The information value of corporate social responsibility[+]

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This version: August 21, 2020

(First draft: November 22, 2017)

Abstract

Using a cheap-talk game, we theoretically demonstrate that corporate social responsibility (CSR) helps mitigate the CEO-board information asymmetry, leading to more informed advising and monitoring by the board. By optimally engaging in CSR, the board can induce stakeholder-driven information revelation and reduce its informational dependence on the CEO, which enables the shareholders to choose an ex ante higher level of board independence. For a sample of U.S. firms between 1999 and 2013, we find strong support for this strategic complementarity between board independence and the information value of CSR. Our results highlight a novel rationale for CSR – the information motive.

Keywords: Corporate social responsibility, stakeholder-induced information revelation, cheap-talk game, endogenous information acquisition

JEL Classification: D8, G3, M14

[+] We are grateful for valuable comments and suggestions from Ian Cooper, Diego Garcia, Xintong Zhan, Kapraun Julia, and participants at the 2019 ASSA Meeting AFE-AEA Session on the Value of Culture, the 2019 HKU-CBI Conference on the Real Effects of Green Bonds and ESG, the 2019 Paris December Finance Meeting, University of Florida, and Seoul National University. All remaining errors are our own.

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Abstract

Using a cheap-talk game, we theoretically demonstrate that corporate social responsibility (CSR) helps mitigate the CEO-board information asymmetry, leading to more informed advising and monitoring by the board. By optimally engaging in CSR, the board can induce stakeholder-driven information revelation and reduce its informational dependence on the CEO, which enables the shareholders to choose an ex ante higher level of board independence. For a sample of U.S. firms between 1999 and 2013, we find strong support for this strategic complementarity between board independence and the information value of CSR. Our results highlight a novel rationale for CSR – the information motive.

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I. Introduction

A significant portion of the U.S. corporate expense budget is allocated to corporate social responsibility (CSR). Fortune 500 firms spend more than $15 billion a year on CSR activities (Financial Times, October 12, 2014). Given its importance, there has been a long-standing debate on the desirability of CSR spending from shareholders' perspective. Several studies posit that CSR creates shareholder value through maximizing stakeholder value, i.e., "doing well by doing good" (Edmans, 2011; Deng, Kang, and Low, 2013; Flammer, 2013; Ferrell, Liang, and Renneboog, 2016). Proponents of this good governance view argue that firms whose managers are properly incentivized engage in appropriate level of CSR activities, with the benefits ultimately accrued to shareholders. In contrast, beginning with Milton Friedman's famous claim that "the only responsibility of corporations is to make profits (New York Times Magazine, 1970, p. 122)," the agency view of CSR claims that it is merely a manifestation of managerial and shareholder interest misalignment (e.g., Cheng, Hong, and Shue, 2016). The empirical evidence on these two opposing views is mixed, leaving this important question – what is the fundamental motive of CSR? – largely unresolved.[1]

While the two opposing views on CSR primarily focus on the managerial incentives that determine CSR activities, one important aspect of CSR that is relevant yet has been largely overlooked in the literature includes its potential information value. CSR activities could alter a firm's information environment and consequently affect the board's decision-making. Specifically, given the dual role of the board as an advisor and a monitor of management, stakeholders' role in enhancing the information environment could be particularly valuable to its outside directors who are potentially lacking in relevant firm-specific information (Duchin, Matsusaka, and Ozbas, 2010). These outside directors are largely dependent on the information from the CEO and other key corporate insiders in order to make valuable advice (Raheja, 2005). When too much board independence hinders effective communication between the CEO and outside independent directors (Adams and Ferreira, 2007), firm-specific information that accrues through stakeholder engagement could facilitate the outside directors' informed advising on the firm's top managers.

[1] Edmans (2011) and Flammer (2013) find that firms that manage their employee relations or environmental issues well are also viewed favorably by the stock market, whereas Cheng, Hong, and Shue (2016) show that, to a certain extent, CSR spending appears to be agency-driven using the 2003 Dividend Tax Cut as a natural experiment. Krüger (2015) also finds a mixed stock market reaction to CSR news, while Ferrell, Liang, and Renneboog (2016) find evidence in support for the good governance view of CSR.

A case in point on this information value of CSR is the corporate responsibility committee within Nike's board of directors, who drove a series of CSR agenda through active communications with the firm's stakeholders (Paine, 2014).[2] Jill Ker Conway, an independent director at Nike, institutionalized a CSR drive by setting up a board-level corporate responsibility committee in 2001. Through this initiative, with four out of five members consisting of independent directors, Nike's board members gained in-depth knowledge of the firm's production process and could provide "informed advising" on its ongoing innovation efforts. By engaging with employees in an 18-month coordinated initiative for strategic planning, the committee was able to identify root causes of Nike's excessive overtime problem. With a need for innovative ways to deal with making the manufacturing process itself safer and more sustainable, the committee encouraged management to invest in a Dutch start-up that offered a waterless process for dyeing polyester that would improve both the product quality and be more environment-friendly.[3]

The information benefit of CSR does not merely consist of such direct information revelation by the stakeholders. There could also be an even more important, indirect benefit of CSR in enhancing a firm's external information environment. There is growing evidence that firms' voluntary CSR activity disclosure reduces analyst forecasting errors and attracts more dedicated institutional investors (Dhaliwal, Li, Tsang, and Yang, 2011; Dhaliwal, Radhakrishnan, Tsang, and Yang, 2012). Following successful CSR engagements initiated by activist institutional shareholders, pension activists and SRI funds are also shown to substantially increase their shareholdings (Dimson, Karakaş, and Li, 2015; Hartzmark and Sussman, 2019), which in turn facilitate richer information production on the part of both the firms' management as well as outside analysts. These recent trends are consistent with the notion of improved quantity and quality of corporate disclosure stemming from increased institutional ownership and interest in the firm's management practices (Boone and White, 2015; Bird and Karolyi, 2016).

In the growing popularity of the impact/SRI funds that put pressure on firms to enhance the corporate profile in various social and environmental issues, the information motive of CSR in the last decade should not be overlooked when we analyze the potential real impacts that these ESG-

[2] For a detailed summary of Paine's (2014) case study, refer to Appendix B.

[3] See also Libit (2013) who identifies "enabling informed board and management decision making" as the primary benefit of effective stakeholder engagement through appropriate CSR activities and reporting.

specialized institutions could bring in to the corporations. The changing information landscape induced by the emergence of these impact investments imply increasing coverage by sell-side analysts who provide detailed firm-specific information services to their institutional clients. Top managers are also well-aware of these pressures from active investors, which jointly implies our novel information motive of CSR that could prevail particularly in the last decade.

Either directly and/or indirectly, a firm's CSR activities would have the potential to significantly alleviate the board's information asymmetry and enables the board to provide more informed advising and monitoring to the firm's management team. If firms are aware of these benefits, we expect the firms to be more willing to expend resources on CSR activities when its information environment is opaque so that the marginal information value of CSR is heightened. These overall information benefits of CSR have not hitherto been singled out for analysis in the literature. We fill this void in the literature.[4]

We start out our analysis by modeling a cheap-talk communication game between the CEO and the board (Adams and Ferreira, 2007), where we explicitly introduce a possibility that the board who represent the value of shareholders could endogenously acquire costly firm-specific information from stakeholders by engaging in CSR activities.[5] Consistent with the key intuition in Adams and Ferreira (2007), the board's access to the CEO's private information enhances both its advising and monitoring qualities. Informed advising by the board benefits both parties by reducing the uncertainty about the project outcome. However, it becomes more difficult to achieve when the CEO derives strong private benefit from controlling the project; a self-entrenched CEO is unwilling to share valuable private information as she believes this would also lead to a loss of control through increased monitoring by the board. Thus, shareholders face a trade-off between firm-specific information and monitoring intensity, and when the degree of information asymmetry between the board and the CEO is sufficiently high, the shareholders have no other option but to appease the CEO and sacrifice monitoring.

However, by endogenously engaging in CSR activities and inducing stakeholders to reveal their own or indirectly induce other information agents' valuable firm-specific information, the board

[4] While a number of studies address the issue of firm complexity and board structure (e.g., Boone, Field, Karpoff, and Raheja, 2007; Coles, David, and Naveen, 2008; Linck, Netter, and Yang, 2008), the information value of CSR is not explicitly addressed in the studies.

[5] Stakeholders' and shareholders' incentives could generally be misaligned. For a similar communication game with the option of endogenous information acquisition, see Di Pei (2015) among others.

can achieve both informed advising and tight monitoring of management without sacrificing their functional efficiency. We derive such equilibrium decision to engage in CSR as an optimal response by the board who aims to enhance its knowledge of firm-specific information and endogenously shake off its informational dependence on the CEO. In opaque information environment, shareholders are able to increase board independence *because* they correctly anticipate that the firm's information environment would be enhanced as a result of CSR activities. In more transparent environment, the board may still opt for CSR to intensify its monitoring, but this action has a less pronounced effect on board independence because the board is less informationally dependent on the CEO in the first place. The informational value of CSR is also larger when the CEO derives a large private benefit from project control. Thus, CSR in the context of our model ought to be perceived as a potential remedy for internal agency problems rather than simply being a symptom of the managerial agency.

Based on these intuitions, our model predicts a strategic complementarity between board independence and CSR activities, which would be stronger when a firm's information environment is opaque to begin with. As direct corollaries to this key hypothesis, our model also predicts the monitoring intensity of a board in equilibrium; the direct effect of CSR on the board's monitoring intensity would be stronger among low information cost firms, whereas the joint effect of CSR and board independence on monitoring intensity would be more pronounced among high information cost firms.

Since our model's predictions take the informational benefits of CSR as given in reducing the CEO-board information asymmetry, it is important to check whether our predictions are in accordance with the observed empirical patterns. To this end, for the U.S. firms from 1999 to 2013, we collect the comprehensive information on their firm financials (Compustat/CRSP), board and CEO characteristics (BoardEx and Execucomp), the degree of each firm's information asymmetry (Thomson Reuters IBES), and CSR activity scores (MSCI ESG KLD STATS) from various sources. Using segment- and analyst-forecast-based measures of a firm's information environment, we confirm that the joint effect of board independence and information cost on a firm's level of CSR activities is indeed positive with strong statistical significance across all information cost measures we considered. Whereas the positive association between board independence and CSR has been documented in a number of studies (e.g., Harjoto and Jo, 2011; Ferrell, Liang, and Renneboog, 2016), our study is the first to highlight that this relationship is strongly influenced by a firm's information environment. We show that board independence exerts a stronger effect on the level of CSR activities as the information cost increases. Moreover, using the impact investment information collected from Morningstar together with Thomson Reuters' institutional ownership information, we find that the joint effect of

board independence and information cost is stronger, particularly when the impact/SRI funds that are specialized in community, diversity, and environmental issues are present as active shareholders (Dimson, Karakaş, and Li, 2015). All these empirical regularities are largely consistent with our model's predictions on both direct and indirect information benefits of CSR.

Our model also predicts that, while the strategic complementarity properties of board independence and CSR would be stronger in high information cost environment, CSR itself would more directly influence a board's monitoring intensity in low information cost environment. Consistent with this prediction, we find that the direct effect of CSR on attenuating CEO pay and increasing the likelihood of forced CEO turnovers is stronger among firms with transparent information environment. In contrast, the joint effect of board independence and CSR on monitoring, as proxied by CEO pay and turnover likelihood, is stronger among firms operating in high information cost environment. The fact that the interaction of CSR and board independence has a differential effect on the intensity of monitoring according to a firm's information environment is a novel finding, further suggesting the importance of information motives of CSR from shareholders' perspective.

Our main empirical finding, namely a stronger strategic complementarity between board independence and CSR activities among firms in opaque information environment, is robust to controlling for firm fixed effect as well as the two-stage least squares approach by Knyazeva, Knyazeva, and Masulis (2013). Our result is thus unlikely to be driven by unobserved heterogeneity at the firm level or simultaneity-induced endogeneity. We further discuss the robustness of our findings, both theoretically and empirically, to a concern about powerful CEOs who might shape CSR investment decisions rather than outside board members. Our results strongly hold even after considering these additional robustness concerns.

To the best of our knowledge, we are the first to introduce the notion of strategic complementarity between board independence and the information value of CSR. We emphasize the information value of CSR through its link to the dual role of a board as an informed advisor and also as a monitor of management. We show that, in equilibrium, the marginal information value of CSR is highest among firms that suffer most from self-entrenched CEOs who are unwilling to share valuable private information to highly independent board members for agency reasons. Our notion of the informationally-motivated CSR endogenously arises under such circumstances as an optimal remedy to the significant agency problems. In this regard, our theory complements and extends the two popular narratives of CSR in the literature: the good and bad governance views of CSR.

Our study also significantly extends the growing interest and active discussion on impact/socially responsible investments (Dimson, Karakaş, and Li, 2015; Hartzmark and Sussman, 2019). Consistent with the findings in Dhaliwal, Li, Tsang, and Yang (2011) and Dhaliwal, Radhakrishnan, Tsang, and Yang (2012), we show a close connection between the information motive of CSR and a particular group of institutional investors. For the first time in the literature, we document that growing share of SRI/impact funds could influence firm-informational and CSR policies. By documenting these joint dynamics, we significantly add to the burgeoning literature on impact investments and their real consequences to corporations (Liang and Renneboog, 2020).

Our paper is organized as follows. Section II provides our theoretical model and derives key testable predictions. Section III describes our data, and Section IV presents our main empirical results. Section V concludes our study.

II. The model

A. Basic setup

We consider a simple two-player game with dates $t = 0, 1, 2, 3$. The firm is established at date 0, and the shareholders appoint the CEO and the board, with the latter's level of independence given by $I \in [0, 1]$. At date 1, with probability $c \in [0, 1]$, only the CEO learns about the realization of some information $\theta \sim U[-\infty, \infty]$. With probability $1 - c$, both the CEO and the board become informed. With probability c, only the CEO is informed about θ.

