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University of Southern California Law School
Los Angeles, CA 90089-0071

Gatekeepers and CEO Reputation[1]

Nina Walton

University of Southern California

Gould School of Law & Department of Economics

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Abstract

This paper provides a theoretical model to examine when and how boards of directors can utilize external experts or gatekeepers to assist them in 1) monitoring managers with career concerns, and 2) approving firm investments. I demonstrate how using gatekeepers to provide second opinions certifying management recommendations affects the disclosure incentives of management. Because certification serves as a signaling mechanism, when managers have the incentive to truthfully reveal all that they know, certification mandates are unnecessary since managers will choose to seek out second opinions on their own. When information disclosures cannot be easily verified, certification mandates can be counterproductive, elevating the status of costly second opinions that always agree with management recommendations. In the absence of incentives for truthful disclosure, it is better for boards to forego efforts to monitor and require management and gatekeepers to pool their recommendations.

  JEL Codes: D02, D82, G34, K22

1 Introduction

Shareholders and boards of directors have long depended on gatekeepers[1] such as auditors, analysts, investment bankers, attorneys, ratings agencies and consultants to overcome informational asymmetries between corporate insiders and outsiders. For certain tasks, the use of gatekeepers (also known as reputational intermediaries) is mandated by law. For example, the Securities and Exchange Act of 1934 requires that publicly traded companies be audited by a registered public accounting firm.[2] In other cases, gatekeeper use is within the firm's discretion, although in practice there may be little variation in use given the legal protection afforded to directors and officers from their reliance on gatekeeper opinions. For example, boards regularly seek fairness opinions by investment banks in the event of a merger or acquisition. Gatekeeper use is truly discretionary when not employed as liability shield, but to provide an additional opinion about a proposed course of action. For example, boards and managers regularly hire management consultants to assist in evaluating investment opportunities. In spite of their widespread use, there has not been a corresponding diminution in agency problems. In fact, many have argued that the corporate scandals of the early 2000s (Enron, WorldCom, Global Crossing and others) as well as the financial crisis of 2008, could not have occurred without the participation of outside experts such as auditors and ratings agencies (Coffee (2006), Healy & Palepu (2003), Demski (2003)).[3]

This evidence presents us with with a dilemma. On the one hand, policy makers, courts and legislative bodies have determined that gatekeepers are the solution to principal-agent problems that arise within corporations where shareholders are dispersed and management is centralized. On the other hand, it appears that the use of gatekeepers can serve to exacerbate informational problems between outsiders and insiders rather than ameliorate them. In particular, gatekeepers can increase agency costs by legitimizing poor managerial

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[1]In this paper, I use the term "gatekeepers" loosely to mean any outside expert relied upon by the board to evaluate recommendations made by management.

[2]Section 10A *Securities and Exchange Act of 1934.*

[3]See also the Congressional Committee on Oversight and Governmental Reform Hearing, "Credit Rating Agencies and the Financial Crisis", October 22, 2008 (http://oversight.house.gov/story.asp?ID=2250).

decisions. In this paper, I ask when and how can principals (in this case, shareholders and boards of directors) use gatekeepers to monitor agents (CEOs), when those agents control access to inside information. In addition, I investigate the trade-offs principals face between proper evaluation of agents and their ability to elicit important information from agents, taking into account the capacity of agents to distort this information. To answer these questions, I examine the simplest possible scenario and an aspirational ideal - boards are independent, gatekeepers are both independent and competent, and CEOs care only about their reputation for being good stewards of the firm.

The set-up of the model can be summarized as follows. A corporation is owned by shareholders who delegate oversight of the firm to an independent board of directors. The board hires a CEO to manage the firm. An outside gatekeeper is available to provide second opinions. The board is expected to both evaluate the perfomance of CEOs and approve corporate investments, however, it is uncertain regarding the skill of the CEO in leading and growing the firm. In a given period, the CEO must recommend to the board whether to make an investment or not that if successful, will grow the company. The CEO controls access to internal information relevant to the investment, but he may or may not have the ability to adequately process it to make an informed recommendation. On the other hand, the gatekeeper is known to have the ability but must rely upon the CEO for access. Because I am concerned with efficacy of rules requiring the use of gatekeepers, I contrast outcomes where outside certification by a gatekeeper is mandated by law or internal corporate policies, with those where the CEO can determine whether to bring in an outsider for a second opinion.

I show that within the context of this model, to the extent that management reveals all relevant information to the gatekeeper, obtaining outside certification can be an effective means of improving decision making within corporations. However, and as is likely, when CEOs can filter information strategically, a second opinion will give little or no information to the board about the appropriateness of a CEO's decision. The CEO will have incentives to strategically filter information when detection of such manipulation is difficult, such as when

information is "soft" or pertaining to future events with uncertain outcomes. In this case, relying on second opinions may be detrimental, since gatekeepers will receive information that leads them to always validate the proposed course of action. Second opinions based on inaccurate information therefore give undue credence to management claims, and mandating certifications in these circumstances, or requiring boards to follow outside recommendations only exacerbates principal-agent issues.

In the absence of rules requiring certification, CEOs who want to impress their boards (who in turn, determine CEO compensation) will internalize the weight boards give to the certification in deciding whether or not to obtain a second opinion. When information disclosures are reliable, boards should give weight to second opinions. Competent CEOs will then use gatekeepers as a matter of course, since certification serves as a powerful signaling mechanism to the board of CEO skill. Importantly, when information is hard for insiders to manipulate, under a discretionary policy, gatekeeper utilization will look *identical* to a mandatory regime. Boards benefit from the second opinion even when it adds no new information about the investment, because it enables learning about the CEO. On the other hand, if information cannot be reliably transmitted to gatekeepers, the board should place no weight on the certification, and CEOs can then more effectively signal their competence by *not* using a gatekeeper. In fact, relying on a second opinion in these circumstances can be detrimental for shareholders, because the firm will make more bad investments than if the board simply disregarded the existence of that opinion. In this case, a discretionary regime *dominates* a mandatory regime - the company saves on wasteful gatekeeper costs, and the board is not locked in to following second opinions that yield no useful information.[4]

These results demonstrate that taking measures to increase the reliability of information coming from management helps to ensure that policies supporting certification achieve their

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[4]This result is a function of the fact that reputational concerns are paramount in CEO payoffs. In the event that a CEO derives a large enough private benefit from an investment taking place (or not), if inside information is easily manipulable, all CEO types will choose to use gatekeepers to obtain a concurring second opinion. There will be no difference then between mandatory and discretionary regimes, although under both regimes, the opinion will be of little use.

desired ends, while reducing the need for such rules in the first place. Credible disclosures by agents enable effective evaluation by principals, but an effort to evaluate can deter credible disclosures. Recognizing the potential adverse consequences in using outside certification as a monitoring mechanism is crucial, because in doing so, boards can implement a set of institutional rules regarding the use of gatekeepers in an effort to partially restore their value to the firm. Boards have two options. Firstly, the board can invest in a technology which increases the likelihood that CEO disclosures are accurate.[5] Gatekeeper certifications can then be used for the dual purpose of evaluating CEO ability and the investment. When this technology is very costly (the main criticism of section 404), a second option may be more appealing. By effectively renouncing its intent to use the recommendation to evaluate the CEO, the board can reduce the CEO's incentive to disclose information strategically in an effort to improve his own reputation. Insisting that gatekeepers work directly with management to come up with a joint (or pooled) recommendation, such that the board cannot distinguish between the CEO's view and that of the gatekeeper, means that the board cannot use the recommendation to evaluate the CEO's ability. Since the board can't compare CEO and gatekeeper recommendations, there is no benefit to withholding or distorting information about an investment in an effort to induce agreeement. The joint recommendation will be valuable therefore in the investment decision but of no use in evaluating CEO ability. Giving up the capacity to evaluate management can thus result in better disclosure of inside information due to the fact that low quality CEOs no longer fear exposure. When information is difficult to verify, a rule requiring joint recommendations clearly dominates both a mandatory regime where recommendations are kept separate and a discretionary regime where gatekeepers will not be used.

The distinction between *disclosure*, where agents reveal private information, and *oversight*, where principals actively evaluate agents or use that information is a useful one. In

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[5]The much maligned section 404 of the Sarbanes-Oxley Act of 2002 is an example of one such effort to improve the credibility of information disclosures by management to outsiders. Section 404 requires managers to assess the adequacy of a corporation's internal controls.

general, principal-agent models do not make a distinction between oversight of agents and agent disclosures of private information. Instead it is usually assumed that principals *monitor* agents, which involves instituting both oversight and disclosure mechanisms. Distinguishing between oversight and disclosure is important however, when the information disclosed will have an effect not only on the agent's reputation, but also on firm profitability. When private information has this dual purpose, principals may prefer to sacrifice oversight (or evaluation) capacity if it means higher quality disclosures.

The Sarbanes-Oxley Act (hereafter SOX) tried to address oversight and disclosure problems that arise in publicly traded corporations, although the controversy over how best to monitor management, as well as potential remedies, is almost as old as the corporate form itself.[6] SOX introduced new mandates that increased the independence of boards and its advisors from management[7], and enhanced the obligations of managers to certify the veracity of disclosures of internal information and attest to the adequacy of internal control systems to outsiders.[8] Hailed as "the most far-reaching reforms of American business practices since the time of Franklin D. Roosevelt"[9], SOX legislation is controversial because it

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[6]Debates over how to induce management to reveal information are universal and longstanding. For example, in the United Kingdom, to overcome disclosure problems, the Joint Stock Companies Act (1844) and the Companies Clause Consolidation Act (1945) required annual statutory audits of corporations, with the auditor being elected by shareholders and not employed by the company. In France, the legislature passed a law in 1857 with the explicit intent of preventing fraud and misrepresentation by firm insiders. The committee head, in his report to the legislature, stated that the bill "attempts as far as possible, to replace deceit and lies with truth and fairness". The legislature considered and rejected mandating external certification of internal claims, relying on *councils of surveillance* (analogous to boards of directors) instead, spelling out their duties and making them liable for failure (Freedeman (1979)). Legislative efforts to ensure quality disclosures in the United States occurred much later. Outside verification of internal claims was only mandated for newly incorporated companies by the NYSE in the 1920's, however, it was not until the passage of the Securities Acts of 1933 and 1934 that external auditing was required for all publicly traded corporations. Until then, disputes over disclosures were mainly dealt with by state courts. See Coffee (2006).

[7]For example, section 301 requires all members of the audit committee to be independent.

[8]Sections 302, 303, 401, 404 and 409 relate to the adequacy of management disclosures to investors. Section 302 requires that senior corporate officers individually certify that their financial statements accurately and fairly present the company's financial position and operating results. Section 303 provides for an SEC rule prohibiting fraudulently influencing or misleading an auditor for purposes of rendering financial statements misleading. Section 404 also makes management responsible for reporting on the state of the company's internal control systems. Section 409 requires management to make timely disclosures of material changes in the company's financial condition.

[9]President George W. Bush, as reported by Elisabeth Bumiller: "Bush Signs Bill Aimed at Fraud in Corporations", The New York Times, July 31, 2002, page A1.

creates a new system of federal regulatory mandates that override alternative contractual arrangements between managers, boards and shareholders (Ribstein (2002), Romano (2006), Coates (2007)). Supporters argue that mandates are necessary to restore confidence in, and integrity of, the public financial markets. Detractors argue that costs of SOX's implementation, in particular those associated with assuring the quality of disclosures about internal information, outweigh the corresponding benefits.[10] The debate over SOX and its many predecessors, raises an important puzzle: when and how can increased oversight and disclosure requirements improve corporate returns?

