Case 1 (Proposition 2) for high project quality beliefs, the untalented board overaccepts less in Case 4 than in Case 1 for high  $\theta$ . Q.E.D.

*Proof of Proposition 6:* As shown in Proposition 5, when the shareholders assess the board’s ability, the untalented board’s overrejection rate for relatively low  $\theta$  is higher than its overrejection rate when the CEO assesses the board’s ability. Disclosing high-precision information to the board attenuates the untalented board’s propensity to overreject on the one hand, and enhances the expected project payoff on the other hand. Thus, the CEO has a stronger preference to choose  $\xi = f$  for relatively low  $\theta$ . When  $\theta$  is relatively high, the untalented board’s overacceptance rate is lower when the shareholders assess the board’s ability than when the CEO assesses the board’s ability. Disclosing low-precision information to the board lowers the expected project payoff. But the associated increase in the reputational payoff (due to the untalented board’s overacceptance) is not high enough to balance the loss in the expected project payoff, because the untalented board’s overacceptance rate is lower when the shareholders assess the board’s ability. Thus, the CEO has a weaker preference to choose  $\xi = n$ . Q.E.D.

*Proof of Proposition 7:* It is obvious that the CEO prefers that the shareholders rather than the board assess her ability. We only need to show that having the CEO rather than the shareholders assess the board’s ability is better for the CEO in terms of her reputational payoff. The expected posterior assessment of the CEO’s ability is

$$\Omega_j \equiv (\eta \Psi_j) \left[ \bar{\eta} - \frac{\sigma^2(1 - \Psi_j)}{1 - \bar{\eta}(1 - \Psi_j)} \right] + (1 - \eta \Psi_j) \left[ \bar{\eta} + \frac{\sigma^2}{\bar{\eta}} \right],$$

for  $j \in \{C, S\}$ , where  $j = C$  means that the CEO assesses the board's ability,  $j = S$  means that the shareholders assess the board's ability, and  $\Psi_j$  is the probability that an available project is rejected by the board when agent  $j$  assesses the board's ability. As shown in Proposition 5, we have  $\Psi_C < \Psi_S$ , that is, an available project is more likely to be rejected by the board when the shareholders assess the board's ability than when the CEO assesses the board's ability. To show  $\Omega_C > \Omega_S$ , it is sufficient to show that  $\Omega_j$  is decreasing in  $\Psi_j$ . Note that

$$\frac{d\Omega_j}{d\Psi_j} \propto \frac{\Psi_j - 1}{\bar{\eta}[1 - \bar{\eta}(1 - \Psi_j)]} < 0.$$

Thus, the CEO's posterior perceived ability is maximized when she assesses the board's ability and the shareholders assess her ability (Case 1). Q.E.D.

*Proof of Proposition 8:* We only prove that the CEO prefers to choose  $\xi = f$  for  $\theta \in \Theta_{L2}^{(1)}$  since the proofs for the other results are similar. There are three possible equilibrium outcomes for  $\theta \in \Theta_{L2}^{(1)}$ .<sup>16</sup>

1. The project is implemented and generates a payoff of  $M$  (good project). The shareholders' posterior beliefs about the CEO's ability are  $[\bar{\eta} + \frac{\sigma^2}{\bar{\eta}}]$  and  $[\bar{\lambda} + \frac{v^2}{\bar{\lambda}}]$  for the *quantity* component and the *quality* component, respectively.
2. The project is implemented and generates a payoff of *zero* (bad project). The shareholders' posterior beliefs about the CEO's ability are  $[\bar{\eta} + \frac{\sigma^2}{\bar{\eta}}]$  and  $[\bar{\lambda} - \frac{v^2}{1-\bar{\lambda}}]$  for the *quantity* component and the *quality* component, respectively.
3. The project is not implemented. The shareholders' posterior beliefs about the CEO's ability are  $[\bar{\eta} - \frac{\sigma^2[1-\Psi_L]}{1-\bar{\eta}[1-\Psi_L]}]$  and  $\bar{\lambda}$  for the *quantity* component and the *quality* component, respectively, where  $\Psi_L$  is defined in the proof of Lemma 1.