When the board fails to learn about θ, it first consults the CEO, who has the option to reveal the information to the board. If the CEO reveals the information on θ to the board, the board does not engage in informationally-motivated CSR. If the CEO refuses to reveal θ, the board has an option to make CSR expenditure amounting to R. Then, upon engaging in CSR, the possibility of resolving the information asymmetry through direct and/or indirect information channel arises, and the board learns about θ with some probability $d \in [0, 1]$.[6] c and d are independent of each other. Although we consider the CSR as the board's decision-making variable in our baseline model, we consider a more general case with the board and the CEO probabilistically assigned the control of the CSR

[6] In the case of stakeholders directly holding the firm-specific information, it would be natural to motivate this situation as a case where various stakeholders hold fragments of potentially relevant information and the firm has to cater to the interests of the overall group to *collectively* piece together this information, rather than trying to search and pin down a single stakeholder that may hold θ on her own.

agenda in Appendix C.[7] We also stress that, regardless of the information channel, the intuitions remain unchanged as long as CSR reduces the extent of CEO-board information asymmetry, either directly or indirectly. In the case of stakeholders directly holding firm-specific information, this situation may be thought of as stakeholders demanding "required" CSR expenditure of R before they reveal θ to the board. In Appendix D, we formally set the preferences of the stakeholders to show that this corresponds to a situation where the stakeholders' preference is reasonably biased relative to the shareholders', in the same direction as the CEO's bias.[8]

We note that, under our set-up, any form of spending that affects the level of information asymmetry between the CEO and the board, i.e., c, has the identical effect on the model results. Thus, we do not rule out any alternative form of corporate spending that could have an identical impact on its level of information asymmetry and reporting practices. However, we also note sky-rocketing demand for socially responsible investment within the past two decades, with many analysts and asset managers closely following firms' CSR agenda (e.g., Dimson, Karakaş, and Li, 2015). We therefore surmise that during our sample period, investing in CSR would likely have been a natural and relevant choice for many corporate boards to attract large institutions as active owners, particularly socially responsible investment (SRI) funds focusing on environmental and social agenda,[9] with the additional aim of making the firm's informational environment more transparent.

At date 2, the board then engages in its own signal gathering. If the board knows θ, it can uncover firm-specific signal ε with certainty. If the board only knows the prior distribution of θ, then $\varepsilon \sim U[0,\ 1]$. Following the board's learning process about ε, it also chooses the monitoring intensity $\pi \in [0,\ 1]$. This monitoring intensity determines who gets the control of the project at date 3. Spe-

[7] Specifically, in Appendix C, we consider an extension where the CEO puts forward a rival meaningless CSR proposal to disable the information channel and prevent the board from engaging in tighter monitoring in the presence of an agency problem. Allowing for this possibility weakens the information value of CSR, but its existence remains qualitatively unaffected as long as the board controls the CSR agenda with some positive probability. In Section IV.D, we further show that our results are empirically robust and consistent with the predictions of this extended model.

[8] When viewed this way, our model may be thought of as revealing the stakeholders' potential governance benefits even when their interests diverge from those of the shareholders. We further stress that, when the stakeholders' preference is similar to the shareholders', they may merely serve to reduce the extent of CEO-board information asymmetry without any interesting interaction between board independence and CSR.

[9] Dimson, Karakaş, and Li (2015) report that, among their sample of shareholder-initiated ESG engagements, SRI funds are by far the most dominant "hard collaborators," with their involvement accounting for nearly 60% of all collaboration efforts by those classified as hard collaborators.

cifically, the board has the control with probability π, while the CEO controls the project with probability $1-\pi$. For the latter case, the board sends a message to the CEO about its knowledge about the firm-specific signal ε, denoted a (i.e., the board's *advice* to the CEO). The project action at date 3 is denoted y. Thus, the set-up of the model is similar to Adams and Ferreira (2007) except for the added option to reduce information asymmetry through stakeholder engagement. Figure 1 depicts the timeline of our game, with the red box highlighting our core extension, namely the CSR decision game.

[INSERT FIGURE 1 HERE]

With the subscripts s, c, and b denoting shareholders, CEO, and the board, respectively, their utility functions are:

$$U_s = -(y-\varepsilon)^2 - \omega R, \text{ where } \omega = 1 \text{ if the board engages in CSR and 0 otherwise,} \quad (1)$$

$$U_c = -(y-\varepsilon+g)^2 + \chi b, \text{ with } g, b > 0, \text{ and } \chi = 1 \text{ if the CEO retains control but 0 otherwise,} \quad (2)$$

$$U_b = -(y-\varepsilon)^2 - \omega R - \frac{\pi^2}{2I}. \quad (3)$$

Here, g denotes the CEO's bias relative to shareholders' preference, while b captures her private benefit from retaining control. Finally, the board's preferences are such that the cost of monitoring is smaller as the level of independence increases, captured by the last term of U_b.

B. Project action at $t = 3$

Under this set-up, Adams and Ferreira (2007) demonstrate that, when the board learns ε but control of the project is assigned to the CEO, then there exists a Bayesian Nash equilibrium in this advising game. Specifically, for $N+1$ real numbers ordered by $0 = a_0 < a_1 < \cdots < a_n = 1$, (a) the conditional probability distribution function of the board's message a upon its observing ε, denoted $q(a|\varepsilon)$, is uniform on support $[a_i,\ a_{i+1}]$ whenever $\varepsilon \in (a_i,\ a_{i+1})$, and (b) the CEO's action given a, $y_c(a)$, is $\frac{a_{i+1}-a_i}{2} - g$ for all $a \in (a_i,\ a_{i+1})$. This is the familiar cheap talk partitioning equilibrium of Crawford and Sobel (1982), who also show that, in the most informative equilibrium, N is the smallest integer that satisfies $N \geq \widetilde{N} \equiv -\frac{1}{2} + \frac{1}{2}\sqrt{1+\frac{2}{g}}$, and the CEO's residual variance of ε is $\sigma_\varepsilon^2 = \frac{1}{12N^2} + \frac{g^2(N^2-1)}{3}$. If the board controls the project, it chooses $y_b = \varepsilon$.

When the board does not know θ, it chooses $y_b = \frac{1}{2}$ when they control the project, while the CEO chooses $y_c = \frac{1}{2} - g$ when she has the control. The residual variance of ε is at its maximum at $\sigma_M^2 = \frac{1}{12}$. Let $\sigma_\varepsilon^2 < \sigma_M^2$ to generate a tension between the board's advising and monitoring roles.

C. Board's monitoring intensity decision at $t = 2$

The board's choice of monitoring intensity is solely dependent on whether it has knowledge of θ or not, regardless of who supplies it. This turns out to be identical to the case in Adams and Ferreira (2007); if we denote the board's information set as $i \in \{\theta, \emptyset\}$, its choice of the monitoring intensity, holding the shareholders' choice of board independence as given, is:

$$\pi(i = \theta; I) = I(\sigma_\varepsilon^2 + g^2), \tag{4}$$

$$\pi(i = \emptyset; I) = Ig^2. \tag{5}$$

Thus, an informed board chooses higher intensity of monitoring.

D. Board's decision to engage in CSR at $t = 1$

We now examine the board's incentive to engage in CSR activities, which only arises when the CEO does not reveal θ. Assuming we have reached this stage, the board's expected utility conditional on its information set is given by:

$$EU_b(i = \theta; I; \omega = 1) = -\big(1 - \pi(i = \theta; I)\big)(\sigma_\varepsilon^2 + g^2) - R - \tfrac{\pi(i=\theta;I)^2}{2I}, \tag{6}$$

$$EU_b(i = \emptyset; I; \omega = 1) = -\pi(i = \emptyset; I)\sigma_M^2 - \big(1 - \pi(i = \emptyset; I)\big)(\sigma_M^2 + g^2) - R - \tfrac{\pi(i=\emptyset;I)^2}{2I}, \tag{7}$$

$$EU_b(i = \emptyset; I; \omega = 0) = -\pi(i = \emptyset; I)\sigma_M^2 - \big(1 - \pi(i = \emptyset; I)\big)(\sigma_M^2 + g^2) - \tfrac{\pi(i=\emptyset;I)^2}{2I}. \tag{8}$$

Notice that whether the stakeholders also reveal θ to the CEO or not is irrelevant, as the valuable advice a to the CEO is only available from the board who has such expertise. The set of equations above then reduces to:

$$EU_b(i = \theta; I; \omega = 1) = -(\sigma_\varepsilon^2 + g^2)\left(1 - \tfrac{I}{2}(\sigma_\varepsilon^2 + g^2)\right) - R, \tag{9}$$

$$EU_b(i = \emptyset; I; \omega = 1) = -(\sigma_M^2 + g^2) + \tfrac{Ig^4}{2} - R, \tag{10}$$

$$EU_b(i = \emptyset; I; \omega = 0) = -(\sigma_M^2 + g^2) + \tfrac{Ig^4}{2}. \tag{11}$$

The board strictly prefers to engage in CSR if and only if:

$$dEU_b(i=\theta;I;\omega=1)+(1-d)EU_b(i=\emptyset;I;\omega=1)>EU_b(i=\emptyset;I;\omega=0). \quad (12)$$

This may be rearranged as:

$$R \le d\left(\sigma_M^2-\sigma_\varepsilon^2+\tfrac{I}{2}\sigma_\varepsilon^2(\sigma_\varepsilon^2+g^2)\right)\equiv \bar{R} \quad (13)$$

The right hand side denotes the maximum CSR expenditure that the board is willing to pay. Notice that this value increases in I, because the main benefit of CSR from the board's perspective lies in its subsequent ability to choose higher monitoring intensity, and this difference in intensity, $\pi(i=\theta;I)-\pi(i=\emptyset;I)=I\sigma_\varepsilon^2$, increases in the level of board independence.

E. CEO's decision to share information at $t=1$

When the CEO decides whether to share θ to the board, it must form an expectation about whether the board would engage in CSR activities upon her refusal. However, this is irrelevant, because:

$$\begin{aligned} &EU_c(i=\theta;I)\ge dEU_c(i=\theta;I)+(1-d)EU_c(i=\emptyset;I)\\ &\Rightarrow EU_c(i=\theta;I)\ge EU_c(i=\emptyset;I), \end{aligned} \quad (14)$$

where $EU_c(i=\theta;I)$ denotes the expected utility of the CEO if the board is informed about θ; if the board is uninformed about θ, it is denoted $EU_c(i=\emptyset;I)$.

Importantly, Equation (14) indicates that the CEO's information revelation constraint remains the same regardless of the board's subsequent CSR choice. Her decision is identical to the baseline case without stakeholders in Adams and Ferreira (2007), with the CEO revealing θ whenever $I \le I'$, with $I' \equiv \frac{\sigma_M^2-\sigma_\varepsilon^2}{\sigma_\varepsilon^2\{b-\sigma_\varepsilon^2\}}$ if $\sigma_\varepsilon^2 < b$ and $I' \equiv 1$ if $\sigma_\varepsilon^2 \ge b$.

F. Shareholders' board independence choice at $t=0$

In this section, we discuss the central result of this paper, specifically the shareholders' choice of board independence when they have an additional option to extract firm-specific information from the stakeholders by engaging in CSR activities. First, Proposition 1 states that the shareholders have no incentive to push for CSR whenever the first best is attainable:

Proposition 1 (no informational CSR under the first best case).

If $b \leq \frac{\sigma_M^2+\sigma_\varepsilon^2(\sigma_\varepsilon^2-1)}{\sigma_\varepsilon^2} \equiv b^f$, CSR does not occur.

Proof. When $b \leq \sigma_\varepsilon^2$, the CEO always reveals θ regardless of the chosen level of independence, so the game will never reach the stage where the board makes its choice over CSR. On the other hand, if $b > \sigma_\varepsilon^2$, the board must satisfy the CEO's information revelation constraint, i.e., $I \leq I'$, with $I' \equiv \frac{\sigma_M^2-\sigma_\varepsilon^2}{\sigma_\varepsilon^2\{b-\sigma_\varepsilon^2\}}$, for the CEO to reveal the information. However, the first best is still attainable if $I' \geq 1$, which reduces to the inequality in Proposition 1.■

This is the first best scenario in Adams and Ferreira (2007). When the CEO's private benefit from retaining project control is sufficiently small, the CEO wishes to avoid the advising equilibrium in which the board partitions the information, and thus she willingly reveals her knowledge of θ. In this instance, the shareholders receive no benefit from stakeholder consultation. Of course, in practice, the firm is still likely to engage in CSR in practice for other reasons, but such CSR will not be informationally motivated.

In contrast, suppose Proposition 1 is not satisfied and the first best scenario of information revelation is not attainable, then there are two distinct equilibria under the baseline setting of Adams and Ferreira (2007) without stakeholders. First, when the degree of CEO-board information asymmetry is high (i.e., large c), or the degree of asymmetry is low and the CEO's private benefit is not too extreme, then the shareholders find it optimal to satisfy the CEO's information revelation constraint by choosing a level of board independence lower than the first best level, $I = I' < 1$, which leads to lower monitoring intensity. This is referred to as "induced revelation." Alternatively, when c is sufficiently small and b is sufficiently large so that appeasing the CEO through lower independence is too costly from the shareholders' perspective, then the shareholders instead choose the maximum level of independence, i.e., $I = 1$, and proceed without the CEO's information revelation.

Before we proceed with presenting our main result, Proposition 2 outlines two simple intermediate findings that aid the ease of exposition for the analyses that follow.

Proposition 2 (Intermediate results on the shareholders' informational CSR incentives).
(i) If the shareholders decide not to induce the CEO to reveal her information but rely instead on stakeholder engagement, they choose the maximum level of independence, $I = 1$, and the board engages in CSR whenever:

$$R \leq d\left(\sigma_M^2 - \sigma_\varepsilon^2 + \frac{\sigma_\varepsilon^2}{2}(\sigma_\varepsilon^2 + g^2)\right). \quad (15)$$

(ii) Whenever it is in the board's interest to engage in CSR, it is also in the shareholders' ex ante interest to do so.

Proof. See Appendix A.

Proposition 2 tells us that, even in the absence of CEO's information revelation, the board's ability to obtain firm-specific information through stakeholder engagement has the potential to alleviate the advising-monitoring trade-off to some extent, which in turn enables the shareholders to opt for the maximum level of independence. Using this result, we summarize the circumstances under which the shareholders find it optimal to engage in CSR activities:

Proposition 3 (Shareholders' informational CSR incentives). Suppose (15) is satisfied. Then, informationally-motivated stakeholder engagement occurs in our model under one of the following two scenarios:

(i) (from no revelation) when c is small but b is sufficiently large, the shareholders do not induce the CEO to reveal information and opt for maximum independence in the absence of stakeholders. CSR occurs as long as (15) is satisfied, but the level of board independence remains unchanged. Ex ante expected monitoring intensity increases.