Evidence on the relationship between board independence (usually equated with oversight) and firm performance is mixed: for the most part independent boards do not seem to result in better firm performance than firms dominated by insiders.[11] One potential reason for the lack of a clear-cut benefit is that independent boards suffer from informational deficiencies. In addition to being time and resource constrained, independent boards, by definition, are not deeply involved with the internal affairs of the corporations they oversee. While independence may lower the risk of conflicts of interest, it also reduces the knowledge board members have about the firm's internal affairs.

Because of this lack of knowledge, in order to satisfy its fiduciary obligations to act diligently in approving investments and monitoring management, boards very often rely on third-party gatekeepers to provide certification. These independent experts can be credible purveyors of impartial advice, because in advising their clients they place their own reputation for expertise on the line. Theory suggests that longer-term concerns about one's

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[10]Section 404 is the most controversial provision because it has proven to be the most costly. Section 404 requires management and outside auditors to report on the scope and adequacy of the company's internal control system. According to *COSO's Integrated Framework*, internal control is broadly defined as a process, effected by an entity's board of directors, management and other personnel, designed to provide reasonable assurance regarding the achievement of objectives in the following categories: 1) Effectiveness and efficiency of operations, 2) Reliability of financial reporting, 3) Compliance with applicable laws and regulations. See http://www.coso.org/publications/executive_summary_integrated_framework.htm.

[11]There is some evidence that independent compensation, audit and nominating committees are associated with higher firm value (Chhaochharia and Grinstein (2004)). For theoretical models describing the endogeneity of board selection and performance, see Fama and Jensen (1983), Hermalin and Weisbach (1998), Almazan and Suarez (2003) and Warther (1998).

reputation for expertise should be sufficient to overcome any short-term benefits from knowingly giving incorrect or bad advice (Kreps and Wilson (1982), Milgrom and Roberts (1982), Fudenberg and Levine (1989)). By certifying management disclosures and recommendations, experts can thus credibly communicate that management is acting in the best interests of the firm (Kraakman (1985)).[12]

While scholars have noted that gatekeepers can fail because of their own conflicts of interest (Coffee (2006)), even in the absence of such conflicts there are other problems with such delegated monitoring. In particular, difficulties with reliance on independent experts to monitor managers can arise due to their otherwise desirable outsider status. As outsiders, experts cannot immediately access all relevant internal information. Instead, they must rely on management to give them the information they need to reach an informed and accurate opinion about a given proposal. The board can evaluate management by comparing its recommendation about a given investment with that of the expert. Certification (when the expert agrees with the manager's recommendation) facilitates oversight if the board expects the manager to be able to make an equally informed recommendation as the expert. When the board does not expect the manager to be able to reach the same conclusion as the expert, no such comparison takes place. Therefore the role the expert plays in assisting the board – certifier or specialist – depends on board expectations as well as the actual ability of the manager. When management's payoff depends on the esteem in which it is held by the board, the fact that the board can and will compare expert and management recommendations changes management's incentives to disclose all relevant information to experts.

This paper extends formal models showing how career concerns impact investment rec-

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[12]While in the model below I assume that gatekeepers act honestly and competently, there is evidence that reputation alone may not be adequate to overcome short-term incentives to collude with management. Arthur Anderson's role in the Enron accounting scandal is a case in point. While questions about the incentives gatekeepers have to collude with management, or to turn a blind eye to corporate malfeasance are interesting, they lie outside the scope of this paper which focuses on the incentives of management to disclose information and the effect of monitoring requirements on the value of outside certification. Policies that aim to reduce gatekeeper incentives to collude with management belong to a different regulatory regime that those dealing with managerial incentives to withhold information from gatekeepers.

ommendations (Holmström (1999), Holmström and Ricart i Costa (1986)), by introducing the possibility of third party certification. Auditing has been considered in the literature on optimal contracting between principals and agents where principals are concerned with the effort level of their agents (Baron and Besanko (1984), Kofman and Lawarrée (1993), Khalil (1997)). Kofman and Lawarrée make a distinction between internal and external auditors, noting that internal auditors are costless, well informed but are likely to collude with agents, while external auditors are costly, not informed but will not engage in collusion. Baron and Besanko (1984) and Khalil (1997) do not have mandated audits, but instead describe the optimal audit policy when agents have private information about costs, or production levels respectively. Similar to these models, agents have private information, and auditing (or certification) is one mechanism that can be used by the principal to uncover it. By contrast, these models all focus on the incentives to audit agent activities *ex-post*, while I examine certification for management recommendations *ex-ante*, where the certification itself can be distorted by the private information transmitted by the agent. In addition, these hierarchical agency models (with a principal, agent and auditor) tend to assume that at a cost, auditors can access all relevant information. In reality, agents are often better informed than both principals and supervisors, and moreover, control access to information relevant to their own performance. While some information will no doubt be verifiable, there may be other relevant information which is "soft" and unverifiable. Information about future rather than past performance may be particularly difficult to verify, especially when even talented CEOs can be wrong.

Like others who have studied information distortion within organizational hierarchies (for example, Aghion and Tirole (1997), Levitt and Snyder (1997), Song and Thakor (2006), Adams and Ferreira (2006)), I have endeavored to provide a positive model describing information control within an organization, and the agent's incentives to share that information with his principal when the principal could later use it against him. Unlike these models, I incorporate the role that third parties outsiders play in assisting principals, examining

specifically how regulatory solutions to problems of information distortion that utilize outside verification, may or may not be viable.

The remainder of the paper proceeds as follows. Section 2 presents the model. After first describing management's incentives to share information with advisors, Section 3 describes equilibrium results. Given the different disclosure regimes, the analysis compares outcomes where use of advisors is mandated with that where use is within managerial discretion. Section 4 concludes.

2   The Model

Consider an environment in which there is a single firm with many shareholders, a CEO who runs the firm, an independent board of directors to whom the CEO reports[13], and an outside expert who is available to provide a second opinion to the firm for a fee. To grow the firm's business, the CEO must make new investments, which must ultimately be approved by the board of directors. Although the board is independent, it relies on the CEO to make recommendations about investment opportunities since it has neither the resources, nor the capability to come to a view on its own. In addition to approving large investments, the board evaluates CEO performance. This entails setting CEO compensation to reflect his ability at making investments, and replacing the CEO if the board loses confidence in his abilities.[14]

At the beginning of each period, an investment opportunity becomes available to the firm, of which both the board and the CEO are aware. If approved, the investment costs the firm $c \in (0, 1)$. A good investment (G) is profitable for the firm, yielding a return of 1,

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[13]For the purposes of the model, I assume the entire board consists of independent directors. In reality, some insiders usually sit on the board, however insiders are not allowed to sit on key governance committees (such as nomination, compensation or auditing), or on investment committees where there is some potential conflict of interest between managers and director decisions. Outside experts are particularly relevant in these contexts. Alternatively, one can imagine the CEO serving as a proxy for all inside board members.

[14]The model focuses on CEO ability to make investments. Of course, CEOs carry out other tasks such as managing the firm's existing business. Many of these tasks however, require decisions about investments (such as investing in R&D to bring out a next-generation product) or divestments (whether to sell or shut down an existing business).

while a bad investment (B) has a return of 0, resulting in a net loss. Investment outcome is observed only if the investment is made. If the board does not approve the investment, it is not made, and the outcome is unknown. However, both the CEO and the board know that the unconditional likelihood that the investment outcome is good is $\theta \in (0,1)$.

In making his recommendation whether to invest or not, the CEO has access to both private and public information. Public information is available to everyone including the board. An example of public information is knowledge about the competitive landscape or the market in general. Access to private information, on the other hand, is controlled by the CEO.[15] Importantly, controlling access means that information given to the board and other outsiders may only be partial or inaccurate, yet those outsiders would not be so aware without being explicitly informed. For example, in a proposed merger, the potential synergy from combining firm operations is private information. Because of the "soft" nature of this information, it may be difficult or impossible for outsiders to verify its accuracy or completeness prior to the merger's execution. While the board and the public may eventually discover exactly what the CEO knew at the time, at least in the short-run, they remain unaware of the full extent of the CEO's private information.

Before making a recommendation, the CEO draws a private *signal* consisting of two pieces of information: $K = \{k_1, k_2\}$. Information could include past and expected sales and revenues, potential synergies, growth opportunities. Each piece of information can be a good (g) or bad (b) indicator about the likely investment state. A signal is called strong (S) if either $K = \{g, g\}$ or $K = \{b, b\}$: the information is clear and unambiguous about the likely investment outcome. A signal is called weak (W) if $K = \{g, b\}$: the pieces of information conflict with one another, and so the outcome is harder to predict. Importantly, because the CEO is an insider, he controls outsider access to the signal. While the CEO's signal is known only to himself, it is commonly known that the probability of a strong good signal is

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[15]The CEO relies on his management team who in practice control the information in question. To simplify the discussion, I refer to the CEO rather than top corporate officers, since the CEO either knows or could have known about internal information relevant to the investment.

$\gamma_G \in (0,1)$ and a strong bad signal is $\gamma_B \in (0,1)$. For simplicity, assume that $\gamma_G = \gamma_B = \gamma$.

Using his signal K, the CEO draws an inference $s \in \{s^G, s^B\}$ about the investment which is either good or bad. CEOs can have either *high ability* (H) or *low ability* (L) in drawing inferences about the true investment state. The relationship between CEO ability and signal strength can be described as follows. While both types $i \in \{H, L\}$ always draw the same signal, they will only draw the same inference about an investment opportunity when the signal is strong. For weak signals, only the high type will be able to draw an informative inference about the investment outcome. The low type cannot distinguish between the conflicting elements to determine which state is more likely. He draws an inference about the investment outcome that is completely noisy, giving no indication of the true investment state. Based on this inference, the CEO makes a recommendation to the board about whether or not to make the investment. The CEO's recommendation is denoted $\widehat{s}_i \in \{\widehat{s}_i^G, \widehat{s}_i^B\}$ where $\widehat{s}_i^G$ is a recommendation in favor of the investment and $\widehat{s}_i^B$ is a recommendation to reject.