If the CEO chooses  $\xi = f$ , her expected utility is

$$U'_{C(f)} = U_{C(f)} + \kappa_C \left\{ \begin{array}{l} [1 - \eta(1 - \Psi_f)]\bar{\lambda} + \eta(1 - \Psi_f)\lambda \left( \bar{\lambda} + \frac{v^2}{\bar{\lambda}} \right) \\ + \eta(1 - \Psi_f)(1 - \lambda) \left( \bar{\lambda} - \frac{v^2}{1 - \bar{\lambda}} \right) \end{array} \right\}, \quad (A63)$$

where  $U_{C(f)}$  and  $\Psi_f$  are given by (A37). If instead the CEO chooses  $\xi = n$ , her expected utility is

<sup>16</sup> Proof: If the project is implemented and generates a payoff of  $M$ , we have  $r(\lambda|M) = \frac{r(M|\lambda)r(\lambda)}{\int_0^1 r(M|\lambda)r(\lambda)d\lambda} = \frac{\lambda r(\lambda)}{\bar{\lambda}}$ . Thus,  $\mathbf{E}[\lambda|M] = \int_0^1 \lambda r(\lambda|M)d\lambda = \bar{\lambda} + \frac{v^2}{\bar{\lambda}}$ . If the project is implemented and generates a payoff of *zero*, we have  $r(\lambda|zero) = \frac{r(zero|\lambda)r(\lambda)}{\int_0^1 r(zero|\lambda)r(\lambda)d\lambda} = \frac{(1-\lambda)r(\lambda)}{1-\bar{\lambda}}$ . Thus,  $\mathbf{E}[\lambda|zero] = \int_0^1 \lambda r(\lambda|zero)d\lambda = \bar{\lambda} - \frac{v^2}{1-\bar{\lambda}}$ . If the project is not implemented, the posterior belief about  $\lambda$  remains at its prior  $\bar{\lambda}$ .

$$U'_{C(n)} = U_{C(n)} + \kappa_C \left\{ \begin{aligned} & [1 - \eta(1 - \Psi_n)]\bar{\lambda} + \eta(1 - \Psi_n)\lambda \left( \bar{\lambda} + \frac{v^2}{\bar{\lambda}} \right) \\ & + \eta(1 - \Psi_n)(1 - \lambda) \left( \bar{\lambda} - \frac{v^2}{1 - \bar{\lambda}} \right) \end{aligned} \right\}, \quad (\text{A64})$$

where  $U_{C(n)}$  and  $\Psi_n$  are given by (A38). Since  $U_{C(f)} > U_{C(n)}$  (Proposition 2), in order to show that the CEO prefers  $\xi = f$ , that is,  $U'_{C(f)} > U'_{C(n)}$ , it is sufficient to have

$$\begin{aligned} & \kappa_C \left\{ \begin{aligned} & [1 - \eta(1 - \Psi_f)]\bar{\lambda} + \eta(1 - \Psi_f)\lambda \left( \bar{\lambda} + \frac{v^2}{\bar{\lambda}} \right) \\ & + \eta(1 - \Psi_f)(1 - \lambda) \left( \bar{\lambda} - \frac{v^2}{1 - \bar{\lambda}} \right) \end{aligned} \right\} \\ & - \kappa_C \left\{ \begin{aligned} & [1 - \eta(1 - \Psi_n)]\bar{\lambda} + \eta(1 - \Psi_n)\lambda \left( \bar{\lambda} + \frac{v^2}{\bar{\lambda}} \right) \\ & + \eta(1 - \Psi_n)(1 - \lambda) \left( \bar{\lambda} - \frac{v^2}{1 - \bar{\lambda}} \right) \end{aligned} \right\} \propto \frac{\kappa_C v^2 (\lambda - \bar{\lambda})}{\bar{\lambda}(1 - \bar{\lambda})} \geq 0. \end{aligned}$$

Thus, as long as  $\lambda \geq \bar{\lambda}$ ,  $\lambda$  is slightly smaller than  $\bar{\lambda}$ , or  $\kappa_C$  is sufficiently small, we have  $U'_{C(f)} > U'_{C(n)}$ , that is, the CEO prefers  $\xi = f$ . Note that when  $\lambda$  is much smaller than  $\bar{\lambda}$ , or  $\lambda$  is just a little bit smaller than  $\bar{\lambda}$  but  $\kappa_C$  is sufficiently large, the CEO prefers  $\xi = n$ . Q.E.D.

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