(ii) (from induced revelation) when c is sufficiently large, or when c is small and b is within some intermediate range, shareholders engage in "induced revelation" in the absence of stakeholders. However, the shareholders engage in CSR when d is sufficiently large, R is sufficiently small, and b is sufficiently large. Board independence increases, and expected monitoring intensity also increases when b is sufficiently large.

Proof. See Appendix A.

Proposition 3 tells us that the shareholders engage in CSR under two distinct circumstances. First, suppose the shareholders are not overly concerned about the degree of information asymmetry between the CEO and the board. Then, when the CEO's private benefit is too high, the shareholders choose the maximum level of board independence and proceed without information revelation in the absence of stakeholder engagement, because satisfying the CEO's information revelation constraint

requires too much sacrifice in terms of board independence. Here, engaging in informationally-motivated CSR is merely an additional source of information that enables more intensive monitoring; if the benefit of increased monitoring exceeds its cost, then it is in the shareholders' interest to do so.

However, as the information asymmetry increases, it can be shown that induced revelation becomes optimal for a larger range of the CEO's private benefit; in fact, when the asymmetry is too severe, the shareholders always relies on the CEO for information through lowering the level of independence in the absence of stakeholder engagement. Nevertheless, if the shareholders are convinced that the board is incentivized to gather information through CSR, either directly or indirectly, they can ex ante choose a higher level of board independence, breaking off their informational dependence on the CEO. Thus, board independence and CSR expenditure are strategic complements in this high information cost environment. Put differently, even when the CEO holds informational advantage, the shareholders are willing to be more aggressive in setting the firm's corporate governance if they are confident that engaging in reasonable levels of CSR expenditure would significantly reduce the firm's board-CEO information asymmetry. In Figures 2 and 3, we illustrate how board independence and expected monitoring intensity change as the option of stakeholder consultation becomes available to the shareholders, assuming c is low enough to admit both the cases of "induced revelation" and "no revelation" in the absence of stakeholders.

[INSERT FIGURES 2 AND 3 HERE]

An interesting corollary of Proposition 3 is that informationally-motivated CSR would be more prominent when the level of CEO's private benefit from control, i.e., b, is sufficiently large. After all, in the first best case where the CEO willingly reveals her firm-specific information, they have no incentive to engage in CSR activities out of informational reasons. Thus:

Corollary 1 (CEO's private benefits and shareholders' informational CSR incentives). Informationally motivated CSR will be more likely to be observed among firms where the CEOs derive high private benefits from retaining corporate control.

Proof. Follows immediately from Proposition 3.

It is generally viewed that CEOs enjoying high private benefit from corporate control engage in more CSR activities out of various agency problems, with various perks and personal satisfaction that stem from being on good terms with the firm's internal and external stakeholders. In other words,

CSR expenditure is seen as being symptomatic of greater agency issues within the firm. While this cannot be ruled out, our model suggests that CSR could also be an optimal response by the board and the shareholders to enhance their knowledge of firm-specific information and shake off their informational dependence on the CEO in such environments. If so, CSR expenditure may be viewed as a potential remedy for internal agency problem rather than being a symptom of it.

Our model yields some interesting testable predictions. First, strategic complementarity between board independence and CSR would only be observed when the shareholders switch from "induced revelation" to "CSR-assisted revelation." Given that the shareholders are more likely to induce the CEO to reveal her information in the first place when the firm suffers from a high degree of CEO-board information asymmetry, we have:

(H1) *A positive relationship between the level of board independence and a firm's CSR activities will be more evident among firms with high information cost.*

Moreover, our model predicts that the shareholders would engage in CSR activities to increase the intensity of monitoring. However, in low information cost environment, increased monitoring through CSR occurs without any effect on the firm's level of board independence. In contrast, when the degree of information asymmetry is sufficiently high, and assuming b is sufficiently large so that stakeholder consultation enables a higher level of monitoring intensity, the intensity of monitoring will be primarily determined by the *joint* effect of board independence and CSR expenditure, because of their strategic complementarity properties discussed earlier. Thus:

(H2) *The direct effect of CSR on the board's monitoring intensity will be stronger among the low information cost firms, but the joint effect of board independence and CSR will be stronger among the high information cost firms.*

Of course, as acknowledged earlier, the board could opt for information generation through other means of spending apart from the conventional definition of CSR activities; after all, our model does not explicitly distinguish between CSR and all other forms of spending that affect the level of board-CEO information asymmetry. However, we specifically focus on a firm's CSR activities for our subsequent empirical analyses as they form the central part of stakeholder engagement efforts in most firms, and given the sheer increase in the interest for socially responsible investment among major

institutional investors in recent decades. Thus, we apply the testable predictions of our model specifically within the context of CSR spending, although it is *a priori* possible that the predictions of our model could materialize itself in other related contexts.

III. Data

Our sample consists of firms incorporated in the U.S. and covered by Compustat/CRSP, BoardEx, and MSCI ESG KLD STATS between 1999 and 2013. Board variables are constructed primarily from BoardEx, supplemented with ISS, while CEO-related variables are constructed from Execucomp. CSR activities are assessed using MSCI ESG KLD STATS. Analyst forecast variables are from Thomson Reuters IBES, and business segment variables are constructed using Compustat Historical Segments. Quarterly mutual fund holdings data (including SRI and impact funds) are from Thomson Reuters s12 database. State-level U.S. Presidential Election results between 1996 and 2012 are from the National Archives and Records Administration. Finally, we use geographic coordinates from 2010 U.S. Census Gazetteer Files to compute the distance between firm headquarters.

A. Board independence and other board characteristics

Our key measure, *Board Independence*, is the percentage of independent directors in the board for each firm-year. We follow the BoardEx definition of independent directors for this purpose.[10] We also construct industry median board independence, with industry defined according to the first two digits of the SIC code, as one of the instrumental variables.[11] Moreover, we construct the following variables from BoardEx as controls: *Log Board Size*, *CEO-Chair Duality*, *Busy Board*, and *Old Independent Director* dummy. We further construct some CEO-related variables from BoardEx, namely *CEO Age*, *CEO Tenure*, and *Inside-Succession CEO* dummy. From ISS, we compute *Average Independent Director Equity Ownership* and *E-index* (Bebchuk, Cohen, and Ferrell, 2009).[12] A detailed definition of each control variable is provided in Appendix E.

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[10] In untabulated analysis, we confirm that employing the ISS definition of independent directors does not lead to any qualitative change to the results.

[11] This is used as one of the instruments for a firm's board independence in Knyazeva, Knyazeva, and Masulis (2013), as Levit and Malenko (2016) demonstrate that the directors' desire to join other boards leads to strategic complementarity of corporate governance among competitors.

[12] ISS discontinued coverage of some of the provisions necessary for the calculation of Gompers, Ishii, and Metrick's (2003) G-index during our sample period, so we use E-index instead, which Bebchuk, Cohen, and Ferrell (2009) demonstrate to hold stronger value implications compared to other ISS provisions.

B. CSR score

We use MSCI ESG KLD STATS to assess a firm's CSR activities along seven categories: community, corporate governance, diversity, employee relations, environment, human rights, and products. It has an extensive checklist of strengths and concerns for each category. However, as the number of criteria for each category differs from year to year, it is not straightforward to engage in a direct comparison of the CSR score. Thus, we use the adjustment proposed by Manescu (2011) and Deng, Kang, and Low (2013), with the adjusted score of firm i in year j for category X defined as:

$$X_{i,j} = \frac{No.of\ Strengths_{i,j}}{No.of\ Strength\ Criteria_j} - \frac{No.of\ Concerns_{i,j}}{No.of\ Concern\ Criteria_j}. \quad (16)$$

We then aggregate the adjusted score of each category to arrive at a firm's adjusted CSR score for a given year. However, since board independence and executive pay both form part of a firm's corporate governance score, our measure of CSR excludes this category, aggregating only the adjusted scores of the other six categories.

C. Information cost

Our model predicts that the strategic complementarity of board independence and CSR would be stronger in high information cost environment. In the context of our model, these will be firms where the level of information asymmetry between the CEO and the outside directors, i.e., c, will be high. Similar to Duchin, Matsusaka, and Ozbas (2010), we use four measures that proxy for a firm's level of information asymmetry. First, we calculate *Analyst Forecast Error*, which is the absolute difference between the analysts' consensus estimate for quarterly earnings in the last calendar month before the earnings statement, normalized by the firm's total book assets, and the actual earnings, also normalized by the firm's total assets, averaged across four quarters in a given calendar year. We also calculate *Analyst Forecast Dispersion*, namely the standard deviation of the analysts' forecasts for quarterly earnings, normalized and averaged in the identical manner. This measure, however, is sensitive to firm size, with large firms followed by substantially more analysts and garnering higher accuracy of forecasts. Thus, we use the residual of a simple regression of these variables on log assets to adjust for firm size.

Second, using the Compustat Historical Segments file, we construct two further measures: *Multiple Segment* dummy, which equals 1 if and only if the firm reports more than one business segment

with non-missing sales in a given year,[13] and *Business Segment Diversification*, namely one minus segment-level sales Herfindahl-Hirschman Index (HHI).[14]

D. CEO pay and turnover

Our model predicts the board may strategically engage in CSR activities to enhance its monitoring intensity. As in the previous literature on corporate governance, we surmise that increased monitoring would affect CEO pay and turnover. Thus, we construct *Log CEO Total Pay*, using item TDC1 in Execucomp expressed in constant 2002 dollars.[15] We also construct *CEO Equity Ownership*, namely the percentage of the firm's shares held by the CEO.

CEO turnovers are also identified from Execucomp. We assign a CEO turnover event to fiscal year *t* if the event occurs during the last two fiscal quarters of year t or the first two fiscal quarters of year $t+1$, as is standard in the literature. We classify a CEO turnover as suspected forced in a similar manner to Fee, Hadlock, and Pierce (2013), namely when the departing CEO is less than 60 years old and does not re-emerge immediately as CEO of another firm within the one-year window that follows.

E. Impact fund holdings

We construct the firm-level holding share of impact funds using Morningstar Direct and Thomson Reuters Mutual Fund Holdings (s12) databases. Morningstar has a number of broad definitions for the funds' sustainability intentionality. First, Morningstar identifies ESG funds, defined as those that incorporate ESG principles in their investment process. Second, Morningstar also identifies impact funds, defined as those that "seek to make a measurable impact in investments on specific issue areas alongside financial return." We focus on the latter group of funds whose investment decisions tend to be more sensitive to a firm's CSR activities. Morningstar further reports whether these funds' focus on investment impact include environmental, community development, gender and diversity, or other issues.[16] We use both the overall impact fund flag as well as the flag for each of these four sub-categories in Morningstar.

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[13] Results are similar when we use the number of business segments instead.

[14] When constructing the measure, we do not include a small number of segments with negative sales entries, which arise from complexities within the IFRS rules.

[15] Results remain directionally consistent, albeit with weaker statistical significance, when the log CEO current compensation (Execucomp item *TOTAL_CURR* in constant 2002 dollars) is used as the dependent variable instead.

[16] These sub-categories are not mutually exclusive, and many impact funds simultaneously focus on more than one sub-category. In addition to these four sub-classifications, Morningstar identifies impact funds focusing on low-carbon/fossil fuel-free issues, but these funds are (almost without exception) also classified as environmental impact funds, and we thus do not separately consider this sub-category.

We match the Morningstar *secid* of each share class of these impact funds to its respective *crsp_fundno* identifier using CUSIP as described in Pástor, Stambaugh, and Taylor (2015). Then, using the MFLINKS file, we match the *crsp_fundno* identifier to *fundno* identifier in Thomson Reuters database. Using the latest available quarterly mutual fund holdings, we compute for each firm-year observation how much of a firm's common equity is held by impact funds (or those that satisfy the criteria for each Morningstar sub-category). We divide this holding with the amount of shares outstanding as reported in CRSP Monthly Stock File (*shrout*) to arrive at the impact funds' holding share.

F. Other controls

From Compustat and CRSP, we construct the following variables as controls, with accompanying explanation provided in Appendix D: *Log Assets*, *Book-to-Market*, *Market Leverage*, *Free Cash Flow*, *Sales Growth*, *Cash Ratio*, *Return on Assets (ROA)*, and *1-year Abnormal Stock Return*. We further calculate the Democratic leaning of the firm's headquarter state, namely the difference between the state's percentage of votes cast for the Democratic candidate in the last Presidential Election and the corresponding national figure, given Di Giuli and Kostovetsky's (2014) finding of blue state firms' greater propensity to engage in CSR activities. Finally, we calculate *Local Director Pool*, namely the number of Compustat firms not sharing the same four-digit SIC headquartered within sixty-mile radius, which Knyazeva, Knyazeva, and Masulis (2013) show to be a valid instrument for the level of board independence, along with *Big City* and *Medium City* dummies using the 2010 U.S. Census data.[17]

G. Summary statistics

Table 1 reports the summary statistics. A dominant 95.2% of firm-year observations in our sample have a majority of independent directors in the board, which is not surprising given that most of our sample period falls after the implementation of the Sarbanes-Oxley Act. However, the percentage of independent directors vary substantially, with the inter-quartile range in excess of 20%, suggesting that there is sufficient variation in the level of board independence across firms. This is important as a director conventionally classified as independent may be more closely linked to the CEO through connections or co-option (e.g., Hwang and Kim, 2009; Fracassi and Tate, 2012; Coles, Daniel, Naveen,

[17] Knyazeva, Knyazeva, and Masulis (2013) restrict their sample to firms not belonging to financial (SIC 6000-6999) or utilities (SIC 4900-4999) industry and thus their *Local Director Pool* variable is computed by counting only non-financial firms. We do not make a similar restriction and thus we count the number of both financial and non-financial firms within sixty-mile radius in this paper.

2014). The percentage of independent directors in the board may also matter if there is a supermajority requirement for mergers or charter amendments, both constituents of the E-index.

[INSERT TABLE 1 HERE]

As for the firms' CSR activities, we find that both the mean and the median of CSR score (excluding corporate governance) is marginally negative. CEO turnover and suspected forced turnover events comprise 9.7% and 5.2% of the firm-year observations, respectively, and an average CEO in our sample receives around $4.6 million in total annual compensation in constant 2002 dollars.