While inferences may be informative, they will not always be correct. Since unpredictable events can sour even the most promising of investment opportunities, investment outcomes are inherently uncertain. Therefore, the most accurate inference will only be imperfectly correlated with the true investment state, and high types cannot be absolutely confident that they will be correct. The high type draws an accurate inference with probability p, regardless of the signal. To ensure that the high type's inference is more likely to be right than wrong, I assume that $p > \max\{\theta, 1 - \theta\}$. When the signal is strong, the low type also draws an accurate inference with probability p. For weak signals, I assume without loss of generality, that the low type is equally likely to draw a good and bad inference regardless of the true state. Hence his signal is completely noisy and therefore uninformative. Summarizing,

$$\Pr\left(s_{i\in\{H,L\}}^G \mid G, S\right) = \Pr\left(s_{i\in\{H,L\}}^B \mid B, S\right) = p$$

$$\Pr\left(s_H^G \mid G, W\right) = \Pr\left(s_H^B \mid B, W\right) = p$$

$$\Pr\left(s_L^G \mid G, W\right) = \Pr\left(s_L^G \mid B, W\right) = \frac{1}{2}$$

The probability that the high type draws a good inference and the investment state is good is $p\theta$, and the probability he draws a good inference and the true investment state is bad is $(1-p)(1-\theta)$. Therefore, the unconditional probability he draws a good inference is $p\theta + (1-p)(1-\theta)$. Similarly, the probability the high type draws a bad inference when the true investment state is bad is $p(1-\theta)$, and the probability he draws a bad inference when the true state is good is $(1-p)\theta$. The unconditional probability the high type draws a bad inference is $p(1-\theta) + (1-p)\theta$. Using Bayes Rule, we can calculate the conditional probabilities that the high type is right and wrong given his inference:

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\begin{aligned}
\Pr\left(G \mid s_H^G\right) &= \frac{p\theta}{p\theta + (1-p)(1-\theta)} \\
\Pr\left(B \mid s_H^G\right) &= \frac{(1-p)(1-\theta)}{p\theta + (1-p)(1-\theta)} \\
\Pr\left(B \mid s_H^B\right) &= \frac{p(1-\theta)}{p(1-\theta) + (1-p)\theta} \\
\Pr\left(G \mid s_H^B\right) &= \frac{(1-p)\theta}{p(1-\theta) + (1-p)\theta}
\end{aligned}
$$

To simplify notation, going forward let $p\theta + (1-p)(1-\theta) = x$ and $p(1-\theta) + (1-p)\theta = 1 - x$. The probabilities of good and bad signals are the same for low types who draw strong signals. Following a weak signal, the probability the low type makes the correct recommendation is just the unconditional probability that the investment is good or bad. Therefore, we have:

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\begin{aligned}
\Pr\left(G \mid s_L, W\right) &= \Pr\left(G\right) = \theta \\
\Pr\left(B \mid s_L, W\right) &= \Pr\left(B\right) = 1 - \theta
\end{aligned}
$$

The board is uncertain about the CEO's type. It maintains a prior belief that the CEO has high ability with probability $\alpha \in (0,1)$. The board derives its belief from all that it knows about the CEO's performance in this and in other positions. The CEO however, is aware of his own ability type. One might alternatively think that there is an initial move

by nature determining the probability distribution over CEO types in the population. The board knows these probabilities, but the actual type is known only to the CEO.

In addition to the CEO's recommendation, the board can rely upon a recommendation from a third party expert, who charges the firm a fixed fee z. There are two reasons why paying for an additional recommendation may be valuable to the board: 1) the expert provides an additional recommendation, providing reassurance to the board that an investment is worth making (or not); and 2) the second opinion increases the board's capacity to evaluate the CEO, by allowing the board to compare CEO and expert recommendations. The expert depends on the CEO to give her access to the signal from which she also draws an inference, denoted by s_e. It is common knowledge that the expert is honest, always recommending in accordance with her inference. She is also known to have high ability. I make the assumption that when presented with the same signal, high types all draw identical inferences. This assumption implies that uncertainty is systematic. High ability CEOs and experts will therefore be incorrect about exactly the same factors when presented with exactly the same information.[16] Following a weak signal, low types do not know what recommendation the expert will make, however, they do know the probability that the expert makes a good or bad recommendation. On the other hand, low types do know how the expert will recommend following a strong signal. This knowledge is important, as it provides the foundation for the low type's incentives to distort the signal they disclose to the expert.

2.1 Timing of the Game

In order to examine the necessity and value of regulation, I examine several different regulatory regimes, each of which reflects the heterogeneous use of advisors in corporate practice today. I first consider an unregulated environment, where the CEO makes all decisions

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[16]The assumption of perfect correlation provides a simple structure in which to examine the demand for certification. The results below will follow through so long as inferences between experts and high types have some degree of positive correlation. This is not the case when inferences are independent. Then, the expert's recommendation does not give the board additional information about CEO type. The second opinion will, however, give the board additional information about the investment outcome, and therefore assists it in determining whether to approve the investment, even when the CEO has high ability.

and the board is passive, only seeing recommendations and making final approval decisions. Against this unregulated regime, I compare an environment in which certifications are mandated either by law, contract or informal board policy. A regulated environment is equivalent to one in which boards have their own set of experts, who report directly to them.[17]

Figure 1 describes in detail the timing for the unregulated game. Before play begins, at time $t = 0$, the board forms its belief about the likelihood that the CEO has high ability, and nature determines the true state of the investment. At time $t = 1$, an investment opportunity becomes available and the CEO sees the signal K. The CEO decides whether or not to hire an expert and the timing of recommendations. Let $e_i \in \{e_i^h, e_i^n\}$ denote the hiring decision where e_i^h represents the decision by a CEO with type i to hire, and e_i^n is the decision not to hire. With mandates (either for certification or second opinions), the expert is always hired.

Figure 1: Timing of "Unregulated" Game

t=0
Nature determines CEO type

t=1
Investment opportunity becomes available
CEO makes hiring decision and reporting decision

t=2
CEO sees signal, draws inference and makes recommendation
CEO discloses signal to expert
Expert makes recommendation
Board approves or rejects investment

t=3
Investment outcome realized
Board updates prior belief about CEO type
CEO receives continuation payoff

With respect to the timing of recommendations, conditional upon hiring the expert, the

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[17]Several commentators have suggested that boards should have their own set of advisors permanently on call as a way to overcome informational asymmetries between boards and managers. See for example Goldberg (1972), Hazard and Rock (2004) and Cox (2003).

CEO must decide whether recommendations should be "pooled" or "separated". The notion of pooled and separated recommendations, not to be confused with pooling and separating strategies, is designed to capture the idea of certification – that is, whether the board can compare recommendations to evaluate the CEO. With pooled reports, the CEO sees the expert's recommendation before making his own. Since high types and experts will always draw the same inference (because of perfect correlation), recommending differently to the expert will lead the board to believe the CEO has low ability. Therefore in equilibrium low types will never disagree with the expert. We call the reports "pooled" because the board cannot distinguish the CEO's recommendation from that of the expert since they will always be in agreement.

Separated reporting occurs when the CEO makes his recommendation known to the board prior to knowing what the expert's recommendation will be. Boards can only compare CEO and expert recommendations if the reports are separated in this sense. Separating recommendations by time – that is, hiring the expert only *after* the CEO makes a recommendation – is one credible method of providing separated reports. Let $r_i \in \{r_i^s, r_i^p\}$ denote the reporting strategy where r^s represents separated reports while r^p represents pooled reports. With no regulation, the CEO can determine whether to have pooled or separated reporting. With mandated use of an expert, boards can require either pooled or separated reporting.

At time $t = 2$, the CEO draws his signal K and his inference about the investment outcome s. If he does not hire, or recommendations are separated, the CEO also makes his recommendation known to the board $\widehat{s}$. If an expert is hired, since the CEO controls the expert's access to the signal, he has a choice to present the true signal or to lie. The disclosure strategy, denoted by $\varphi_i\left(\widehat{S} \mid W\right)$, represents the probability that the CEO lies about his signal, reporting a strong signal instead of a weak signal.[18] The choice is not innocuous. Recall that low types will only be guaranteed of drawing the same inference as high types and experts when the signal is strong. Since a weak signal provides ambiguous

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[18]Below, I show that in equilibrium that no type would ever consider lying when the signal is strong. This would not necessarily be the case if the advisor is strategic, and infers type from signal reported.

information about the likely investment state, by manipulating the signal it is possible to report either a strong signal that the investment outcome is bad, or a strong signal that the investment outcome is good. If the CEO presents a strong signal to the expert when the true signal is actually weak, there is always a chance he will be caught and held accountable for the misrepresentation. Accordingly, I assume that the expert detects the misrepresentation with exogenous probability $0 \leq \rho \leq 1$, upon which discovery, she will inform the board. The detection probability ρ is designed to capture two factors: firstly, the amount of risk or liability that accrues to management from non-disclosure or misrepresentation of material information, and secondly, the "softness" or degree of manipulability of the information in question.

The CEO uses a recommendation strategy denoted by $\sigma_i\left(\widehat{s}_i \mid s_i\right)$. This strategy is the probability the CEO makes a certain recommendation conditional on his inference. Given that the low type draws an uninformative inference when the signal is weak, his recommendation strategy is independent of his inference, that is, $\sigma_L\left(\widehat{s}_L \mid s_L, W\right) = \sigma_L\left(\widehat{s}_L\right)$. After seeing the recommendation(s), the board decides whether to approve the investment or not. The board is risk neutral and approves investments with the goal of maximizing expected profits for the firm, which is just the expected benefit of the investment, minus the cost of investing c, minus any advisory fees z that are incurred.

At time $t = 3$, the investment outcome is realized if the investment is made. At this point, the board updates its prior belief about CEO ability using Bayes rule. The posterior belief, denoted by $\widehat{\alpha}$, is equivalent to the CEO's compensation going into the next period. The model focuses on the reputational concerns of CEOs, rather than the private benefits CEOs stand to gain upon certain events transpiring, or upon profit sharing in the event the investment goes well.[19] While in some cases, private benefits and profit sharing will be large enough to overcome concerns about reputation, it is legitimate to think that in general,

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[19]Examples of private benefits include large payouts or "golden parachutes" that become payable upon a change of control transaction, and stock in the private company that accrues to management in the event of a management buyout (MBO) of a publicly traded company. Examples of profit sharing include grants of company stock and stock options.

efforts to influence standing with the board and with the corporate community at large will be a guiding motivation of many CEOs. In any event, I note below the optimal institutional rules around the use of third-party experts when alternative forms of compensation are large enough to swamp reputational concerns. Given the structure of the game described above, the CEO's actions in the first period only affect his objective function through his continuation payoff $\widehat{\alpha}$. Therefore his choices in equilibrium must maximize the expectation of the continuation payoff over all possible realizations of investment outcomes. This structure is analogous to a game in which there are two periods and play ends after the second period. The CEO makes choices to maximize the expected posterior belief of the board.

3   Equilibrium Results

Throughout the analysis, I utilize the equilibrium solution concept of Perfect Bayesian Nash Equilibrium. To obtain uniqueness, I impose the intuitive criterion (see Cho and Kreps (1987)). The intuitive criterion eliminates equilibria that can only be sustained by imposing unreasonable beliefs about out-of-equilibrium behavior.[20]

Before analyzing the solution to this game, it is instructive to provide a roadmap outlining the results that follow (summarized in Table 2 below). The equilibrium analysis proceeds by first examining CEO incentives to reveal the full information set to the expert if hired. After establishing the disclosure strategy (which depends on the probability of detection), I discuss the equilibrium outcomes under different hiring and reporting regimes (mandated use with separated reporting, mandated use with pooled reporting, CEO discretion over use).

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[20]In signaling games, the intuitive criterion requires that if the information set following a certain action a_j by a given type t_i is off the equilibrium path, and that action is equilibrium-dominated for that type, then the receiver's belief $\Pr\left(t_i \mid a_j\right)$ should place zero probability on the player being type t_i. In a perfect Bayesian equilibrium in a signaling game, the action a_j is *equilibrium-dominated* for type t_i if t_i's equilibrium payoff is greater than t_i's highest possible payoff from playing a_j. See Cho and Kreps (1987).