[INSERT FIGURE 4 HERE]

In Figure 4, we plot sample average CSR score (excluding corporate governance) by Fama-French 12-industry classification. Two industries with the highest engagement in CSR activities are consumer non-durables and business equipment. At the opposite end of the spectrum, the industry that stands out from others with the lowest level of CSR engagement is oil, gas, and coal extraction.[18]

IV. Results

A. Univariate correlation

Our model predicts that the strategic complementarity between board independence and CSR would be stronger when the information asymmetry between the board and the CEO is sufficiently high so that the option of informational CSR enables the shareholders to free their dependence on the CEO and choose a higher *ex ante* level of board independence. To examine whether this is the case, we first present univariate correlation between board independence and CSR score, separately for high and low information cost environments. We define a firm to be operating in a high information cost environment if its information cost measure at the previous fiscal year-end exceeds that of sample median for the previous fiscal year. We then compute the correlation between a firm's board independence at the beginning of the fiscal year and its year-end CSR score. Table 2 presents our results.

[18] We stress that, though the average CSR score is negative across all 12 industries, this does *not* mean that the firm is exerting negative cost in CSR activities. It merely indicates that the level of a firm's CSR concerns in general outweighs its "positively viewed" CSR activities when converting the KLD database flags into a quantitative score.

[INSERT TABLE 2 HERE]

Across all four measures, the correlation between board independence and CSR is stronger in high information cost environments, which supports our (H1). In particular, the difference in correlation coefficients is particularly strong when information cost is defined in terms of analyst-based measures; whereas we observe strong and significant correlation between board independence and CSR in opaque information environment, coefficient estimates become statistically insignificant in more transparent environment. Table 2 thus presents some prima facie evidence of strategic complementarity between board independence and CSR in opaque information environment.

B. Board independence and CSR activities

Our first hypothesis states that the positive relationship between a firm's board independence and CSR activities would be stronger in high information cost environment. To test this, we set up an OLS model in the following manner:

$$\text{CSR Score} = \beta_0 + \beta_1 \text{Board Independence} + \beta_2 \text{Info. cost} + \beta_3 \text{Board Independence} \times \text{Info. cost} + f(\text{Controls}) + \varepsilon \quad (17)$$

All specifications include log assets, book-to-market, free cash flow, cash ratio, and sales growth as firm-level controls. We also control for CEO age and tenure. Among board characteristics, we control for log board size, CEO-chair duality, busy board, and old independent director dummy. Finally, we include the Democratic leaning of the firm's headquarter state (Di Giuli and Kostovetsky, 2014). We further control for industry fixed effect using SIC two-digit dummies, and we also include year dummies. Standard errors are clustered by firm (Petersen, 2009).[19] Table 3 presents our results.

[INSERT TABLE 3 HERE]

Across all four information cost measures, Table 3 reveals that an increase in the level of board independence has a strong positive effect on a firm's CSR activities in opaque environments, with the interaction term bearing the expected sign and significant at the 1% level in all instances. The estimates imply that the overall CSR score of multiple-segment firms are higher by 0.25 than single-segment

[19] All results are consistent with the use of standard errors that are two-way clustered by firm and year and alternative industry definitions such as SIC three-digit industries.

firms with similar characteristics. For other measures, a one standard deviation increase in information cost is consistent with an increase in overall CSR score of between 0.11 and 0.19.

All firm-level controls turn out to be significant at the 5% level. Large, growth firms tend to engage more in CSR activities, as is the case for firms with lower leverage, consistent with Bae, Kang, and Wang (2011). Firms with high free cash flow and cash ratio also engage more in terms of CSR activities, which could either be agency-motivated or consistent with our Corollary 1, namely that the shareholders are more willing to engage in CSR activities to utilize information provided by the stakeholders when the CEO derives large private benefits from retaining control. As in Di Giuli and Kostovetsky (2014), we also find greater propensity of blue-state firms to engage in CSR activities, with statistical significance at the 1% level. Finally, old CEOs and independent directors are markedly less hospitable toward CSR activities, with both variables bearing negative sign significant at the 1% level.

[INSERT TABLE 4 HERE]

In Table 4, we re-run the OLS regressions in Table 3, but using each KLD category score as the dependent variable instead. For brevity, we focus on business segment diversification and size-adjusted analyst forecast error as segment- and analyst-based measure of information cost, respectively, in many of our empirical analyses henceforth, but untabulated results confirm that the results are fully consistent with the use of other measures of information cost. If CSR activities are informationally motivated, as we posit, then the board is more likely to engage in CSR activities viewed as relevant in reducing the degree of board-CEO information asymmetry, be it through direct or indirect channels. In particular, given that impact funds in Morningstar focus on community development, gender and diversity, and environment,[20] and given the increasing presence of such funds with non-financial motives in investment in the market for asset management, we expect the statistical significance of the interaction term on the three corresponding KLD categories (community, diversity, and environment) to be stronger. We indeed find this to be the case in Table 4, with the statistical significance of the board independence-information cost interaction term significant at the 1% level for these three categories but not for the other three (i.e., employee relations, human rights, and product safety).

In Table 5, we engage in a more direct test of how the presence of CSR-conscious institutional investors acts as a catalyst to informationally-motivated CSR. In particular, the presence of mutual

[20] We find that all our sample impact funds in Morningstar focus on *at least* one of community development, gender and diversity, and environment (or low-carbon/fossil-fuel free) issues.

funds with non-financial ESG motives often creates space for analysts focusing on a firm's ESG aspects. While attempting to uncover information about a firm's ESG profile, these analysts can offer fresh perspectives about the firm and improve the overall information environment. Thus, we expect the strategic complementarity between board independence and CSR activities in opaque information environment to be more prominent among firms held by such funds. To this end, in Table 5, we re-estimate our baseline results in Table 3 (using business segment diversification and size-adjusted analyst forecast error as information cost measures), albeit separately for firms held vs. not held by funds identified in Morningstar as "impact funds." We separately consider the overall presence of all impact funds as well as those satisfying the criteria for each sub-category. We further test the statistical significance of subsample coefficient difference by running full sample regressions with all explanatory variables and fixed effects interacted with the impact fund held dummy. Table 5 presents our results.

[INSERT TABLE 5 HERE]

Table 5 Panel A reveals that, regardless of the information cost measure used, the interaction term between board independence and the information cost measure has a significantly more positive impact on a firm's CSR activities among firms held by impact funds, with the subsample coefficient difference statistically significant at the 5% level in both instances. Moreover, as shown in Panel B, the subsample coefficient difference of the interaction term is most prominent, both in terms of statistical and economic significance, when we consider impact funds focusing on environmental issues. This is very much in line with our result in Table 4, where the interaction term has a highly significant statistical association with a firm's KLD environment score. For the other three sub-categories, the interaction term exhibits more prominent degrees of statistical significance when we consider size-adjusted analyst forecast error but less so for business segment concentration. Overall, our evidence in Table 5 Panel B strongly hints at the relevance of *indirect* channels of information production, with the presence of impact funds, and in particular environmental impact funds, intensifying a firm's informational CSR motives. This is not surprising given that these funds with non-financial motives act as natural collaborators to shareholder-initiated engagements on environmental and social fronts, as Dimson, Karakaş, and Li (2015) note.

Ferrell, Liang, and Renneboog (2016) similarly examine the relationship between board independence and the firm's propensity to engage in CSR, with board independence entering as an instrument for managerial "pay-for-performance" incentives. Our contribution to this literature on the re-

lationship between board independence and CSR is in demonstrating that the strength of this relationship is dependent on the firm's existing informational environment; our empirical finding of strong complementarity between board independence and CSR in opaque information environment is in line with our theoretical predictions, with the shareholders reaping the information benefits of CSR by reducing its reliance on management for firm-specific information and opt for an ex ante higher level of board independence.

a) CEO compensation

Our (H2) predicts that the direct effect of CSR on monitoring intensity would be higher among low information cost firms, while the joint effect of CSR and board independence on monitoring intensity would be more pronounced among high information cost firms. To test this hypothesis, we estimate the following equation separately for high and low information cost environments:

$$\begin{aligned}\text{Log CEO Total Pay} = {} & \gamma_0 + \gamma_1 \text{Board Independence} + \gamma_2 \text{CSR Score} \\ & + \gamma_3 \text{Board Independence} \times \text{CSR Score} + g(\text{Controls}) + \varepsilon \end{aligned} \quad (18)$$

If, as our model predicts, the direct effect of CSR on monitoring intensity is stronger when the firm's information environment is relatively transparent, then we expect γ_2 to be lower in low information cost environment subsample. In contrast, as the joint effect of board independence and CSR activities on monitoring intensity is stronger among high information cost firms, we expect γ_3 to be lower in opaque environments. In other words, when we take a subsample difference of coefficients between high and low information environments, the difference of γ_2 should bear positive sign while that of γ_3 should be negative.

Given the importance of firm performance in CEO compensation, we include the following as controls in addition to those used in the previous subsection: ROA, 1-year abnormal stock return, inside-succession CEO dummy, and CEO equity ownership, while we drop the firm headquarter state's Democratic leaning.[21] Table 6 presents our results.

[INSERT TABLE 6 HERE]

[21] Results remain qualitatively consistent when we include E-index as an additional control. We remove this from our main set of controls as the use of the ISS database leads to a sizeable loss of observations.

For both measures of information cost, empirical results support our (H2); whereas subsample difference of γ_2 is positive and significant at the 5% level in both instances, the opposite is true of the coefficient difference for γ_3, negative and significant at the 5% level. More importantly, the direct effect of CSR on CEO compensation is negative in low information cost environments, while the joint effect of CSR and board independence on CEO compensation is negative in high information cost environments, further supporting our hypothesis that CSR activities enable the board to intensify its monitoring intensity.[22] In contrast, our empirical results are difficult to reconcile with the agency view that treats CSR as a symptom of misalignment of interest between the shareholders and management. Even though firms with high free cash flow do tend to engage more in CSR, as is evident from Table 3, the agency view cannot explain the disciplining effect of CSR (in transparent information environment) or the interaction between CSR and board independence (in more opaque information environment) on CEO compensation. Rather, the results are more in line with our model's corollary, namely that the board finds it more attractive to engage in CSR when it is more susceptible to agency issues *because of* its desire to obtain firm-specific information and intensify monitoring.

b) CEO turnover

In addition to CEO compensation, we now analyze whether CSR activities—either directly or through its interaction with board independence—have a differential effect on the likelihood of CEO turnover depending on the firms' information environments. When analyzing CEO turnover, previous studies focus on turnover-performance sensitivity by interacting the main variable of interest with performance measures such as abnormal stock return or ROA (Hwang and Kim, 2009; Coles, David, and Naveen, 2014). However, in our setting, this amounts to a three-way interaction between board independence, CSR, and performance measure, complicating the interpretation of each variable. Thus, we propose the empirical set-up as follows:

$$\text{Suspected Forced CEO Turnover Dummy} = \Lambda\{\theta_0 + \theta_1 \text{Board Independence} + \theta_2 \text{CSR Score} + \theta_3 \text{Board Independence} \times \text{CSR Score} + h(\text{Controls}) + \varepsilon\}, \quad (19)$$

[22] While the marginal effect of board independence is positive and significant at the 1% level in both instances, which may appear puzzling from an agency point of view (e.g., Bebchuk and Fried, 2003), Hermalin (2005) shows that an independent board that increases monitoring could be consistent with higher CEO compensation if the CEO demands more compensation for greater effort and job insecurity that arises as a result.

where $\Lambda(\cdot)$ denotes the logistic link function. Put differently, we examine the direct effect of CSR and the interaction term on the likelihood of turnover, albeit limiting our attention to turnover cases with a suspicion of being performance-motivated.[23] We then separately estimate (18) for firms operating in high and low information cost environments in the identical manner to Table 6. Table 7 presents our results.[24]

[INSERT TABLE 7 HERE]

While much caution is needed when interpreting the logit results of the two subsamples without a clear, undisputed means of testing for the equality of coefficients, the results are broadly in line with our predictions. Specifically, we find that θ_2, i.e., the direct effect of CSR on the likelihood of suspected forced CEO turnover, is larger in more transparent information environment, while θ_3, which captures the joint effect of CSR and board independence, is larger in opaque information environment.

Taken together, Tables 6 and 7 suggest that there appears to be a systematic difference in how CSR engagement, either on its own or through its interaction with the level of board independence, affects the intensity of monitoring between opaque and transparent information environments. The results are thus broadly in line with our hypothesis, namely that CSR engagement could provide the board with a means of ameliorating its internal conflict between the dual roles of advising and monitoring. Without the information motive as outlined in our model, it is difficult to explain the differential effect of CSR and the interaction of CSR and board independence on monitoring intensity as a firm's information environment changes, strongly suggesting the importance and relevance of this motive from the perspective of shareholders and independent directors.

C. Robustness Tests

We carry out several additional tests to document the robustness of our key result, namely the existence of a positive relationship between the strategic complementarity of board independence and CSR activities and the firm's information cost environment. First, even though we control for unobserved

[23] In untabulated analysis, we confirm that turnover-performance sensitivity analysis yields similar results, with the signs of CSR Score × 1-year Abnormal Stock Return and Board Independence × CSR Score × 1-year Abnormal Stock Return consistent with the main analysis. The signs of CSR Score and Board Independence × CSR Score also remain unchanged. We also confirm that our results are consistent when the dependent variable includes all turnover cases.

[24] Comparing regression coefficients between subsamples in logit or probit models is contentious, so we abstain from any statistical inference on their difference.

heterogeneity at the industry level through SIC two-digit dummies, board independence, CSR, and other corporate financial decisions may be influenced by unobserved heterogeneity at the firm level. This is particularly important given that the board structure of a firm is known to be relatively stable over time (e.g., Linck, Netter, and Yang, 2008). Thus, in Table 8, we re-estimate our baseline regression in Table 3 albeit with firm fixed effect replacing SIC two-digit industry fixed effect. We find that the interaction term of board independence and information cost measure continues to bear the expected sign and with statistical significance at the 5% level in all instances, strongly suggesting that our result is unlikely to be driven by firm-level time-invariant unobserved heterogeneity.

[INSERT TABLE 8 HERE]

However, it is still possible that other omitted variables drive both the level of board independence as well as CSR activities, given that both form part of corporate decisions are simultaneously decided by the board and management. To this end, we follow the instrumental variable approach of Knyazeva, Knyazeva, and Masulis (2013). In accordance with their specification, the following four instruments proxy for the level of board independence: local director pool, big city dummy, medium city dummy, and industry median board independence. For each information cost measure, we interact each instrument with the information cost measure to instrument for the board independence-information cost interaction term in the second stage. We re-estimate the CSR regression in Table 3 using the two-stage least squares (2SLS) model and present the second stage results including the Kleibergen-Paap (2006) Wald F-statistic and the difference-in-Sargan C-statistic in Table 9.[25]

[INSERT TABLE 9 HERE]

Across all four measures of information cost, we find that the joint effect of board independence and information cost measure on CSR activities bears the expected sign and is always significant at the 5% level and also at the 1% level except for one instance. Kleibergen-Paap Wald first-stage F-statistic for weak instrument test is between 15 and 17, suggesting that the extent of weak instrument problem is not severe. Furthermore, difference-in-Sargan endogeneity test statistics generally indicate

[25] Regression specifications in Table 8 do not pass the Hansen (1982) overidentification test at the 10% level, but as Knyazeva, Knyazeva, and Masulis (2013) note, this requires strong distributional assumptions.

a statistically significant difference in coefficient estimates between the OLS and 2SLS models, further justifying the use of instrumental variables to address possible endogeneity issues.[26]

Furthermore, we consider a possibility that the board may not have the full control of the CSR agenda in firms with powerful CEOs. In Appendix C, we first theoretically demonstrate that such possibility indeed weakens the informational value of CSR but has no qualitative impact on its existence. We then conduct additional empirical robustness tests toward the relative strength of our information channel; we investigate how the channel effect depends on the likelihood of the board's ability to control CSR agenda. To this end, we construct two equal subsamples based on the two proxies for the CEO power, (i) the previous year-end value of CEO pay slice (Bebchuk, Cremers, and Peyer, 2011) and (ii) the previous year-end level of board independence, respectively. We suspect that CEOs are more likely to have control of the CSR agenda in high CEO pay slice and low board independence firms. According to the predictions of the extended model, the information channel of CSR will be weaker among these subsamples, but there is no reason to expect it to disappear completely. To examine whether this is the case, we re-estimate our main regression in column (3) of Table 3, using size-adjusted analyst forecast error as information cost measure.[27] Table 10 reports the results.

[INSERT TABLE 10 HERE]

In line with the predictions of our extended model, the interaction term between board independence and size-adjusted analyst forecast error is larger in economic magnitude for the high board independence subsample, compared to the low board independence subsample, with marginal statistical significance at the 10% level. We obtain similar results for CEO pay slice subsamples, though we do not find statistically significant difference in coefficients between the two subsamples. Overall, the evidence suggests that the information channel is indeed marginally weaker among firms where the CEOs are suspected to be powerful and thus likely to have sizeable control of the CSR agenda. Above all, though, the interaction term remains statistically significant at the 1% level across all subsamples regardless of the information cost measure used. Thus, our informationally-motivated CSR channel remains robust, albeit somewhat weaker in magnitude, even among firms where the CEO is likely to have strong control over the CSR decision-making process.

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[26] In untabulated analysis, we also use independent director death and mandatory retirement as an additional instrument, drawing on from the insights of Fracassi and Tate (2012). Results are qualitatively very similar.

[27] Using other information cost measure leads to consistent results.

To summarize, regardless of whether we control for firm-level unobserved heterogeneity or engage in rigorous 2SLS IV estimation to address possible endogeneity issues, and across all levels of board independence and CEO power measures, our main findings on the strategic complementarity of board independence and information value of CSR remains intact. These robustness tests thus suggest that CSR activities could be driven by these information motives.

V. Conclusion

We propose a new rationale for CSR – the information motive of socially responsible investments by corporations. Using a simple cheap-talk game between a firm's CEO and outside independent directors, where the directors could endogenously obtain valuable firm-specific information from stakeholders by engaging in CSR activities, we demonstrate that CSR could mitigate the CEO-board information asymmetry and facilitate the board's full functional efficiency in its dual role, namely, informed advising and tight monitoring of management by independent directors.

We theoretically show that, in equilibrium, the marginal information value of CSR is greatest among firms that suffer most from self-entrenched CEOs, who are unwilling to share valuable private information to highly independent board members for agency reasons. Under such circumstances, our notion of the informationally-motivated CSR activities endogenously arises as a remedy to this familiar agency problem. Given these perspectives, our model predicts a novel strategic complementarity between board independence and CSR activities, particularly for firms that operate in informationally opaque environments.

Using the data on firms' socially responsible activities from 1999 to 2013, together with the board compositions and various proxies for firm information environments, we find empirical evidence to be largely consistent with our theory. We find a significant and positive relation between the level of board independence and a firm's CSR activities as the firm's information environment becomes more opaque. Our results hold across various information acquisition cost proxies, including analyst forecast error, analyst forecast dispersion, multiple business segments dummy, and the degree of sales concentration across multiple segments. They are also robust to controlling for omitted firm-level heterogeneity as well as simultaneity concerns.

Overall, our study sheds light on the information value of CSR. We model CSR activities as a potential remedy for the managerial agency problems, and CSR is more than just a manifestation of good governance; rather, it enables good governance by ameliorating the CEO-board information

asymmetry. In this respect, our information view of CSR stands apart from the prevailing views of CSR, namely the good versus bad governance views. By providing an alternative explanation that goes beyond the usual focus on the managerial incentives that determine CSR activities, our theory and empirical analyses significantly extend our understanding of the unresolved yet important issue in the literature, namely the fundamental motive of CSR.

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Figure 1: Timeline of the CSR Game