Table 2: Summary of Equilibrium Results

	"Low" Probability of detection	"High" Probability of detection
Mandated Use & Separated Reports	-CEO can manipulate expert's signal -Expert always agrees with CEO -Investment made when recommendation is positive - Limited learning about CEO type	- CEO does not manipulate expert's signal -Expert sometimes agrees with CEO -Investment made when recommendation is positive -Learning about CEO type
Mandated Use & Pooled Reports	- CEO does not manipulate expert's signal -No disagreement between expert and CEO -Investment made when recommendation is positive - No learning about CEO type	- CEO does not manipulate expert's signal -No disagreement between expert and CEO -Investment made when recommendation is positive - No learning about CEO type
CEO Discretion Over Expert Use	- No expert is hired. - Investment made when CEO recommendation and expected return is positive - Limited learning about CEO type	- Expert always hired & recommendations are made separately -CEO does not manipulate signal -Expert sometimes agrees with CEO -Investment made when expert report is positive - Learning about CEO type

The analysis is divided into mandated use and discretionary use of outside experts to reflect heterogeneity of use in practice. In general, I define "mandate" to encompass any instance where the board seeks a second opinion. For example, publicly traded corporations are required to have their financial disclosures independently audited by outside auditers.[21] Importantly, with mark to market accounting standards, financial disclosures will depend on views about likely investment outcomes. In addition, not required by regulation, but encouraged by the courts, boards regularly obtain independent fairness opinions from investment banks as a way to protect themselves from liability in major corporate transactions such as mergers or acquisitions.[22] In securities offerings, companies and underwriters employ attor-

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[21]SOX requires external auditors to report directly to the audit committee (section 301). The Securities Act of 1933 and Securities and Exchange Act of 1934 requires issuers of publicly traded securities to audit their financial statements.

[22]*Smith vs. Van Gorkum* (488 A. 2d. 875-878 (1985)) is the seminal case establishing that second opinions, known as "fairness opinions", serve as a liability shield for boards from shareholder lawsuits. In *Van Gorkum*, the Delaware Supreme Court stated that while the obtainment of an independent fairness opinion in a change of control transaction is not required, it is evidence that directors have met the enhanced fiduciary burden that arises when transactions are not conducted at arms length. Cases subsequent to *Van Gorkum* have confirmed that fairness opinions issued by investment banks, consulting firms, accounting firms or other independent advisors, are sufficient to effectively remove legal risk for gross negligence for board directors.

neys to perform due diligence on management disclosures about financial performance and operating risks.[23] Companies seeking to issue debt seek a credit rating from a ratings agency. Finally, companies do not have a choice over whether they are covered by investment analysts who issue buy, hold and sell ratings on stocks based on their opinion of investment strategy and growth potential. On the other hand, "discretion" refers to management control over the use of outside experts. For example, management consultants are hired by, and work directly with management to form a recommendation on a given strategy; investment banks bring investment opportunities to firms, or will work with management to assess potential acquisitions or merger targets; and attorneys and accountants work with in-house counsel and finance department on legal and accounting issues respectively. I assume that when the use of experts is mandated (either because of law or internal board policy), the Board must follow the recommendation of the expert. When the use of experts is discretionary, the board can disregard their opinion.

3.1 CEO Disclosure Strategy

To solve for the equilibrium of this game, we use backward induction starting with the disclosure decision, since this is the CEO's final strategic node.[24] The CEO wishes to maximize his expected continuation payoff $E\left[\widehat{\alpha}\right]$. Therefore, the disclosure strategy depends on how the board updates its belief about ability type. If recommendations do not match, the board's posterior is always $\widehat{\alpha}\left(\widehat{s} \neq s_e\right) = 0$. First note that if the CEO draws a strong signal, there is no incentive to lie since he will always come to the same conclusion as the expert. The real issue then, is what the CEO should disclose to the expert following a weak signal. Since the high type draws an identical inference to the expert, he will always prefer to reveal the full

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[23] The Securities Act of 1933 imposed strict liability on any issuer of securities that makes a material misstatement or omission in the disclosure document. As a defense, officers and directors need to show that they conducted a "reasonable investigation" verifying the accuracy of claims made in the issuing document. The obligation to conduct a reasonable investigation has essentially been delegated to the company's corporate attorneys. See Coffee (2006).

[24] Even though the game continues after this point, board approval decisions and updating of priors that take place after information disclosure are purely mechanical.

information set. This implies $\varphi_H \left(\widehat{S} \mid W, e^h \right) = 0$. The low type, who does not know what the expert will recommend, must decide whether to reveal his signal, risking the chance that the expert will disagree with him, or to strategically manipulate elements, risking detection by the expert. The following two lemmas outline the disclosure strategies for the low type under pooled and separated reporting structures respectively. Proofs for Lemmas 1 and 2 as well as all other propositions below, are contained in the Appendix.

Lemma 1 (*Disclosure strategy with pooled reports*) *When CEO and expert reports are pooled, low types will always truthfully disclose the weak signal to the expert using a disclosure strategy* $\varphi_L \left(\widehat{S} \mid W, e^h, r^p \right) = 0$.

The intuition behind Lemma 1 is simple: because the CEO knows the expert's opinion prior to making his own, and because his payoff depends only upon the board's view of his ability, he has no incentive to lie about his signal. Because there is full disclosure, the expert's recommendation will be reliable. By contrast, the disclosure strategy when reports are separated depends directly on the probability of detection. Defining $\rho^{\widehat{K}}$ represents the as the *cutoff detection threshold*, we have the following lemma.

Lemma 2 (*Disclosure strategy with separated reports*): *Following a weak signal, when* $\rho < \rho^{\widehat{K}} < 1$, *the low type always discloses a strong signal upon seeing a weak signal:* $\varphi_L \left(\widehat{S} \mid W, e^h, r^s \right) = 1$. *When* $\rho > \rho^{\widehat{K}}$, *the low type always truthfully discloses the weak signal:* $\varphi_L \left(\widehat{S} \mid W, e^h, r^s \right) = 0$. *The cutoff detection threshold* $\rho^{\widehat{K}=\{g,g\}}$ *and* $\rho^{\widehat{K}=\{b,b\}}$ *are strictly increasing in* α. *Further,* $\rho^{\widehat{K}=\{g,g\}}$ *is strictly decreasing in* θ, *and* $\rho^{\widehat{K}=\{b,b\}}$ *is strictly increasing in* θ.

Lemma 2 establishes that when reports are separated, the disclosure strategy depends directly on the likelihood that third party experts detect that the signal they receive from management is incomplete. When the probability of detection is "low" (that is, when $\rho < \rho^{\widehat{K}}$), the CEO presents an strong signal, favoring the recommendation he has already made.

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The risk that the expert does not certify the CEO's recommendation with full disclosure outweighs the risk of being caught with partial disclosure. When the probability of detection is "high" ($\rho > \rho^{\widehat{K}}$), the CEO presents a weak signal because the risk of detection outweighs the risk of no match.

The cutoff threshold detection level $\rho^{\widehat{K}}$ depends on the overall state of the economy θ. When the investment outcome is likely to be good, the expert is more likely to make a good recommendation. The CEO then has less need to withhold information, since he has greater certainty over how the expert will report. The same logic applies when the outcome is likely to be bad. Disclosing the true signal poses less of a risk, since recommendations are likely to match. Cutoff detection thresholds increase when the investment outcome is less certain since the low type will be unsure of the expert's recommendation and therefore more willing to lie.

The cutoff detection threshold also increases with the board's prior belief about CEO ability α. Low types held in relatively high regard by the board, have more to lose if the expert fails to provide certification. Therefore, to protect their reputation, they are more likely to withhold information to ensure certification, even as the risk of detection increases. The escalating riskiness of the behavior engaged in by executives at companies such as Enron and WorldCom exemplifies this point. Even as the likelihood of detection grew, executives continued to manipulate and withhold information from the board and other third parties. The costs of exposure were so great that seemingly reckless behavior became rational.[25]

The hope of legislative efforts, such as SOX, is to increase the incentives of management to fully disclose relevant information to third parties. Below I show that whether SOX is effective, depends directly on whether these efforts are successful. The results above demonstrate that such efforts are important since low types will withhold information from certifying parties when it is not likely they will be detected doing so. Because the detection

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[25]Kofman and Lawarrée (1993) reach a similar conclusion noting that collusion with internal auditors (with side payments) becomes more attractive for managers the larger their punishment is for low effort. Also see Chevalier and Ellison (1997) for empirical evidence that mutual fund managers with poor performances choose riskier portfolios than those with good performances.

thresholds are strictly less than one, detection does not have to be perfect to ensure management cooperation. Therefore full auditing of every management claim is unnecessary. If increasing the probability of detection is costly, boards can invest just to the point at which management would rather disclose the true signal.

We are now in a position to continue with the equilibrium analysis. Given that disclosure will either be full or partial, we can likewise split up the analysis. Since the focus of the paper is on the impact of regulation, we can further divide into the discussion into examination of mandated versus discretionary hiring decisions.

3.2 High probability of detection

3.2.1 Mandated use of experts

In circumstances where the probability of detection is high enough ($\rho > \rho^{\widehat{K}}$), low types will always fully disclose their signal regardless of the reporting structure. When reports are pooled, even though the certification is reliable, no learning about CEO type is possible. High types will always report their true inference. Low types who see the expert's recommendation will simply make the same recommendation to the board.

With separated reporting, the low type does not have an opportunity to see the expert's recommendation before making his own, and therefore will not know how she will recommend. He does however know the likelihood the expert draws good and bad inferences, and how the board updates following certification. A Perfect Bayesian Nash Equilibrium is defined below.

Definition 3 (Perfect Bayesian Nash Equilibrium with mandates and full information): *i) Knowing his own ability type and after drawing an inference from his private signal, the CEO utilizes a recommendation strategy $\sigma(\widehat{s} \mid s)$ that maximizes his expected continuation payoff $E[\widehat{\alpha}]$; ii) after observing the CEO's strategy and using the expert's recommendation, the board updates its prior belief about CEO ability using Bayes law; iii) the*

22

board approves investments after a positive recommendation from the expert and when the expected profits are positive; iv) board beliefs are consistent with CEO strategy and CEO strategy is optimal given board beliefs.

Because inferences are imperfectly correlated with the true investment state, it is possible for experts to be wrong when acting honestly and relying on the true signal. Even so, obtaining an informed recommendation increases the likelihood that the board makes decisions that maximize profits, and thus it will always follow the expert's recommendation.[26] For the CEO, all that matters is whether or not the expert certifies the CEO's recommendation, rather than the actual investment outcome if realized. If the expert fails to certify the CEO's recommendation, the board infers that the CEO has low ability. Letting $\varphi_L\left(\widehat{S} \mid W, e^h, r^s\right) = 0$, and given that the high type always reports his true inference (because he knows that the expert is honest, and will always agree with him), the board's posteriors following a good recommendation and a bad recommendation, both certified by the expert respectively are:

$$\widehat{\alpha}\left(\widehat{s}^G, s_e^G\right) = \frac{\alpha}{\gamma + (1-\gamma)\left(\alpha + (1-\alpha)\, x\sigma_L\left(\widehat{s}^G\right)\right)} \tag{1}$$

$$\widehat{\alpha}\left(\widehat{s}^B, s_e^B\right) = \frac{\alpha}{\gamma + (1-\gamma)\left(\alpha + (1-\alpha)(1-x)\left(1 - \sigma_L\left(\widehat{s}^G\right)\right)\right)} \tag{2}$$

With mandates in place, the only thing the CEO must decide is the recommendation to make to the board. The low type will set $\sigma_L\left(\widehat{s}^G\right)$ to maximize his expected continuation payoff:

$$E_L\left[\widehat{\alpha}\right] = \sigma_L\left(\widehat{s}^G\right) x\widehat{\alpha}\left(\widehat{s}^G, s_e^G\right) + \left(1 - \sigma_L\left(\widehat{s}^G\right)\right)(1-x)\,\widehat{\alpha}\left(\widehat{s}^B, s_e^B\right)$$

Proposition 4 details the equilibrium reporting strategies.