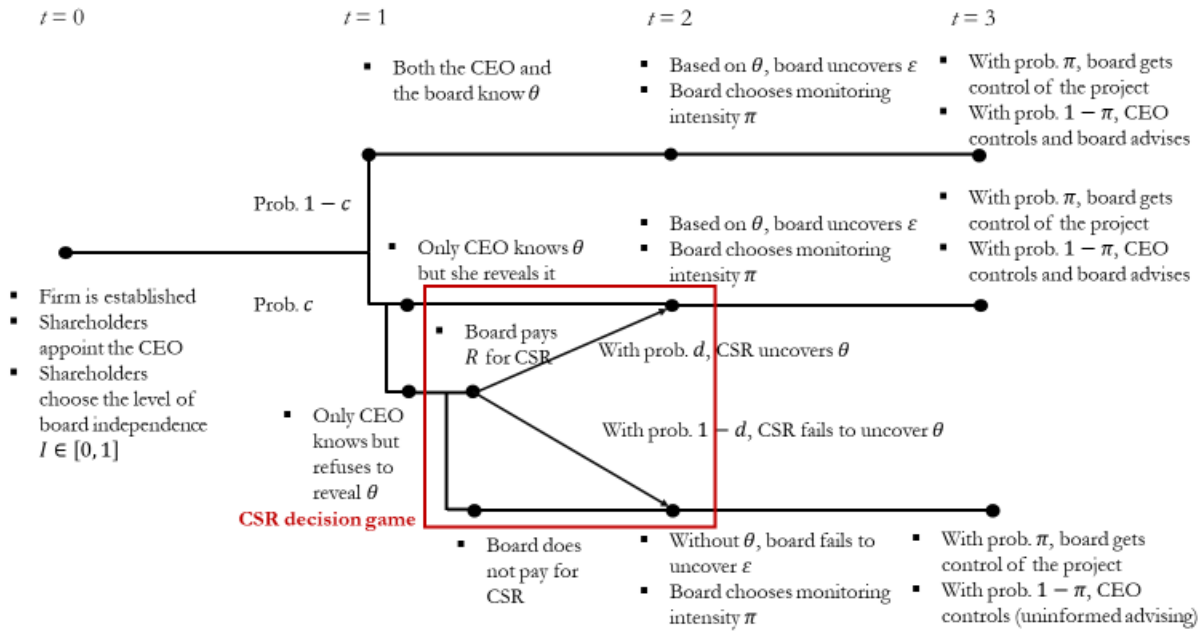

Figure 2: Optimal board independence with vs. without stakeholder information

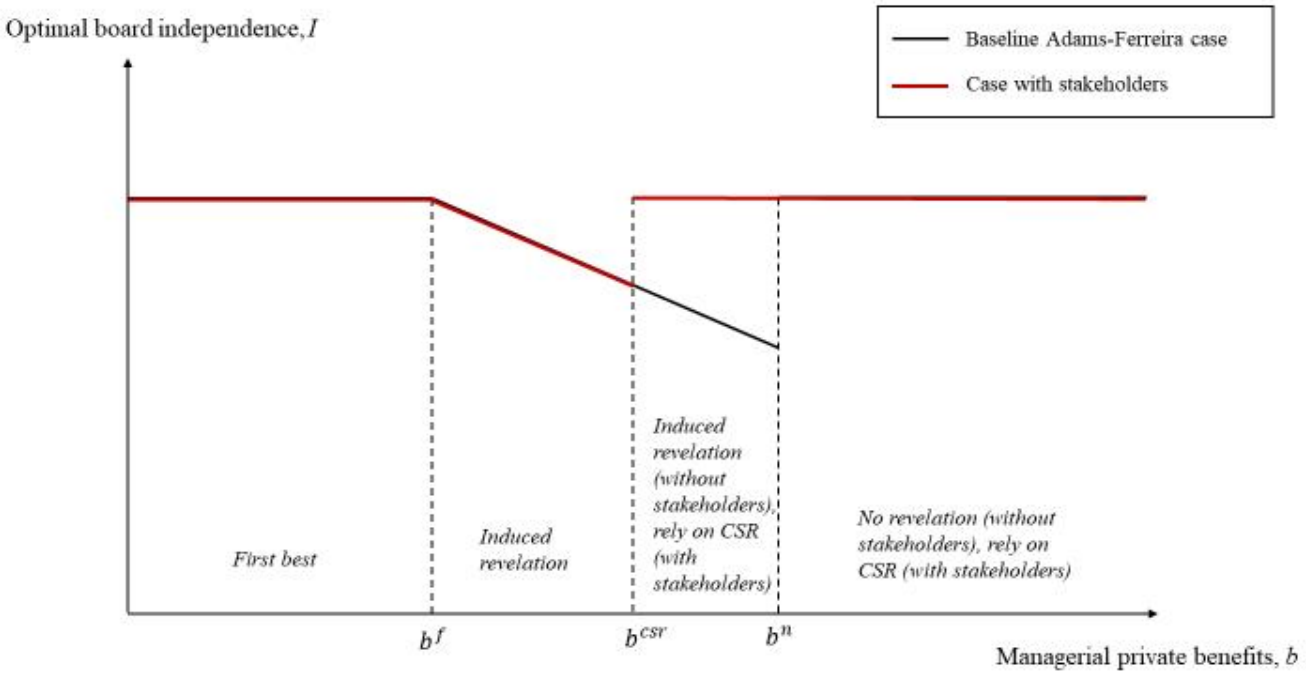

Figure 3: Expected monitoring intensity with vs. without stakeholder information

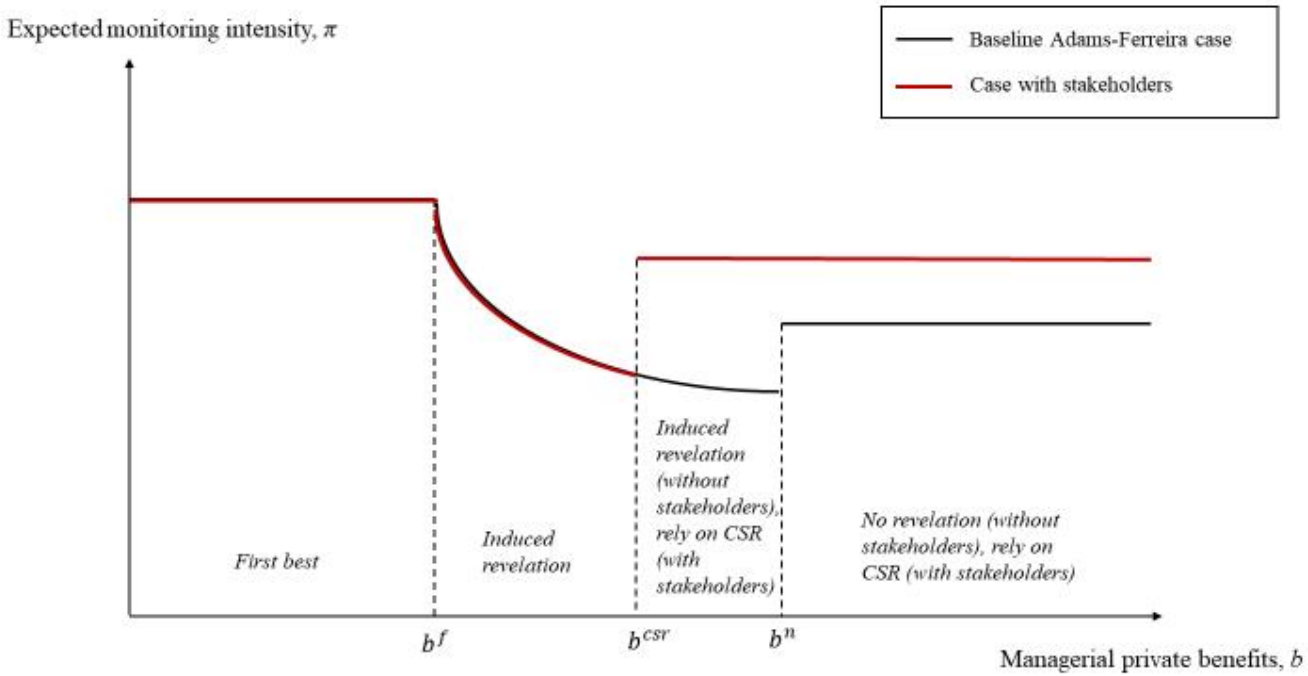

Figure 4: Industry breakdown of CSR scores

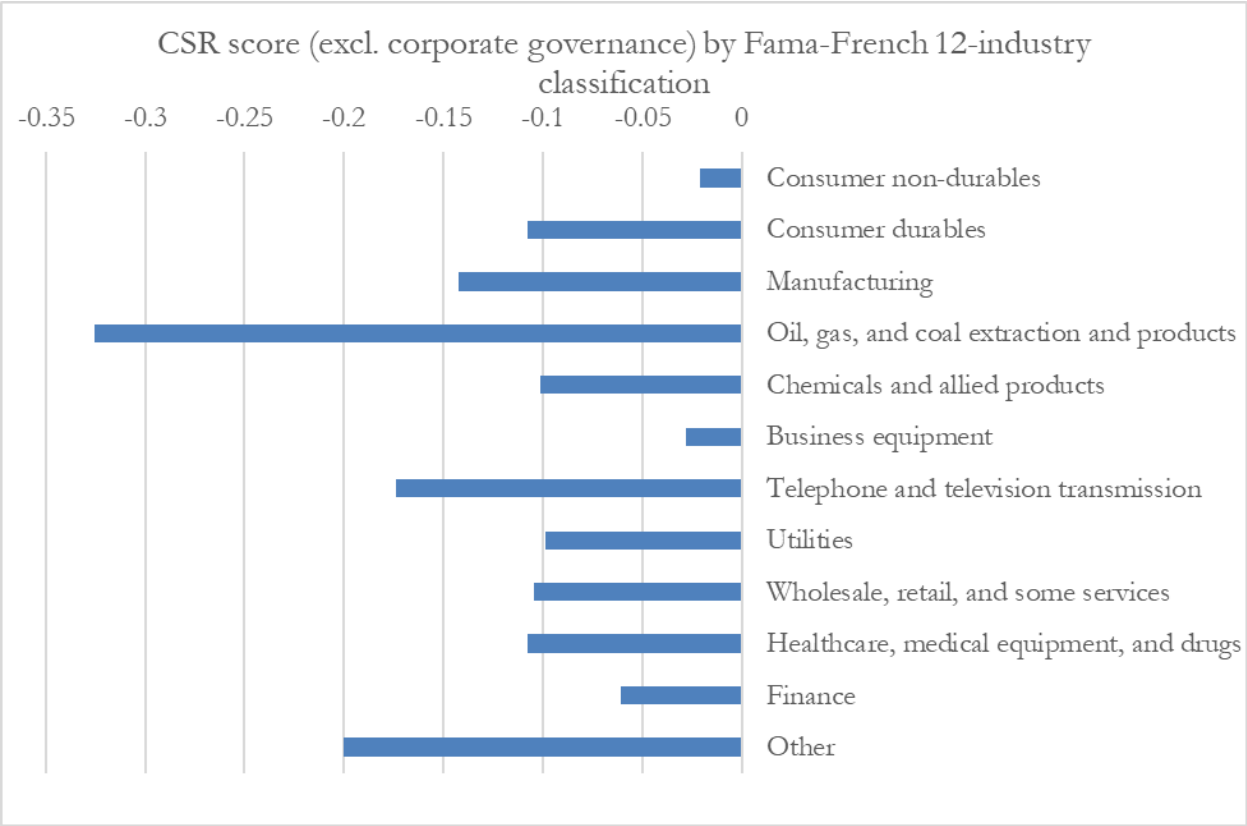

Table 1: Summary Statistics

This table summarizes the characteristics of our main variables of interest. All reported values are winsorized at the 1st and 99th percentiles. For detailed explanation on the definition of each variable, please refer to Appendix D.

	Obs.	Mean	St. Dev.	Q1	Median	Q3
Panel A: Firm-level variables						
Assets (in $ millions)	24,007	7,713.9	21,354.7	479.3	1524.3	4,769.1
Book-to-Market	24,004	0.565	0.440	0.287	0.487	0.756
Market Leverage	23,955	0.172	0.178	0.026	0.123	0.260
Free Cash Flow	24,010	0.043	0.134	0.126	0.055	0.102
Sales Growth	23,984	0.109	0.288	-0.016	0.072	0.182
Cash Ratio	24,010	0.191	0.237	0.032	0.097	0.260
Return on Assets (ROA)	24,010	0.026	0.134	0.006	0.037	0.085
1-Year Abnormal Stock Return	23,980	0.059	0.456	-0.206	-0.004	0.229
Size-Adjusted Analyst Forecast Error	19,587	0.000	0.041	-0.014	-0.007	0.001
Size-Adjusted Analyst Forecast Dispersion	18,759	0.000	0.018	-0.057	-0.003	0.001
Multiple Segment dummy	19,904	0.554	0.497	0.000	1.000	1.000
Business Segment Diversification	19,832	0.240	0.266	0.000	0.100	0.489
Firm HQ State's Democratic Leaning	23,816	0.014	0.075	-0.036	0.027	0.081
Panel B: Board-level variables						
Board Size	23,973	9.174	2.494	7.000	9.000	11.00
Board Independence (BoardEx)	23,973	0.763	0.128	0.667	0.786	0.875
Board Independence (ISS)	14,099	0.751	0.133	0.667	0.778	0.867
Majority Independent dummy (BoardEx)	23,973	0.952	0.213	1.000	1.000	1.000
CEO-Chair Duality	23,973	0.639	0.480	0.000	1.000	1.000
Busy Board	23,793	0.445	0.497	0.000	0.000	1.000
Old ID dummy	23,785	0.605	0.489	0.000	1.000	1.000
Average ID Equity Ownership	14,089	0.002	0.005	0.000	0.001	0.001
E-index	15,367	2.748	1.466	2.000	3.000	4.000
Panel C: CSR-related variables						
Overall CSR Score (ex. Corporate Governance)	23,392	-0.109	0.548	-0.417	-0.167	0.092
Community Score	23,392	0.021	0.173	0.000	0.000	0.000
Diversity Score	23,392	-0.097	0.305	-0.333	0.000	0.125
Employee Relations Score	23,392	-0.022	0.167	-0.033	0.000	0.000
Environment Score	23,392	0.015	0.128	0.000	0.000	0.000
Human Rights Score	23,392	-0.010	0.051	0.000	0.000	0.000
Product Score	23,392	-0.014	0.185	0.000	0.000	0.000

(Table 1 continued)

Panel D: CEO-level variables						
CEO Age (in years)	23,433	55.65	7.376	51.00	56.00	60.00
CEO Tenure (in years)	23,433	5.558	5.445	1.800	3.900	7.500
Inside-Succession CEO dummy	23,433	0.718	0.450	0.000	1.000	1.000
CEO Turnover dummy	16,969	0.104	0.305	0.000	0.000	0.000
CEO Turnover dummy (Suspected Forced)	16,969	0.056	0.230	0.000	0.000	0.000
CEO Total Pay (in constant 2002 $ thousands)	16,884	4,562.1	4,931.0	1,479.0	2,967.4	5,657.5
CEO Equity Ownership	16,715	0.019	0.046	0.001	0.003	0.011
Panel E. Instruments						
Local Director Pool (raw number of firms)	23,883	256.6	252.5	56.00	206.0	349.0
Big City	23,883	0.391	0.488	0.000	0.000	1.000
Medium City	23,883	0.354	0.478	0.000	0.000	1.000
Industry Median Board Independence (BoardEx)	24,088	0.741	0.071	0.714	0.750	0.800

Table 2: Univariate correlation

This table reports the correlation coefficient between CSR score at the end of a fiscal year and the beginning-of-year level of board independence, separately for firms in high and low information cost environments. A firm's environment is defined as high information cost if its information cost measure exceeds the sample median at the beginning of the year. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level, respectively.

	All	High info. cost environment	Low info. cost environment
Panel A. Multiple Business Segment dummy			
Board Independence-CSR Correlation Coefficient	0.103***	0.120***	0.065***
No. of Obs.	19,216	10,561	8,655
Panel B. Business Segment Diversification			
Board Independence-CSR Correlation Coefficient	0.103***	0.123***	0.066***
No. of Obs.	19,163	9,730	9,433
Panel C. Size-Adjusted Analyst Forecast Error			
Board Independence-CSR Correlation Coefficient	0.110***	0.150***	-0.002
No. of Obs.	18,961	9,525	9,436
Panel D. Size-Adjusted Analyst Forecast Dispersion			
Board Independence-CSR Correlation Coefficient	0.109***	0.144***	0.006
No. of Obs.	18,056	9,079	8,977

Table 3: Determinants of CSR: Board independence and information cost environment

This table reports the OLS regressions of KLD CSR score (excluding Corporate Governance) on board independence and information cost measures. We control for firm-, board-, and CEO-level characteristics as specified in the table, as well as SIC 2-digit industry and year dummies. All controls are lagged by one year. Board independence follow the BoardEx definition. Firm-clustered standard errors are in parentheses. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level, respectively.

	Dependent variable: Overall CSR Score (excl. Corporate Governance)			
	(1)	(2)	(3)	(4)
Information cost measure used:	Multiple Business Segment dummy	Business Segment Diversification	Size-Adjusted Analyst Forecast Error	Size-Adjusted Analyst Forecast Dispersion
Board Independence	0.052	0.521***	0.222***	0.226***
	(0.059)	(0.141)	(0.051)	(0.053)
Information Cost Measure	-0.202***	-0.359***	-2.556***	-8.172***
	(0.058)	(0.121)	(0.660)	(1.954)
Board Independence	**0.253*** **	**0.424*** **	**3.491*** **	**10.582*** **
× Information Cost Measure	**(0.080)**	**(0.164)**	**(0.883)**	**(2.581)**
Log Assets	0.085***	0.086***	0.085***	0.087***
	(0.007)	(0.007)	(0.008)	(0.008)
Book-to-Market	-0.050***	-0.048***	-0.058***	-0.051***
	(0.015)	(0.015)	(0.015)	(0.016)
Market Leverage	-0.263***	-0.269***	-0.293***	-0.301***
	(0.042)	(0.042)	(0.043)	(0.045)
Free Cash Flow	0.085**	0.085**	0.099***	0.106***
	(0.033)	(0.034)	(0.036)	(0.038)
Cash Ratio	0.104***	0.099***	0.092***	0.091***
	(0.025)	(0.025)	(0.026)	(0.027)
Sales Growth	-0.023**	-0.023**	-0.024**	-0.024**
	(0.011)	(0.011)	(0.012)	(0.012)
CEO Age	-0.002***	-0.002***	-0.002***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
CEO Tenure	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)

(Table 3 continued)

Log Board Size	0.201***	0.203***	0.215***	0.221***
	(0.028)	(0.028)	(0.030)	(0.031)
Busy Board	0.017	0.018	0.009	0.008
	(0.012)	(0.012)	(0.012)	(0.013)
CEO-Chair Duality	0.008	0.009	0.019	0.019
	(0.013)	(0.013)	(0.013)	(0.014)
Old Independent Director Dummy	-0.050***	-0.050***	-0.061***	-0.062***
	(0.012)	(0.012)	(0.012)	(0.013)
Firm HQ State's Democratic Leaning	0.487***	0.484***	0.506***	0.492***
	(0.103)	(0.102)	(0.108)	(0.112)
Constant	-1.240***	-1.604***	-1.442***	-1.450***
	(0.196)	(0.206)	(0.242)	(0.246)
Industry Dummies	SIC2D	SIC2D	SIC2D	SIC2D
Year Dummies	YES	YES	YES	YES
No. of Obs.	19,216	19,163	18,961	18,056
Adjusted R-squared	0.200	0.200	0.206	0.206

Table 4: Determinants of CSR activities by each KLD category

This table reports the OLS regressions of each KLD category adjusted score on board independence and either (i) business segment diversification or (ii) size-adjusted analyst forecast error. All regressions include the identical set of controls as in Table 3, as well as SIC 2-digit industry and year dummies. All explanatory variables are lagged by one year. Firm-clustered standard errors are in parentheses. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Community	Diversity	Employee Relations	Environment	Human Rights	Product
Panel A. Business Segment Diversification						
Board Independence × Information Cost	0.126**	0.267***	0.002	0.132***	0.002	-0.071
	(0.049)	(0.080)	(0.053)	(0.042)	(0.018)	(0.057)
Controls, SIC2D industry and year dummies	YES	YES	YES	YES	YES	YES
No. of obs.	19,163	19,163	19,163	19,163	19,163	19,163
Adjusted R-squared	0.103	0.338	0.161	0.169	0.123	0.108
Panel B. Size-Adjusted Analyst Forecast Error						
Board Independence × Information Cost	0.765***	1.418***	0.575*	0.627***	-0.021	0.254
	(0.203)	(0.540)	(0.346)	(0.172)	(0.061)	(0.203)
Controls, SIC2D industry and year dummies	YES	YES	YES	YES	YES	YES
No. of obs.	18,961	18,961	18,961	18,961	18,961	18,961
Adjusted R-squared	0.107	0.339	0.161	0.175	0.123	0.109

Table 5: Determinants of CSR: Firms held vs. not held by impact funds

This table reports the OLS regressions re-estimating the results in columns (2) and (3) of Table 3 (using business segment diversification and size-adjusted analyst forecast error as information cost measures), albeit separately for firms held vs. not held by impact funds. In Panel A, we consider the holdings of all impact funds, while in Panels B-E, we consider the holdings of impact funds focusing on each of the four sub-categories outlined in Morningstar (environmental, gender and diversity, community development, and other issues). In columns (3) and (6), we report the subsample coefficient difference and test its significance by using a pooled full sample regression with all independent variables and fixed effects interacted with impact fund holding dummy. All regressions include the identical set of controls as in Table 3, as well as SIC 2-digit industry and year dummies. All explanatory variables are lagged by one year. Firm-clustered standard errors are in parentheses. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level, respectively.

Info. Cost Measure:	Dependent variable: Overall CSR Score (excl. Corporate Governance)					
	Business Segment Diversification			Size-Adj. Analyst Forecast Error		
	(1)	(2)	(3)	(4)	(5)	(6)
	Held	Not-Held	Subsample coeff. diff.	Held	Not-Held	Subsample coeff. diff.
Panel A. Impact Funds: Full Sample						
Board Independence	0.575***	-0.074	0.648**	6.464***	0.828	5.636***
× Information Cost Measure	(0.221)	(0.171)	(0.260)	(1.736)	(0.693)	(1.816)
Controls, SIC2D industry and year dummies	YES	YES		YES	YES	
No. of obs.	11,524	7,638		12,021	6,937	
Adjusted R-squared	0.234	0.130		0.238	0.130	
Panel B. Impact Funds: Environmental						
Board Independence	0.599***	-0.120	0.719***	6.367***	0.819	5.548***
× Information Cost Measure	(0.230)	(0.165)	(0.262)	(1.833)	(0.680)	(1.904)
Controls, SIC2D industry and year dummies	YES	YES		YES	YES	
No. of obs.	10,919	8,243		11,404	7,554	
Adjusted R-squared	0.241	0.131		0.244	0.132	
Panel C. Impact Funds: Gender and Diversity						
Board Independence	0.264	0.296*	-0.032	11.854***	2.333***	9.521**
× Information Cost Measure	(0.334)	(0.175)	(0.373)	(4.284)	(0.780)	(4.260)
Controls, SIC2D industry and year dummies	YES	YES		YES	YES	
No. of obs.	5,235	13,923		5,557	13,398	
Adjusted R-squared	0.286	0.128		0.296	0.130	

(Table 5 continued)

Panel D. Impact Funds: Community Development

Board Independence	0.274	0.272	0.001	13.448**	1.694**	11.754*
× Information Cost Measure	(0.305)	(0.170)	(0.342)	(6.108)	(0.699)	(6.068)
Controls, SIC2D industry and year dummies	YES	YES		YES	YES	
No. of obs.	6,043	13,115		6,385	12,572	
Adjusted R-squared	0.277	0.122		0.285	0.123	

Panel E. Impact Funds: Other Issues

Board Independence	0.255	0.278	-0.023	13.124**	1.717**	11.406*
× Information Cost Measure	(0.303)	(0.169)	(0.340)	(5.951)	(0.700)	(5.910)
Controls, SIC2D industry and year dummies	YES	YES		YES	YES	
No. of obs.	5,945	13,213		6,275	12,682	
Adjusted R-squared	0.289	0.120		0.298	0.121	

Table 6: Determinants of CEO Pay: Board independence, CSR, and information cost

This table presents the OLS regressions of log CEO total annual compensation on board independence and CSR score, separately for high and low information cost subsamples. All specifications include ROA, 1-year abnormal stock return, log assets, book-to-market, market leverage, free cash flow, cash ratio, CEO age, CEO tenure, CEO equity ownership, inside-succession CEO dummy, log board size, busy board, CEO-Chair duality, and old independent director dummy as controls, as well as SIC 2-digit industry and year dummies. All explanatory variables are lagged by one year. Firm-clustered standard errors are in parentheses. For subsample tests, chi-squared test value is indicated in parentheses. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level, respectively.