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[26] Courts have cited the fact that a board has obtained a second opinion from an independent advisor about a potential investment, as evidence that it has fulfilled its procedural fiduciary duty to shareholders. See *Smith v Van Gorkum.*

Proposition 4 *(Mandates with full information and separated reports) When advice is mandated, reports are separated and $\rho > \rho^{\hat{K}}$, there exists a unique Perfect Bayesian Nash Equilibrium where i) the high type truthfully reports his inference; ii) the low type reports a good recommendation with probability $\sigma_L^* \left(\hat{s}^G \right)$, where $\sigma_L^* \left(\hat{s}^G \right) = 1$ for $\theta \geq \bar{\theta}$, $\sigma_L^* \left(\hat{s}^G \right) = 0$ for $\theta \leq \underline{\theta}$, $x < \sigma_L^* \left(\hat{s}^G \right) < 1$ for $\frac{1}{2} < \theta < \bar{\theta}$, $0 < \sigma_L^* \left(\hat{s}^G \right) < x$ for $\underline{\theta} < \theta < \frac{1}{2}$, and $\sigma_L^* \left(\hat{s}^G \right) = x = \frac{1}{2}$ for $\theta = \frac{1}{2}$; and iii) the board approves the investment when the advisor makes a good recommendation and $\Pr \left(G \mid s_e^G \right) - c > 0$.*

When signals are accurately and fully disclosed, certification of management decisions can be of great assistance to boards for several reasons. Although costly[27] and perhaps of limited direct informational value (as happens when the CEO has high ability), certification increases the the likelihood of good corporate investments, enables boards to learn faster about CEO ability and to not unduly punish high types for unforeseen investment outcomes. Learning about investments occurs because the second opinion comes from a high ability expert - therefore the board has more confidence in recommendations and can use the recommendation in determining whether to make the investment. Learning about CEO type is possible because of the possibility that the CEO and expert disagrees: upon seeing disagreement, type is completely revealed; upon seeing agreement, the board increases its opinion of the CEO because high types are more likely to agree with experts than low types. The high type recommends truthfully, knowing that the expert will certify his recommendation. The low type employs a strategy that maximizes the chances that he will recommend in the same way as the expert, utilizing a pure strategy of always reporting good (bad) if the unconditional likelihood the investment is good (bad) is high (low) enough. Otherwise he uses a mixed strategy, overemphasizing the recommendation the advisor is more likely to make. This result provides some justification for mandates, and is no doubt, the out-

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[27]Implicitly assumed throughout the paper is that the advisor's fee z does not exceed the expected return net of investment costs. If advisory fees are too costly, then boards would prefer never to obtain certification. Note that if the CEO has discretion, even when fees exceed the net return, he will still obtain certification because it is the company who pays the fee not the CEO. The CEO will use company resources inefficiently to increase his own private payoff. Requiring the CEO to pay the advisor directly may result in a separating equilibrium because hiring only makes economic sense for high types.

come policy makers have in mind when proposing regulations that require boards to obtain external certification of management recommendations.

3.2.2 CEO discretion over use of experts

Now consider an unregulated environment, where the CEO determines whether and how to use the outside expert. A Perfect Bayesian Nash Equilibrium is defined as follows.

Definition 5 *(**Perfect Bayesian Nash Equilibrium with CEO discretion and full information**): i) Knowing his own ability type and after drawing an inference from his private signal, the CEO makes a hiring decision $e \in \{e^h, e^n\}$, reporting decision $r \in \{r^s, r^p\}$ and utilizes a recommendation strategy $\sigma(\widehat{s} \mid s)$ that maximizes his expected continuation payoff $E[\widehat{\alpha}]$; ii) after observing the CEO's strategy and the expert's recommendation (if hired) and the investment outcome (if made), the board updates its prior belief about CEO ability using Bayes law; iii) the board approves investments after a positive recommendation from the expert and when the expected profits are positive; iv) board beliefs are consistent with CEO strategy and CEO strategy is optimal given board beliefs.*

To determine CEO strategy, we need first to determine the payoffs in the absence of the outside recommendation. Without certification, the board uses its observation of the recommendation and the investment outcome (if known) to update its priors. The posterior following a good recommendation and good outcome is,

$$\widehat{\alpha}\left(\widehat{s}^G, G\right) = \frac{\alpha p}{\alpha p + (1 - \alpha)\,\sigma_L\left(\widehat{s}^G\right)} \tag{3}$$

The posterior following a good recommendation and bad outcome is,

$$\widehat{\alpha}\left(\widehat{s}^G, B\right) = \frac{\alpha\,(1 - p)}{\alpha\,(1 - p) + (1 - \alpha)\,\sigma_L\left(\widehat{s}^G\right)} \tag{4}$$

After a bad recommendation (where no outcome is observed), the posterior is,

$$\widehat{\alpha}\left(\widehat{s}^B\right) = \frac{\alpha\left(1-x\right)}{\alpha\left(1-x\right) + \left(1-\alpha\right)\left(1 - \sigma_L\left(\widehat{s}^G\right)\right)} \tag{5}$$

CEOs choose hiring, reporting and recommendation strategies to maximize expected continuation payoffs. The payoff to different hiring and reporting strategies for the high type depends directly on the low type's recommendation strategy $\sigma_L\left(\widehat{s}^G\right)$. Given this strategy we can calculate equilibrium payoffs for the high type under different equilibria (whose existence depends directly on board beliefs about out-of-equilibrium behavior). Utilizing the intuitive criterion to eliminate equilibria that require unreasonable beliefs about out-of-equilibrium behavior, I demonstrate that there is a unique equilibrium where both CEO types always hire and choose a separated reporting structure.

Proposition 6 *(CEO discretion with full information): There exists a unique Perfect Bayesian Nash equilibrium in which both types always hire an expert, choose a separated reporting structure, and give recommendations in accordance with Proposition 4 above. The board believes the CEO has low ability if he chooses not to hire an expert, or if he chooses a pooled reporting structure. The board approves investments when the expert makes a good recommendation, and* $\Pr\left(G \mid s_e^G\right) - c > 0$.

Giving the CEO discretion over when to obtain a second opinion results in exactly the same equilibrium as described in Proposition 4. Because certification is a signal to the board of CEO ability (since only high ability CEOs will always agree with experts) by seeking certification, high types can actually improve their expected reputations relative to the case when no expert is available. The uniqueness of this equilibrium arises from the fact that expected payoffs following certification strictly dominate any other equilibrium payoffs for high types, but leave low types worse off than were they not to hire or pool reports. This result is robust for all values of the board's prior α. The fact that certification provides additional information to the board about CEO ability, is especially important since with no

certification, given the low type's strategy, high types only improve their reputation when they make a good recommendation and the investment outcome is good. Otherwise the posteriors decline relative to the prior.

When experts are unavailable, I show in the Appendix below that the low type makes a good recommendation more often than the high type is wrong – that is, $\sigma_L\left(\widehat{s}^G\right) > 1 - p$. This implies that $\widehat{\alpha}\left(\widehat{s}^G, B\right) < \alpha$; not surprisingly, reputation declines after a positive recommendation and a bad outcome. On the other hand, given that investment outcomes are unobservable when no investment is made, low types are more inclined to reject investments than high types. Therefore, $1 - \sigma_L\left(\widehat{s}^G\right) = \sigma_L\left(\widehat{s}^B\right) < x$ implying that $\widehat{\alpha}\left(\widehat{s}^B\right) < \alpha$: following an uncertified bad recommendation, reputation also declines. A second opinion from a credible expert therefore protects high types from adverse inferences. Low types also seek certification, even though they are strictly worse off, since the board believes upon seeing out-of-equilibrium behavior (in this case, not hiring), that the CEO has low ability.

Note that CEO type is completely revealed to the board only in the event of disagreement between the CEO and gatekeeper. In the event of agreement, the board increases its posterior belief relative to its prior regarding the likelihood that the CEO has high ability, simply because high types always agree with the expert, while low types will do so only sometimes. In this equilibrium, therefore, although learning about type will be more accurate and faster than under an equilibrium with no outside certification available, it is possible for low types to never be revealed as such, and to have long careers as purportedly brilliant CEOs.

Certification as described here is somewhat analogous to investment models with reputational herding. Scharfstein and Stein (1990) provide a model where an investment manager (who does not know his own ability type but has access to private information) sees another manager's investment recommendation before making his own. Trueman (1994) also provided a model investigating how analysts (who do know their ability type) predict corporate earnings to protect their reputations.[28] Both of these models demonstrate that agents who

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[28]See Ottoviani and Sørensen (2000) for additional commentary on the relationship between correlation of private signals and private knowledge about one's type.

are concerned about their reputations will ignore their own private information (even when they have high ability), preferring to recommend in a way that mimics recommendations by others already made. While in our model, high types will not ignore their own private information about likely investment outcomes when making their recommendation, they will take into account the impact of an additional recommendation on their reputation. Just as in the herding models where a concurring prior recommendation protects analysts in the event investments are bad, so too does a concurring second opinion that is obtained after the CEO makes his own recommendation. In reputational herding models, the manager is not given a choice about the presence of additional recommendations. I show below, that if given a choice, under the assumptions outlined above, high types will do better with additional recommendations, than without. The second opinion certifying the CEO's recommendation to invest or not, gives more credibility to that recommendation, and provides the CEO with protection in the event that the investment performs poorly.[29]

To support this result, we have evidence that there was strong demand for external auditing in the United States in the 1920's, prior to the institution of auditing mandates. By 1933, 85% of all publicly traded corporations already sought outside audits as a signal to investors of disclosure quality.[30] More recently, there is evidence that such signaling occurred with the SOX requirement that CEOs certify the company's audited statements. Executives at several public companies (including among others, Fannie Mae, Gannett Co, Marriott, Corning, Delphi Corp) certified their financial disclosures before the signing deadline as a way to demonstrate their confidence in their statements. J.T. Battenberg, CEO of Delphi Corp and one of the first executives to certify, stated, "Some CEOs said I put them on the defensive." Similarly Corning Inc stated that it wanted to certify when it was not yet required to do

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[29]Of course, this result depends on the high type knowing that the additional recommendation is coming from another high ability type. Certification is only credible (and therefore desirable), when the certifying party's type is known. Below I investigate how low types deal with their ignorance about how the advisor will recommend, and how this ignorance increases the chances of certifications being unreliable.

[30]Colonel A.H. Carter, President of New York Society of Certified Public Accountants in testimony to the Senate Committee on Banking and Currency, 73rd Cong. 56-62 (1933). In these same hearings Senator Gore pointed out that pervasive auditing failed to prevent the 1929 Crash. See Previts and Merino (1998).

so, because it would underscore its differences with other firms in the telecommunications sector.[31]

The results in Propositions 4 and 6 are dependent on the following assumptions: (1) managers are mainly concerned about their reputations; (2) managers are aware that they are being monitored by their superiors; and (3) advisors are assured access to all relevant information. If managers stand to gain some private benefit from a particular decision by the board, obtaining certification may not be part of an equilibrium strategy under a discretionary regime. For example, if the private inference for an investment opportunity is bad, but the CEO receives a very large payout in the event the investment is made – big enough to outweigh concerns about potential reputational damage – then high types will not choose to seek certification on their own, preferring to recommend in favor of the investment. Similarly, if low types do not believe they will be duly punished, they would rather not obtain external certification because it increases their risk of exposure. Mandates may be useful devices in both of these cases *so long as the information disclosed by management is accurate.* If the information is unreliable, mandates can be counterproductive elevating the status of costly second opinions that are ultimately uninformative. The remainder of the paper investigates outcomes when management disclosures may be incomplete.

3.3 Low probability of detection

3.3.1 Mandated use of experts

When the probability of detection is small enough, low types will always present strong signals to experts in an effort to predetermine the expert's recommendation.[32] The fact

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[31] Downey Grimsley, "Signing the Bottom Line; Top Executives at 16 Companies Certify Their Books", *Washington Post*, August 1, 2002.

[32] The expert only reports her recommendation to the Board, not her actual signal. Therefore in equilibrium only high types disclose weak signals. Note however, that if the board did see the nature of the signal, then the disclosure incentives for both types would change. So long as they are sure of how experts will interpret the signal, high ability CEOs will always want to report weak signals even after receiving strong signals. Low ability CEOs will also report a weak signal following a strong signal. Treating the board as seeing recommendations not signals eliminates incentives to disclose information strategically as a signalling device and more closely mirrors how boards make decisions in reality.

that the CEO always lies destroys both the signaling value and the investment value in second opinions. Boards who realize that detection is unlikely should expect to see matching recommendations, and therefore will disregard the second opinion focusing only on the recommendation of the CEO, which does allow some learning about CEO type. In these circumstances, mandating second opinions leads to little new information (only the fact that the CEO may be caught manipulating his signal) with sometimes considerable expense. Requiring boards to follow the expert's recommendation is particularly problematic since not only are firm resources wasted on fees, but may lead to a suboptimal investment strategy. Proposition 7 details this equilibrium, assuming that the board is allowed to ignore the expert's recommendation.

Proposition 7 *(Mandates with separated reporting and low detection probability):* *When a second opinion is mandated, reports are separated and $\rho < \rho^{\widehat{K}}$, i) high types will truthfully disclose their signal and truthfully recommend in accordance with their inference; ii) low types will always disclose a strong signal to the expert recommending in accordance with the signal presented; iii) following a weak signal, low types use a mixed recommendation strategy, making a good recommendation with probability $\sigma_L^n\left(\widehat{s}^G\right) \in (1-p, x)$; iv) the board approves the investment when $\alpha \Pr\left(G \mid \widehat{s}^G\right) + (1-\alpha)\theta - c > 0$; and v) the board will disregard the expert's recommendation in the formation of its posterior belief $\widehat{\alpha}$.*[33]

With separated reports, disagreement between low ability CEOs and experts is possible, but low detection probabilities means that it is safe for the CEO to manipulate the expert's signal to ensure a match. Given that the second opinion is required, the low type will always prefer to lie since disagreement results in revelation of low type. However given that the board disregards the match, the low type will not rely on the expert's recommendation in his own recommendation strategy. Instead, he will utilize a recommendation strategy to maximize his expected payoff. In equilibrium the low type mixes between recommending in

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[33]Note that with certification, since the CEO's payoff is not related to investment outcome, the low type is indifferent between making a good recommendation and a bad recommendation.

favor and against investments, although he recommends against investments more frequently than high types due to the fact that rejecting an investment is safer since no outcome is actually observed by the board. The board updates its priors in accordance with equations (3) - (5) above.

Where the board cannot discount expected profits to account for the fact that the expert is no longer providing high quality recommendations (because of the bad information they are based upon), boards will make more bad investments. In addition, the payment of expert fees - often of a consequential amount - leads to reduced corporate profits.

Contrast this result to one where expert opinions are mandated, but CEO recommendations are pooled with those of experts. Pooled reporting eliminates any incentive for signal manipulation, resulting in recommendations that provide information about the investment, although not CEO type.

Proposition 8 *(Mandates with pooled reporting and low detection probability): When advice is mandated, reports are pooled and $\rho < \rho^{\widehat{K}}$, i) high types truthfully recommend in accordance with their inference, and ii) low types match recommendations to the expert. The board approves the investment when the recommendation is good and $\Pr\left(G \mid \widehat{s}^G\right) - c > 0$.*

Proposition 8 demonstrates that boards may not be able to carry out both monitoring and approval functions when CEOs have career concerns.[34] Information transmission by self-interested CEOs has been investigated by Adams and Ferreira (2006) and Song and Thakor (2006). Adams and Ferreira come to the conclusion that firms with friendly boards (who do not monitor CEOs too intensely) may have better investment outcomes than firms with independent boards. The CEO's trade-off between presenting good information and being held accountable for poor recommendations, means that he is not inclined to present information to the board which could later be held against him. The results here, which take into account the role of third parties in assisting boards, lead one to a similar conclusion.

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[34]Note however, that pooled reports may not remedy CEO incentives to partially disclose information to the advisor if the CEO stands to gain some private benefit from a particular investment recommendation.

Boards that monitor too closely may be given inferior investment advice.

3.3.2   CEO discretion over use of expert

With discretion over hiring decisions, the high type will take into account the incentives of the low type to present a strong signal to the expert when his true signal is weak, as well as the board's rational disregard for the additional signal in monitoring CEO type. When the probability of detection is small, low ability types lie about their signal and the second opinion loses its signaling power. Since the CEO will only be evaluated on his recommendation and investment outcomes, there is no value in hiring expensive experts to provide separate recommendations. Furthermore, high ability types will still not hire experts to provide second opinions even when the opinions are pooled and no learning is possible. The high type maximizes his expected payoff from being evaluated on investment performance alone. Proposition 9 describes the equilibrium.

Proposition 9 *(**CEO discretion with low detection probability**): When outside advice is discretionary, and $\rho < \rho^{\widehat{K}}$, the following strategies and beliefs constitute a unique equilibrium: i) no expert is ever hired; ii) the high type makes recommendations in accordance with his inference; iii) the low type makes a good recommendation with probability $\sigma_L^n\left(\widehat{s}^G\right) \in (1-p, x)$; (iv) the board believes that the CEO has low ability if he hires an expert; (v) the board approves the investment when the CEO makes a good recommendation and $\alpha \Pr\left(G \mid \widehat{s}^G\right) + (1-\alpha)\theta - c > 0$.*

The choice to use an outside expert is undesirable for the high types, even when that second opinion can convey useful information about an investment by the utilization a pooling reporting structure. The choice to *not hire* becomes a signal since low types would prefer to pool their recommendations with the expert, and allow no learning about their type. This result is analogous to anti-herding described by Levy (2004), where high ability managers with career concerns deliberately act unilaterally and not seek advice, even though that

advice is costless to them. So long as the board can disregard the expert's opinion, allowing CEO discretion over use of experts will result in the same investment outcome where expert use is mandated. This result is preferable for the firm however, since no advisory fees are incurred.

The results laid out above demonstrate that collusion between agents and gatekeepers is not necessary to generate results where certifications are used to deceive principals. Reputational concerns alone can provide enough of an incentive to distort information provided by the agent to the gatekeeper. They also demonstrate why a mandate can be a very blunt mechanism that may ultimately fail. With discretion, actors can take their own and others' incentives into account when deciding on their hiring and investment strategy. Actions themselves can be valuable signaling mechanisms. Removing the capacity to act so as to signal can exacerbate the very behavior hoped to be deterred by regulation.

Finally, note that Proposition 9 holds so long as reputational concerns are dominant. Consider for example, a situation where a major portion of the CEOs payoff consists of profit-sharing compensation such as stock options or stock grants. In this case low types will be more concerned with making good investments, and avoiding bad investments. Therefore, they will prefer to hire an expert and give her access to all available private information. The high type will not hire, since not hiring in this case indicates their type, and since the expert adds no new information about the likely investment outcome. Thus, we have a separating equilibrium where experts are only used where needed. The low type does not mind revealing his low ability because his rewards from doing so outweigh the rewards from pooling behavior. Giving the CEO discretion over hiring policy is optimal since they will sort themselves, saving the firm expert fees.

4   Conclusion

In this paper, I argue that increased scrutiny of management by boards may not lead to improved disclosure of inside information for two main reasons. Firstly, provisions that mandate increased board oversight ignore the incentives for managers to disclose information. Good managers do not need oversight but would like to be evaluated, and so are willing to comply with rules and disclose information. Bad managers, who do need oversight, would rather not reveal relevant information since they may be penalized for doing so. Secondly, provisions strengthening the role and independence of gatekeepers who assist boards by certifying management recommendations, fail to appreciate that the quality of outside certifications is only as good as the quality of the information they are based on and that management can often manipulate this information without being detected. Put together, these reasons imply that provisions intensifying board oversight through an external certification mechanism will only be successful if management has enough of an incentive to truthfully disclose all that it knows. I demonstrate that when such incentives exist, policies that mandate the use of gatekeepers are unnecessary since managers will choose to institute certification mechanisms on their own. In the absence of disclosure incentives, such mandates may be counterproductive.

Management has incentives to distort the private information it discloses when it knows that its performance is being actively evaluated. Oversight therefore can create the very problem it was designed to overcome. Profit sharing may ameliorate and private benefits may exacerbate the incentives to disclose full information. Nevertheless, so long as management cares enough about its reputation, it will disclose information to experts strategically to improve its standing with the board, not always in accordance with the best interests of shareholders.

For this reason, institutional rules that co-exist with the obligation to monitor (or that increase the independence of boards) assume great significance. In this paper, I have examined the circumstances in which gatekeepers can assist boards in carrying out their fiduciary duties to shareholders to maximize firm profits, and to monitor management. The ability

to monitor depends squarely on the gatekeeper's ability to gain unfettered access to internal information. Rules that increase the incentives for management to fully disclose all that it knows directly facilitate monitoring. On the other hand, rules that require certification without taking into account these incentives will be redundant at best, and detrimental at worst.

Given that management's reputation depends so heavily on the information it discloses, and that outside certification can a valuable monitoring and approval device, the question naturally arises as to why firms don't institute systems on their own to ensure adequate disclosures and outside certification. Separation between ownership and control combined with dispersed ownership, means that entrenched managers will choose contracts (or charters and by-laws) that benefit them directly, possibly at the expense of shareholders who have little ability to exert control (Berle and Means (1932), Cary (1974), Coffee (1988)). It is thought that mandates are necessary to overcome problems involved with ensuring that companies enact efficient contracts. Instituting requirements that increase the ability and likelihood that boards monitor runs counter to the self-interest of some CEOs, meaning that changes to by-laws which would implement these measures are unlikely. However, so long as CEOs retain control over internal corporate information, the value of mandates overriding these contractual arrangements may not be of great value.

The costs of ensuring the quality of private information disclosures (indirectly incorporated in the model into the advisory fee z) lie at the heart of the criticisms of SOX. Indeed there is empirical evidence to suggest that companies at the margin, for whom the cost of improving information quality exceeds the benefit from better investment decisions and certifications, have decided to opt out of the public markets altogether (Engel, Hayes and Wang (2004), Kamar, Kamara-Pindic & Talley (2009 forthcoming)). By escaping provisions regarding the quality of internal control systems, these companies also escape mandates requiring increased monitoring. This may not be such a bad thing, because when information is too "soft" or too costly to verify, monitoring can generate the wrong incentives. In this

paper, I show that mandates increasing the intensity of oversight are only desirable when coupled with measures that increase the likelihood that management will fully disclose all relevant information.