	Dependent variable: Log CEO Total Pay			
	(1)	(2)	(3)	Subsample
	All	High info. cost	Low info. cost	diff. in coeff. (2)-(3)
Panel A. Business Segment Diversification				
Board Independence	0.661***	0.569***	0.809***	-0.240
	(0.111)	(0.132)	(0.185)	(1.20)
CSR Score	0.054	0.268*	-0.371	0.638**
	(0.148)	(0.137)	(0.300)	(4.01)
Board Independence × CSR Score	-0.104	-0.358**	0.407	-0.765**
	(0.172)	(0.158)	(0.354)	(4.56)
Controls, SIC2D industry and year dummies	YES	YES	YES	
No. of obs.	12,730	7,178	5,552	
Adjusted R-squared	0.514	0.542	0.475	
Panel B. Size-Adjusted Analyst Forecast Error				
Board Independence	0.650***	0.487***	0.896***	-0.409**
	(0.108)	(0.145)	(0.133)	(4.83)
CSR Score	0.094	0.247	-0.422**	0.669**
	(0.145)	(0.175)	(0.212)	(6.31)
Board Independence × CSR Score	-0.149	-0.317	0.493*	-0.810**
	(0.168)	(0.203)	(0.258)	(6.44)
Controls, SIC2D industry and year dummies	YES	YES	YES	
No. of obs.	12,756	7,346	5,410	
Adjusted R-squared	0.525	0.447	0.362	

Table 7: Determinants of suspected forced CEO turnover: Board independence, CSR, and information cost environment

This table reports logit estimation results of the probability of a suspected forced CEO turnover on board independence and CSR score, separately for high and low information cost subsamples. A CEO turnover is classified as suspected forced if the departing CEO's age is less than 60 and he/she does not re-surface as CEO of another firm within the one-year window afterward. The definition of information cost environment, as well as the set of controls and fixed effects, are identical to Table 5. Firm-clustered standard errors are in parentheses. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level, respectively.

	Dependent variable: Suspected Forced CEO Turnover dummy			
	(1)	(2)	(3)	Subsample
	All	High info. cost	Low info. cost	diff. in coeff. (2)-(3)
Panel A. Business Segment Diversification				
Board Independence	-0.693**	-0.534	-0.622	0.088
	(0.353)	(0.461)	(0.545)	
CSR Score	-0.379	-0.693	-0.127	-0.566
	(0.476)	(0.632)	(0.772)	
Board Independence × CSR Score	0.463	0.892	0.085	0.807
	(0.596)	(0.779)	(0.989)	
Controls, SIC2D industry and year dummies	YES	YES	YES	
No. of obs.	12,557	6,921	5,295	
Pseudo R-squared	0.049	0.059	0.061	
Panel B. Size-Adjusted Analyst Forecast Error				
Board Independence	-0.786**	-0.780*	-0.889	0.109
	(0.330)	(0.429)	(0.570)	
CSR Score	-0.222	-0.399	0.171	-0.570
	(0.463)	(0.525)	(1.031)	
Board Independence × CSR Score	0.271	0.574	-0.321	0.895
	(0.578)	(0.653)	(1.311)	
Controls, SIC2D industry and year dummies	YES	YES	YES	
No. of obs.	12,577	7,209	5,102	
Pseudo R-squared	0.047	0.059	0.064	

Table 8: Determinants of CSR: Firm fixed effect

This table re-estimates Table 3, albeit with firm fixed effect replacing SIC two-digit industry fixed effect. All explanatory variables are identical to those used in Table 3. Firm-clustered standard errors are in parentheses. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level, respectively.

	Dependent variable: Overall CSR Score (excl. Corporate Governance)			
	(1)	(2)	(3)	(4)
Information cost measure used:	Multiple Business Segment dummy	Business Segment Diversification	Size-Adjusted Analyst Forecast Error	Size-Adjusted Analyst Forecast Dispersion
Board Independence	-0.143*	0.496**	0.039	0.039
	(0.078)	(0.175)	(0.069)	(0.072)
Information Cost Measure	-0.264***	-0.439**	-3.431**	-10.280**
	(0.072)	(0.150)	(1.083)	(4.246)
Board Independence	**0.358*** **	**0.583** **	**4.374** **	**12.051** **
× Information Cost Measure	**(0.097)**	**(0.199)**	**(1.386)**	**(5.146)**
Controls	YES	YES	YES	YES
Firm Fixed Effect	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES
No. of Obs.	19,216	19,163	18,961	18,056
Adjusted R-squared	0.481	0.481	0.479	0.480

Table 9: Determinants of CSR: Instrumental variable regressions

This table reports the 2SLS regressions of overall CSR score (excluding corporate governance) on board independence and information cost measures. We use local director pool, big city dummy, medium city dummy, and SIC two-digit industry median board independence to instrument for board independence. For a detailed explanation of each instrument, refer to Appendix D. All other controls are identical to those used in Table 3, and we also include SIC two-digit industry and year dummies. All explanatory variables in the second stage are lagged by one year. Firm-clustered standard errors are in parentheses. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level, respectively.

	Dependent variable: Overall CSR Score (excl. Corporate Governance)			
	(1)	(2)	(3)	(4)
Information cost measure used:	Multiple Business Segment dummy	Business Segment Diversification	Size-Adjusted Analyst Forecast Error	Size-Adjusted Analyst Forecast Dispersion
Board $\widehat{\text{Independence}}$	0.295	1.587***	0.824**	0.730*
	(0.407)	(0.484)	(0.411)	(0.428)
Information Cost Measure	-0.524***	-0.978***	-9.201***	-21.091**
	(0.137)	(0.257)	(3.461)	(9.345)
Board $\widehat{\text{Independence}}$	**0.687*** **	**1.238*** **	**12.331*** **	**27.370** **
× Information Cost Measure	**(0.188)**	**(0.345)**	**(4.562)**	**(12.070)**
Controls	YES	YES	YES	YES
Industry Dummies	SIC2D	SIC2D	SIC2D	SIC2D
Year Dummies	YES	YES	YES	YES
No. of Obs.	19,216	19,163	18,961	18,056
Diff.-in-Sargan Endogeneity Test C-stat.	6.276**	4.877*	8.118**	3.671
(p-value)	(0.043)	(0.087)	(0.017)	(0.160)
Kleibergen-Paap rk Wald first-stage F-stat.	16.960	16.477	16.539	15.642

Table 10: Informational value of CSR: Subsample analysis

This table re-estimates columns (3) of Table 3, using the size-adjusted analyst forecast error as a measure of information cost measure, albeit separately for CEO pay slice or board independence subsamples. At each fiscal year-end, we define low CEO pay slice or board independence firms as those with values below the sample median at the fiscal year-end, with high CEO pay slice or board independence firms defined analogously. We then use the latest fiscal year-end data to construct high and low CEO pay slice or board independence subsamples. All regressions include the identical set of controls as in Table 3, as well as SIC 2-digit industry and year dummies. All explanatory variables are lagged by one year. Firm-clustered standard errors are in parentheses. For the subsample difference-in-coefficient test results in column (3) and (6), we report the χ^2-statistic in parentheses. *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	CEO pay slice subsample			Board independence subsample		
	Low	High	Subsample diff.-in.-coeff.	High	Low	Subsample diff.-in.-coeff.
Board Independence	12.612***	6.896***	5.716	11.935***	4.300***	7.635*
× Size-Adjusted Analyst Forecast Error	(3.400)	(2.827)	(2.29)	(3.771)	(1.242)	(3.66)
Controls, SIC2D industry and year dummies	YES	YES		YES	YES	
No. of obs.	6,430	6,987		9,465	9,496	
Adjusted R-squared	0.234	0.229		0.246	0.171	

Appendix A: Proofs

Proof of Proposition 2. We prove this proposition in steps. The shareholders' ex ante expected utility from not inducing CEO information revelation but engaging in stakeholder consultation is equal to:

$$EU_s(I;\omega=1) = -c(1-d)[\sigma_M^2 + (1-Ig^2)g^2] \\ -\big(1-c(1-d)\big)[1-I(\sigma_\varepsilon^2+g^2)](\sigma_\varepsilon^2+g^2) - cR \qquad \text{(A.1)}$$

Simple algebraic inspection of (A.1) yields that it unambiguously increases in I. Thus, when the shareholders anticipate stakeholder-assisted information revelation through their CSR activities, they will set the level of board independence at its maximum, i.e., $I = 1$. This is not surprising as there is no tension between board independence and stakeholder information provision. Putting $I = 1$ into (13) yields the board's maximum willingness to engage in CSR as given in the proposition.

On the other hand, when the CEO does not reveal her information and the board decides not to engage in CSR, the shareholders, once again, choose the maximum level of board independence, with their ex ante expected utility given by:

$$EU_s(I=1;\omega=0) = -c[\sigma_M^2 + (1-g^2)g^2] - (1-c)(1-\sigma_\varepsilon^2-g^2)(\sigma_\varepsilon^2+g^2). \qquad \text{(A.2)}$$

Thus, the difference in the shareholders' expected utility between "no revelation" and "stakeholder-assisted revelation," i.e., $EU_s(I;\omega=1) - EU_s(I;\omega=0)$, is given by:

$$EU_s(I=1;\omega=1) - EU_s(I=1;\omega=0) = cd[\sigma_M^2 + (1-g^2)g^2] \\ -cd(1-\sigma_\varepsilon^2-g^2)(\sigma_\varepsilon^2+g^2) - cR. \qquad \text{(A.3)}$$

But, knowing that $R \leq d\left(\sigma_M^2 - \sigma_\varepsilon^2 + \frac{\sigma_\varepsilon^2}{2}(\sigma_\varepsilon^2+g^2)\right)$, it must be that:

$$EU_s(I=1;\omega=1) - EU_s(I=1;\omega=0) \geq cd[\sigma_M^2 + (1-g^2)g^2] \\ -cd(1-\sigma_\varepsilon^2-g^2)(\sigma_\varepsilon^2+g^2) - cd\left(\sigma_M^2 - \sigma_\varepsilon^2 + \frac{\sigma_\varepsilon^2}{2}(\sigma_\varepsilon^2+g^2)\right). \qquad \text{(A.4)}$$

A simple rearrangement of (A.4) yields:

$$EU_s(I=1;\omega=1) - EU_s(I=1;\omega=0) \geq \frac{cd\sigma_\varepsilon^2}{2}(\sigma_\varepsilon^2+3g^2) > 0. \qquad \text{(A.5)}$$

This completes the second part of the proposition, namely that when the board finds it optimal to engage in stakeholder consultation, it is also in the ex ante interest of the shareholders'. In fact, even at the board's cut-off point, the shareholders strictly prefer CSR activities; this discrepancy stems

from the fact that, whereas the board internalizes the increased cost of monitoring following stakeholder consultation, the shareholders are not affected by it. Thus, the board exhibits a lower willingness to expend on CSR activities than the shareholders. ■

Proof of Proposition 3. Part (i) of Proposition 3 follows immediately from Proposition 2; whenever (15) is satisfied, stakeholder consultation always dominates no revelation from the shareholders' point of view. However, in both instances, the shareholders set the level of board independence at $I = 1$, so stakeholder consultation has no impact on board independence. Ex ante expected monitoring intensity increases from $cg^2 + (1-c)(\sigma_\varepsilon^2 + g^2)$ to $c(1-d)g^2 + \big(1 - c(1-d)\big)(\sigma_\varepsilon^2 + g^2)$.

On the other hand, suppose that $EU_s(I = I'; \omega = 0) \geq EU_s(I = 1; \omega = 0)$, which guarantees that the shareholders prefer to induce the CEO to reveal her information by setting a lower level of board independence in the absence of stakeholders. First, notice that:

$$EU_s(I = I'; \omega = 0) = -\left[1 - \frac{(\sigma_M^2 - \sigma_\varepsilon^2)(\sigma_\varepsilon^2 + g^2)}{\sigma_\varepsilon^2(b - \sigma_\varepsilon^2)}\right](\sigma_\varepsilon^2 + g^2). \tag{A.6}$$

We still need to compare whether the shareholders have an incentive to engage in CSR activities strategically in order to obtain firm-specific information from the stakeholders. To do so, we need to compare $EU_s(I = I'; \omega = 0)$ and $EU_s(I = 1; \omega = 1)$. Since:

$$\begin{aligned} EU_s(I = 1; \omega = 1) = &-c(1-d)[\sigma_M^2 + (1 - g^2)g^2] \\ &-\big(1 - c(1-d)\big)(1 - \sigma_\varepsilon^2 - g^2)(\sigma_\varepsilon^2 + g^2) - cR, \end{aligned} \tag{A.7}$$

at the cut-off point of $b = b^f$, $EU_s(I = I'; \omega = 0) = -(1 - \sigma_\varepsilon^2 - g^2)(\sigma_\varepsilon^2 + g^2)$, which is larger than $EU_s(I = 1; \omega = 1)$ even in the limit of $d = 1$ because $R > 0$. Thus, as long as b is close to b^f, the shareholders will find it optimal to induce the CEO to reveal her information even when the stakeholders hold accurate firm-specific information.