5   Appendix

Proof. *(Lemma 1)* Since reports are pooled, the low type sees the expert's recommendation prior to making his own. Because the expert always agree with the high type (because they have perfectly correlated inferences), the low type will also always make the same recommendation as the expert. Since recommendations never disagree when reports are pooled, the board's posterior belief that the CEO has high ability is $\widehat{\alpha} = \alpha$. If the CEO lies, there is a risk he will be caught by the expert. The expected continuation payoff is 0 if the CEO is caught, and if not caught is $(1 - \rho)\,\alpha < \alpha$. Therefore, the low type maximizes his expected payoff by not lying, using a disclosure strategy $\varphi_L\left(\widehat{S} \mid W, e^h, r^p\right) = 0$. ∎

Proof. *(Lemma 2)* To simplify notation, and to account for the fact that strategies may be different depending on the recommendation, substitute $\varphi_L\left(\widehat{s}\right)$ for $\varphi_L\left(\widehat{S} \mid W, e^h, r^s\right)$. Recalling that $x \equiv p\theta + (1 - p)(1 - \theta)$, the probability the expert makes a good recommendation, and that $\sigma_L\left(\widehat{s}^G\right)$ denotes the probability that the low type makes a good recommendation, and disclosure strategy $\varphi_L\left(\widehat{s}\right)$ is the probability that he discloses true signal, with separated reports the board's posterior following good recommendations by both the CEO and expert, is:

$$\widehat{\alpha}\left(\widehat{s}^G, s_e^G \mid e^h, r^s, \varphi\right)$$
$$= \frac{\alpha}{\gamma + (1 - \gamma)\left(\alpha + (1 - \alpha)\left(\varphi_L\left(\widehat{s}\right) + (1 - \varphi_L\left(\widehat{s}\right)\right)\,x\sigma_L\left(\widehat{s}^G\right)\right)\right)}$$

The low type uses a disclosure strategy $\varphi_L\left(\widehat{s}^G\right)$ that maximizes his expected continuation payoff conditional upon a good recommendation:

$$E_L\left[\widehat{\alpha} \mid \widehat{s}^G, e^h, r^s\right] \tag{6}$$
$$= \left(\varphi_L\left(\widehat{s}\right)(1 - \rho) + (1 - \varphi_L\left(\widehat{s}\right))\,x\right)\widehat{\alpha}\left(\widehat{s}^G, s_e^G \mid e^h, r^s, \varphi\right)$$

If the low type decides to make a good recommendation, he sets his disclosure strategy

$\varphi_L(\widehat{s})$ to maximize his expected continuation payoff. Taking a first derivative of equation (6) with respect to $\varphi_L(\widehat{s})$, we can check that the sign depends on only upon the probability of detection ρ. The marginal return from lying is increasing for values of that satisfy:

$$\rho < \frac{\alpha + \gamma + x\sigma_L\left(\widehat{s}^G\right) - \alpha\gamma - x\alpha\sigma_L\left(\widehat{s}^G\right) - x\sigma_L\left(\widehat{s}^G\right)\gamma + x\alpha\gamma\sigma_L\left(\widehat{s}^G\right) - x}{\alpha + \gamma + x\sigma_L\left(\widehat{s}^G\right) - \alpha\gamma - x\alpha\sigma_L\left(\widehat{s}^G\right) - x\sigma_L\left(\widehat{s}^G\right)\gamma + x\alpha\gamma\sigma_L\left(\widehat{s}^G\right)} \equiv \rho^{\widehat{K}=\{g,g\}} < 1 \tag{7}$$

The low type maximizes (6) by making $\varphi_L(\widehat{s})$ as large as possible. Therefore, he sets $\varphi_L(\widehat{s}) = 1$, and only discloses an unambiguously good signal. When $\rho > \rho^{\widehat{K}=\{g,g\}}$, equation (6) is decreasing, and the expected continuation payoff is maximized be making $\varphi_L(\widehat{s})$ as small as possible. Therefore, the low type always discloses the true ambiguous signal, letting $\varphi_L(\widehat{s}) = 0$. Following a bad recommendation by both the CEO and the advisor, the board's posterior is:

$$\widehat{\alpha}\left(\widehat{s}^B, s_e^B \mid e^h, r^s, \varphi\right) \tag{8}$$

$$= \frac{\alpha}{\gamma + (1 - \gamma)\left(\alpha + (1 - \alpha)\left(\varphi_L(\widehat{s}) + (1 - \varphi_L(\widehat{s}))(1 - x)(1 - \sigma_L(\widehat{s}^G))\right)\right)}$$

The expected continuation payoff for the low type, conditional upon a bad recommendation is therefore:

$$E_L\left[\widehat{\alpha} \mid \widehat{s}^G, e^h, r^s\right] \tag{9}$$

$$= (\varphi_L(\widehat{s})(1 - \rho) + (1 - \varphi_L(\widehat{s}))(1 - x))\widehat{\alpha}\left(\widehat{s}^B, s_a^B \mid e^h, r^s, \varphi\right)$$

Following a bad recommendation, the marginal return from lying is increasing for values of ρ such that:

$$\rho < \frac{-\sigma_L\left(\widehat{s}^G\right)(1 - x - \alpha - \gamma + x\alpha + x\gamma + \alpha\gamma - x\alpha\gamma) + x\alpha + x\gamma - x\alpha\gamma}{-\sigma_L\left(\widehat{s}^G\right)(1 - x - \alpha - \gamma + x\alpha + x\gamma + \alpha\gamma - x\alpha\gamma) + x\alpha + x\gamma - x\alpha\gamma + 1 - x} = \rho^{\widehat{K}=\{b,b\}} < 1 \tag{10}$$

The marginal return from lying is decreasing for $\rho > \rho^{\widehat{K}=\{b,b\}}$. To maximize the expected

continuation payoff conditional on making a bad recommendation, the low type will set $\varphi_L\left(\widehat{s}^G\right) = 1$ for $\rho < \rho^{\widehat{K}=\{b,b\}}$, and $\varphi_L\left(\widehat{s}^G\right) = 0$ for $\rho > \rho^{\widehat{K}=\{b,b\}}$.

Finally, it is simple to check that $\frac{\partial\rho^{\widehat{K}=\{g,g\}}}{\partial\alpha} > 0$, $\frac{\partial\rho^{\widehat{K}=\{b,b\}}}{\partial\alpha} > 0$, $\frac{\partial\rho^{\widehat{K}=\{g,g\}}}{\partial\theta} < 0$ and $\frac{\partial\rho^{\widehat{K}=\{b,b\}}}{\partial\theta} > 0$ ∎

Proof. *(Proposition* 4) The proof proceeds by assuming that the equilibrium exists and then demonstrating that CEO strategies are optimal given board beliefs. Since advisors are mandated, the only relevant belief is the updated posterior. The high type will always recommend in accordance with his inference, since his inference is perfectly correlated with the advisor. The low type does not know what the advisor will report (remembering that the signal is ambiguous), but does know the likelihood the advisor draws and reports good and bad inferences. Making a good recommendation always $\left(\sigma_L\left(\widehat{s}^G\right) = 1\right)$ is optimal so long as the expected continuation payoff from doing so, exceeds the payoff from deviating and reporting a bad signal. Substituting into equations (1) and (2), recognizing that $\sigma_L\left(\widehat{s}^B\right) = 1 - \sigma_L\left(\widehat{s}^G\right)$, and that the advisor reports a good inference with probability x and a bad inference with probability $1 - x$, the condition necessary to sustain such a pure strategy is:

$$x\frac{\alpha}{\alpha + (1 - \alpha)\,x} \geq 1 - x \tag{11}$$

The LHS of equation (11) is the expected continuation payoff from always making a good recommendation while the RHS is the expected payoff from deviating by sometimes making a bad recommendation. Define $\bar{\theta} < 1$ as the point that (11) binds with equality. For values of $\theta > \bar{\theta}$, the low type optimizes his expected payoff by setting $\sigma_L^*\left(\widehat{s}^G\right) = 1$. On the other hand, reporting a bad recommendation always, $\sigma_L^*\left(\widehat{s}^G\right) = 0$, is only optimal if the expected payoff from doing so exceeds the expected payoff from deviating. The necessary condition to sustain such a pure strategy is

$$(1 - x)\,\frac{\alpha}{\alpha + (1 - \alpha)\,(1 - x)} \geq x \tag{12}$$

As before, the LHS of equation (12) is the payoff from always making a bad recommendation, while the RHS is the payoff from deviating. Define $\underline{\theta} > 0$ as the point that equation (12) binds with equality. For values of $\theta < \underline{\theta}$, the low type optimizes his expected payoff by always making a bad recommendation, $\sigma_L^* \left(\widehat{s}^G \right) = 0$. For $\underline{\theta} < \theta < \overline{\theta}$, it will not be possible to sustain a pure strategy equilibrium since the low type is better off deviating. Therefore $0 < \sigma_L^* \left(\widehat{s}^G \right) < 1$. Note that equation (1) is decreasing with $\sigma_L^* \left(\widehat{s}^G \right)$, while equation (??) is increasing with $\sigma_L^* \left(\widehat{s}^G \right)$. This means that the low type maximizes his expected payoff when satisfies the condition:

$$x \frac{\alpha}{\gamma + (1 - \gamma)(\alpha + (1 - \alpha) x \sigma_L^* (\widehat{s}^G))} = (1 - x) \frac{\alpha}{\gamma + (1 - \gamma)(\alpha + (1 - \alpha)(1 - x)(1 - \sigma_L^* (\widehat{s}^G)))}$$

(13)

Solving explicitly for $\sigma_L^* \left(\widehat{s}^G \right)$, we can show that for $\frac{1}{2} < \theta < \overline{\theta}$, $\sigma_L^* \left(\widehat{s}^G \right) > x$; and for $\underline{\theta} < \theta < \frac{1}{2}$, $\sigma_L^* \left(\widehat{s}^G \right) < x$. Only for $\theta = \frac{1}{2}$, does the low type make good and bad recommendations with exactly the same probability as the high type: $\sigma_L^* \left(\widehat{s}^G \right) = x = \frac{1}{2}$. ∎

Before proving Proposition 6 directly, we must consider other possible equilibrium outcomes. Lemmas 10 and 11 provide details of strategies and beliefs in two other pure strategy equilibria: expert is hired and reports are pooled, or expert is not hired.

Lemma 10 (*Pooled Reporting*) *There exists an equilibrium in which both types always hire an epxert and choose pooled reports The high type recommends in accordance with his inference, and the low type always agrees with the expert. If the CEO decides not to hire or chooses separated reports, the board believes he is the low type. The board approves investments when the expert makes a good recommendation and $\Pr \left(G \mid s_a^G \right) - c > 0$.*

Proof. Given board beliefs, both types will always hire and choose pooled reports. The high type will report truthfully since his inference is perfectly correlated with the expert. The low type will always recommend in the same way as the expert because he sees the expert's recommendation prior to making his own. Given that the board cannot compare the recommendations, it's posterior (regardless of the recommendation is) $\widehat{\alpha} \left(e^h, r^s \right) = \alpha$.

Since the expert has access to full information, the board will maximize period profits by following the expert's recommendation so long as the net expected benefit is positive. ∎

Lemma 11 *(No Expert) There exists an equilibrium in which i) neither type ever hires an expert; ii) the high type always recommends in accordance with his inference; iii) low type uses a mixed recommendation strategy, making a good recommendation with probability $\sigma_L^n\left(\widehat{s}^G\right) \in (1-p, x)$. If the CEO chooses to hire an expert, the board believes he has low ability.*

Proof. Suppose this equilibrium exists. Since the low type draws an uninformative inference, the probability that he will be correct following a good recommendation is just θ. His expected continuation payoff from making a good recommendation is therefore:

$$E_L\left[\widehat{\alpha} \mid \widehat{s}^G\right] = \theta\widehat{\alpha}\left(\widehat{s}^G, G\right) + (1-\theta)\widehat{\alpha}\left(\widehat{s}^G, B\right) \tag{14}$$

Following a bad recommendation is expected payoff is,

$$E_L\left[\widehat{\alpha} \mid \widehat{s}^B\right] = \widehat{\alpha}\left(\widehat{s}^B\right) \tag{15}$$

In equilibrium, the CEO will set $\sigma_L\left(\widehat{s}^G\right)$ to maximize his total expected payoff:

$$E_L\left[\widehat{\alpha}\right] = \sigma_L\left(\widehat{s}^G\right) E_L\left[\widehat{\alpha} \mid \widehat{s}^G\right] + \left(1 - \sigma_L\left(\widehat{s}^G\right)\right) E_L\left[\widehat{\alpha} \mid \widehat{s}^B\right] \tag{16}$$

Since $E_L\left[\widehat{\alpha} \mid \widehat{s}^G\right]$ is decreasing in $\sigma_L\left(\widehat{s}^G\right)$, and $E_L\left[\widehat{\alpha} \mid \widehat{s}^B\right]$ is increasing in $\sigma_L\left(\widehat{s}^G\right)$, will be maximized when satisfies the following condition:

$$E_L\left[\widehat{\alpha} \mid \widehat{s}^G\right] = E_L\left[\widehat{\alpha} \mid \widehat{s}^B\right] \tag{17}$$

If $\sigma_L\left(\widehat{s}^G\right) = 0$, then $E_L\left[\widehat{\alpha} \mid \widehat{s}^G\right] > E_L\left[\widehat{\alpha} \mid \widehat{s}^B\right]$. This means that always making a bad recommendation cannot be part of an equilibrium strategy since deviation is more profitable.

Likewise, if $\sigma_L\left(\widehat{s}^G\right) = 1$, $E_L\left[\widehat{\alpha} \mid \widehat{s}^G\right] < E_L\left[\widehat{\alpha} \mid \widehat{s}^B\right]$: again deviating is optimal with a strategy which requires the CEO to always make a good recommendation. Therefore, the low type will always use a mixed recommendation strategy. We can check that when $\sigma_L\left(\widehat{s}^G\right) = x$ (the probability the high type makes a good recommendation), $E_L\left[\widehat{\alpha} \mid \widehat{s}^G\right] < E_L\left[\widehat{\alpha} \mid \widehat{s}^B\right]$. The low type will want to place more weight on bad recommendations relative to the high type. Likewise, if $\sigma_L\left(\widehat{s}^G\right) = 1 - p$, we have $E_L\left[\widehat{\alpha} \mid \widehat{s}^G\right] > E_L\left[\widehat{\alpha} \mid \widehat{s}^B\right]$. The low type will want to deviate and make a good recommendation. By continuity, there exists some $\sigma_L^n\left(\widehat{s}^G\right) \in (1 - p, x)$ which satisfies equation (17).

The expected continuation payoff for the high type following a good recommendation is:

$$E_H\left[\widehat{\alpha} \mid \widehat{s}^G\right] = \Pr\left(G \mid \widehat{s}^G, H\right)\widehat{\alpha}\left(\widehat{s}^G, G\right) + \Pr\left(B \mid \widehat{s}^G, H\right)\widehat{\alpha}\left(\widehat{s}^G, B\right) \tag{18}$$

Following a bad recommendation, the expected continuation payoff is just $\widehat{\alpha}\left(\widehat{s}^B\right)$, the same as the low type. For truth-telling to be an optimal strategy for the high type, the following incentive constraints must be satisfied:

$$\Pr\left(G \mid \widehat{s}^G, H\right)\widehat{\alpha}\left(\widehat{s}^G, G\right) + \Pr\left(B \mid \widehat{s}^G, H\right)\widehat{\alpha}\left(\widehat{s}^G, B\right) \quad > \quad \widehat{\alpha}\left(\widehat{s}^B\right) \tag{19}$$

$$\Pr\left(G \mid \widehat{s}^B, H\right)\widehat{\alpha}\left(\widehat{s}^G, G\right) + \Pr\left(B \mid \widehat{s}^B, H\right)\widehat{\alpha}\left(\widehat{s}^G, B\right) \quad < \quad \widehat{\alpha}\left(\widehat{s}^B\right) \tag{20}$$

Note that $\sigma_L^n\left(\widehat{s}^G\right) < x$ implies that $\sigma_L^n\left(\widehat{s}^G\right) < p$, and hence $\widehat{\alpha}\left(\widehat{s}^G, G\right) > \alpha > \widehat{\alpha}\left(\widehat{s}^G, B\right)$. Since by definition, $\widehat{\alpha}\left(\widehat{s}^B\right)$ is a convex combination of $\widehat{\alpha}\left(\widehat{s}^G, G\right)$ and $\widehat{\alpha}\left(\widehat{s}^G, B\right)$, it must be that $\widehat{\alpha}\left(\widehat{s}^G, G\right) > \widehat{\alpha}\left(\widehat{s}^B\right) > \widehat{\alpha}\left(\widehat{s}^G, B\right)$. Since by assumption, $p > 1 - p$, $\Pr\left(G \mid \widehat{s}^G, H\right) > \theta$ and $\Pr\left(B \mid \widehat{s}^G, H\right) < 1 - \theta$. Therefore equation (19) is always satisfied. Since $\Pr\left(G \mid \widehat{s}^B, H\right) < \theta$ and $\Pr\left(B \mid \widehat{s}^B, H\right) > 1 - \theta$, equation (20) is also satisfied. Hence, truth-telling is optimal for the high ability CEO. ∎

We are now in a position to prove that an equilibrium in which the CEO always chooses to hire an expert exists, and that it is unique by virtue of equilibrium dominant payoffs.

Proof. *(Proposition 6)* Assume that this equilibrium exists. By Proposition 4, if he hires an

expert to whom he gives the full information set and chooses a separated reporting strategy, the low type maximizes his expected payoff by using the recommendation strategy $\sigma_L^* \left(\widehat{s}^G \right)$. Thus, the expected payoff for the low type is,

$$E_L \left[\widehat{\alpha} \mid e^h, r^s \right] = \sigma_L^* \left(\widehat{s}^G \right) x \widehat{\alpha} \left(\widehat{s}^G, s_e^G \right) + \left(1 - \sigma_L^* \left(\widehat{s}^G \right) \right) \left(1 - x \right) \widehat{\alpha} \left(\widehat{s}^B, s_e^B \right) \qquad (21)$$

If the low type deviates from the proposed equilibrium strategies by either not hiring an advisor, or by choosing pooled reports, given board beliefs, his expected payoff is,

$$E_L \left[\widehat{\alpha} \mid e^n \right] = E_L \left[\widehat{\alpha} \mid e^h, r^p \right] = 0$$

Since $E_L \left[\widehat{\alpha} \mid e^h, r^s \right] > 0$, deviating yields a lower expected continuation payoff. Therefore the proposed strategies and beliefs constitute an equilibrium.

For uniqueness, we need to show that the expected payoff for the high type equilibrium dominates all other expected payoffs from other possible equilibria. The payoff from always hiring an advisor with a separated reporting structure is:

$$E_H \left[\widehat{\alpha} \mid e^h, r^s \right] = x \widehat{\alpha} \left(\widehat{s}^G, s_e^G \right) + \left(1 - x \right) \widehat{\alpha} \left(\widehat{s}^B, s_e^B \right) \qquad (22)$$

The equilibrium payoff following pooled reports is clearly dominated by equation (**??**). Because $x \sigma_L^* \left(\widehat{s}^G \right) < 1$, we have $\widehat{\alpha} \left(\widehat{s}^G, s_e^G \right) = \frac{\alpha}{\gamma + (1-\gamma)\left(\alpha + (1-\alpha) x \sigma_L^* (\widehat{s}^G) \right)} > \alpha$. Because $\left(1 - x \right) \left(1 - \sigma_L^* \left(\widehat{s}^G \right) \right) < 1$, we have $\widehat{\alpha} \left(\widehat{s}^B, s_e^B \right) = \frac{\alpha}{\gamma + (1-\gamma)\left(\alpha + (1-\alpha)(1-x)\left(1 - \sigma_L^* (\widehat{s}^G) \right) \right)} > \alpha$.

Now we can eliminate equilibria where no expert is used. The total expected payoff from never using experts (Lemma 11), is:

$$E_H \left[\widehat{\alpha} \mid e^n \right] = p \theta \widehat{\alpha} \left(\widehat{s}^G, G \right) + \left(1 - p \right) \left(1 - \theta \right) \widehat{\alpha} \left(\widehat{s}^G, B \right) + \left(1 - x \right) \widehat{\alpha} \left(\widehat{s}^B \right) \qquad (23)$$

Comparing, the expected payoff from always hiring strictly dominates all other expected

43

continuation payoffs. Therefore, beliefs necessary to sustain other equilibria (that only low ability CEOs deviate and hire) are unreasonable. The equilibrium where advisors are always hired is therefore unique. ∎

Proof. *(Proposition 7)* Given that the low type always gives the expert a strong signal, upon seeing matching recommendations the board will disregard the expert's recommendation when evaluating his ability. The low type therefore makes recommendations to maximize his expected payoff. He makes a good recommendation with probability $\sigma_L^n\left(\widehat{s}^G\right) \in (1-p, x)$ (see Lemma 11). ∎

Proof. *(Proposition 9)* Assume that the high type only hires an expert if it improves his expected payoff: that is, if the expected payoff is no different with or without an expert, the CEO will choose not to hire. We now need to show that the expected payoff for the high type from never using an expert is greater than the expected payoff from hiring the expert and pooling reports: that is, $E_H\left[\widehat{\alpha} \mid e^n\right] > \alpha$. Let $\sigma_L^n\left(\widehat{s}^G\right) = x$. Then $\widehat{\alpha}\left(\widehat{s}^B\right) = \alpha$. To show that $E_H\left[\widehat{\alpha} \mid e^n\right] > \alpha$, we need to show that the expected payoff following a good recommendation exceeds the expected payoff from pooling reports with the expert. Alternatively, the expected gain in reputation following a good report and good outcome exceeds the expected loss in reputation following a good report and bad outcome. That is:

$$p\theta\widehat{\alpha}\left(\widehat{s}^G, G\right) + (1-p)(1-\theta)\,\widehat{\alpha}\left(\widehat{s}^G, B\right) > (p\theta + (1-p)(1-\theta))\,\alpha$$

Manipulating these expressions, it is simple to demonstrate that this inequality is always satisfied since by assumption $p > 1 - p$.

Let $\sigma_L^n\left(\widehat{s}^G\right) = 1 - p$. Then $\widehat{\alpha}\left(\widehat{s}^G, B\right) = \alpha$. To show that $E_H\left[\widehat{\alpha} \mid e^n\right] > \alpha$, we need to show that the expected gain in reputation following a good report and good outcome exceeds the expected loss in reputation following a recommendation to reject.

$$p\theta\widehat{\alpha}\left(\widehat{s}^G, G\right) + (p(1-\theta) + \theta(1-p))\,\widehat{\alpha}\left(\widehat{s}^B\right) > (p\theta + p(1-\theta) + \theta(1-p))\,\alpha$$

Again, by manipulating these expressions, it is simple to demonstrate that this inequality is always satisfied since by assumption $p > 1 - p$.

Taking a first derivative, we have $\frac{\partial E_H[\widehat{\alpha}|e^n]}{\partial \ \sigma_L^n(\widehat{s}^G)} < 0$. Therefore since $E_H\left[\widehat{\alpha} \mid e^n\right] > \alpha$ for all $\sigma_L\left(\widehat{s}^G\right) = x$ and $\sigma_L\left(\widehat{s}^G\right) = 1 - p$, we have $E_H\left[\widehat{\alpha} \mid e^n\right] > \alpha$ for all $\sigma_L^n\left(\widehat{s}^G\right) \in (1 - p, x)$. ■

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