Now suppose that (15) is satisfied. Then, the proof of Proposition 2 demonstrates $EU_s(I = 1; \omega = 1) > EU_s(I = 1; \omega = 0)$. Notice that there are two circumstances under which "induced revelation" occurs in the absence of stakeholder consultation. First, when c is sufficiently low, the shareholders induce the CEO to reveal her information for some intermediate range of b but switch to no revelation as b becomes too large, because $EU_s(I = I'; \omega = 0)$ decreases in b but $EU_s(I = 1; \omega = 0)$ is unaffected by it. Let us denote the threshold at which this switch occurs by b^n. In other words, at b^n, $EU_s(I = 1; \omega = 0) = EU_s(I = I'; \omega = 0)$ and thus $EU_s(I = 1; \omega = 1) > EU_s(I = I'; \omega = 0)$. In fact, since $EU_s(I = 1; \omega = 1)$ is also unaffected by b, $EU_s(I = 1; \omega =$

$1) = EU_s(I = I'; \omega = 0)$ will occur at a lower level of b, which we denote b^s. Then, $EU_s(I = 1; \omega = 1) > EU_s(I = I'; \omega = 0)$ for all $b \in (b^s, b^n]$, and the shareholders find it optimal to engage in stakeholder consultation through CSR. As $I' < 1$, the level of independence increases as a result.

The expected monitoring intensity under induced revelation is:

$$\pi(I = I'; \omega = 0) = I'(\sigma_\varepsilon^2 + g^2) = \frac{(\sigma_M^2 - \sigma_\varepsilon^2)(\sigma_\varepsilon^2 + g^2)}{\sigma_\varepsilon^2(b - \sigma_\varepsilon^2)} \tag{A.8}$$

But the expected monitoring intensity under stakeholder-assisted revelation is:

$$\pi(I = 1; \omega = 1) = c(1 - d)g^2 + \big(1 - c(1 - d)\big)(\sigma_\varepsilon^2 + g^2) \tag{A.9}$$

After some algebraic manipulations, it can be shown that $\pi(I = 1; \omega = 1) > \pi(I = I'; \omega = 0)$ if and only if:

$$b > \sigma_\varepsilon^2 + \frac{(\sigma_M^2 - \sigma_\varepsilon^2)(\sigma_\varepsilon^2 + g^2)}{\sigma_\varepsilon^2\big((1 - c(1 - d))\sigma_\varepsilon^2 + g^2\big)}. \tag{A.10}$$

If (A.10) is satisfied, stakeholder-assisted revelation leads to an increase in monitoring intensity, and vice versa.

However, if c is too high, then even as $b \to \infty$, $EU_s(I = I'; \omega = 0) \geq EU_s(I = 1; \omega = 0)$, and induced revelation always dominates no revelation for regardless of the CEO's private benefit (Lemma 1 of Adams and Ferreira, 2007). Let us check whether the shareholders still have an incentive to engage in stakeholder-assisted revelation even under such circumstances. First, (15) can only be satisfied if d is sufficiently high and/or R is sufficiently low. Let us consider the extreme case of $d = 1$. Then, as $b \to \infty$, we have $EU_s(I = 1; \omega = 1) - EU_s(I = I'; \omega = 0) = (\sigma_\varepsilon^2 + g^2)^2 - cR$, which is positive when R is sufficiently small. Given that $EU_s(I = I'; \omega = 0)$ is continuous in b whenever $b > b^f$, this implies there must exist a non-empty range of b where $EU_s(I = 1; \omega = 1) > EU_s(I = I'; \omega = 0)$, i.e., the shareholders prefer stakeholder-assisted revelation to induced revelation. More generally, it can be shown that, for given d and R, $EU_s(I = 1; \omega = 1) > EU_s(I = I'; \omega = 0)$ as $b \to \infty$ whenever:

$$cR < \big(1 - c(1 - d)\big)(\sigma_\varepsilon^2 + g^2)^2 + c(1 - d)\big(g^4 - (\sigma_M^2 - \sigma_\varepsilon^2)\big) \tag{A.11}$$

The first term of (A.11) is unambiguously positive, while the second term is ambiguous. In any case, it can be shown that (A.11) can be satisfied for sufficiently small R and large d, holding the degree of CEO-board information asymmetry, i.e., c, as given. As long as (A.11) is satisfied, there will always be a non-empty region of b above certain threshold where the shareholders prefer to engage

in CSR instead of appeasing the CEO. Once again, board independence increases as a result, while expected monitoring intensity also increases whenever b is large enough to satisfy (A.10). ■

Appendix B: Detailed summary of the Nike's corporate responsibility committee example

This appendix provides a detailed summary of Paine's (2014) case study on Nike's corporate responsibility committee within the board of directors.

B.1. Background

During the 1990s, Nike faced intense protests from various activist groups over its labor records in Asian contract factories. Jill Ker Conway, a former president of Smith College who was appointed to Nike's board as independent director in 1987, recognized the complexity of these social and environmental issues and proposed to the firm's CEO, Phil Knight, that a corporate responsibility committee be formed within the board to engage in health, labor, and environmental issues.

B.2. Benefits of corporate responsibility committee

According to Paine (2014), since its foundation, the committee's works over the years have brought tangible governance benefits to the board in the following ways: "as a source of knowledge and expertise, as a sounding board and constructive critic, as a driver of accountability, as a stimulus for innovation, and as a resource for the full board (p.88)."

Source of knowledge and expertise: The forming of corporate responsibility committee was an initiative driven by an independent director with domain-specific expertise in CSR issues. The committee's subsequent works have distinctly remained a board-driven initiative, with a "close alignment between Conway's diverse talents and the corporate responsibility issues Nike faced in the 1990s (p. 89)." This is a good example of how independent directors with the relevant expertise could take charge of overseeing CSR initiatives at the board level.

A sounding board and constructive critic: The committee's works involve "asking insightful questions, making suggestions, offering perspectives, raising counterpoints, and proposing alternatives (p. 90)" that both enrich and challenge the prevailing view of management. This is aided by the fact that four out of five committee members are independent directors.

A driver of accountability: Changes at the board-level have been accompanied by changes at the corporate level, with "the introduction of dual-reporting lines between the corporate responsibility group and key business functions such as finance, innovation, and supply chain (p. 92)." Moreover, by asking executives to appear regularly before the committee and explain whether their proposed strategies are compatible with the company's overall sustainability objectives, the committee monitors the executives' actions in more potent ways.

A stimulus for innovation: The committee's roles go beyond merely improving corporate image, and a substantial fraction of its time and effort is spent on providing support for innovation. By engaging with employees in an 18-month coordinated initiative with management, the committee was able to identify root causes of Nike's perennial excessive overtime problem, with a need for innovative ways to deal with making the manufacturing process itself safer and more sustainable. The committee subsequently encouraged management to invest in a Dutch start-up that offered a waterless process for dyeing polyester that would improve both the product quality and be more environment-friendly. With the committee's support, the investment was made, and their technology was amalgamated into the supply chain. This is a good example of the committee's engagement with stakeholders yielding tangible benefits in terms of ultimately improving Nike's production process, by enabling the committee to advise management in a more informed manner.

A resource for the full board: According to Nike's executives, "board-level discussions of labor issues in the supply chain gained traction only after the corporate responsibility committee was formed (p. 94)," with the committee's regular reports elevating the entire board's level of understanding and ensuring that that critical issues receive the scrutiny they require.

B.3. The example's relevance to our model

Nike's corporate responsibility committee and its works provide a clear example of board-level CSR initiatives driven by independent directors with relevant expertise in sustainability issues, with the objectives reaching beyond the traditional channel of improving the firm's brand image. The example aptly demonstrates that, by engaging the stakeholders in a targeted way at the board level, the committee has received important information about shortcomings in the prevailing production process. Subsequently, they have been able to advise on more efficient and sustainable solutions to these supply chain issues. This is a classic example of "informed advising." At the same time, the committee's greater understanding of the firm's production process and supply chain has allowed its members to challenge executives' thinking and ask them to explain their proposed course of actions in a constructive yet focused manner, improving their capacity as monitors of management.

Appendix C: Control of the CSR Agenda

When the CEO has private benefit from control of the project, it may be in her interest to prevent the board from engaging in information gathering through stakeholder consultation. Thus, in this appendix, we prove that our qualitative results remain robust to the possibility of the control of the CSR agenda belonging to the CEO.

To this end, we consider the following extension. When the CEO refuses to share firm-specific information and the game reaches the board's CSR expenditure decision at $t = 1$, the CEO has the option to put forward a rival proposal costing the same amount, R. The CEO's proposal is different from the board's in that her version of stakeholder engagement ensures no firm-specific information would be revealed to the board. Suppose furthermore that, when there are two CSR proposals, the board is able to push through its proposal with probability z, where the probability may or may not depend on I, i.e., the prevailing level of board independence. In our set-up, the board acts completely in accordance with the shareholders' interests, so it is natural to assume that a more independent board would fight harder to secure its proposal. In addition, a more independent board is more likely to have sufficient voting power to curb CEO's rival proposal. Thus, whenever z is a function of board independence, we assume it to be a monotonically increasing function of it, i.e., $z = z(I)$ with $z' > 0$.

Assume that it is in the CEO's interest to put forward a rival proposal whenever the board puts forward a proposal (which will turn out to be the case later). In this instance, the board prefers to engage in CSR if and only if:

$$zdEU_b(i = \theta; I; \omega = 1) + (1 - zd)EU_b(i = \emptyset; I; \omega = 1) > EU_b(i = \emptyset; I; \omega = 0). \quad \text{(C.1)}$$

Then, the board's CSR decision may be characterized as:

$$R \leq zd\left(\sigma_M^2 - \sigma_\varepsilon^2 + \frac{I}{2}\sigma_\varepsilon^2(\sigma_\varepsilon^2 + g^2)\right) \equiv \bar{\bar{R}} < \bar{R} \quad \text{(C.2)}$$

The CEO's ability to put forward a rival proposal reduces the informational value of CSR, making it less attractive for the board to engage in informationally-motivated CSR in the first place. Notice, however, that the addition of the parameter z only serves to scale down the probability d; as long as $z \neq 0$, i.e., as long as the management is unable to completely sabotage the board's channels of informational communication with the stakeholders, our main qualitative result remains unchanged. Moreover, with z either a constant or an increasing function of I, we know that the right hand side of

(C.2) is an increasing function of I. Thus, as in the main model, the board is more willing to expend resources on stakeholder engagement as its level of independence increases.

However, it remains to be checked whether it is in the CEO's interest to put forward such a rival proposal. A simple comparison of the CEO's expected utility yields that the CEO prefers to bid for a rival proposal whenever:

$$zdEU_c(i = \theta; I) + (1 - zd)EU_c(i = \emptyset; I) \geq dEU_c(i = \theta; I) + (1 - d)EU_c(i = \emptyset; I) \quad \text{(C.3)}$$

A necessary and sufficient condition for the bidding of rival proposal upon reaching the CSR decision stage, knowing that $z \in [0,1]$, is $EU_c(i = \theta; I) < EU_c(i = \emptyset; I)$, i.e., whenever the CEO expects a higher utility by not revealing the information, taking I as given.

However, notice that this stage is reached only when it is in the CEO's interest not to reveal the information, i.e., $EU_c(i = \theta; I) < EU_c(i = \emptyset; I)$, for otherwise, the CEO would prefer to reveal the firm-specific information herself in the first place. Then, it can be trivially shown that the CEO's information revelation condition is identical to the main model, which is also equal to the condition in the baseline Adams-Ferreira model, i.e., (14).

Finally, a simple algebraic manipulation analogous to the Proof of Proposition 2 reveals both parts of the proposition stand as long as z is either constant or monotonically increasing in I. This reveals that whenever it is in the board's interest to engage in informationally-motivated CSR, it is also in the shareholders' interest to do so. Then, it is also the case that the shareholders decide to choose the maximum level of board independence, i.e., $I = 1$, whenever the CEO refuses to share firm-specific information and the board has to rely on stakeholder-assisted information revelation.

Thus, if the CEO has the possibility of controlling the CSR agenda and preventing the board from acquiring firm-specific information, the board is less likely to engage in informationally-motivated CSR due to its lower marginal informational value. However, as long as the CEO does not have the complete control of the CSR agenda, the existence of our information channel remains qualitatively robust.

Appendix D: Stakeholders' optimization problem

In this appendix, we explicitly set-up the stakeholders' preference. Suppose that their preference is given by:

$$U_{st} = -(y - \varepsilon + h)^2, \tag{D.1}$$

We do not assume the direction of h, i.e., the stakeholders may be biased either toward or against the CEO. Under the model set-up, the board approaches the stakeholders for information if the CEO refuses to reveal θ. Suppose first that the board refuses to engage in any CSR activities. Then, rationally anticipating the board's monitoring intensity as specified in (4) and (5), the stakeholders' respective expected payoffs from revealing and not revealing θ are:

$$EU_{st}(i = \theta) = -I(\sigma_\varepsilon^2 + g^2)h^2 - \big(1 - I(\sigma_\varepsilon^2 + g^2)\big)(\sigma_\varepsilon^2 + (h - g)^2), \tag{D.2}$$

$$EU_{st}(i = \emptyset) = -Ig^2(\sigma_M^2 + h^2) - (1 - Ig^2)(\sigma_M^2 + (h - g)^2). \tag{D.3}$$

Naturally, information revelation is weakly preferred in the absence of CSR if $EU_{st}(i = \theta) \geq EU_{st}(i = \emptyset)$. Similar to the CEO's revelation constraint, we may derive a maximum level of board independence, I'', at which the stakeholders would reveal their information in the absence of CSR. Specifically, it may be easily shown that stakeholders' information revelation constraint requires $I \leq I''$, where $I'' \equiv \frac{\sigma_M^2 - \sigma_\varepsilon^2}{\sigma_\varepsilon^2\{2g(h-g) - \sigma_\varepsilon^2\}}$ if $\sigma_\varepsilon^2 < 2g(h - g)$, while $I'' \equiv 1$ if $\sigma_\varepsilon^2 \geq 2g(h - g)$.

However, the stakeholders are only consulted when the CEO refuses to reveal information. Thus, if $I'' < I'$, i.e., if the stakeholders' information revelation constraint is more stringent than the CEO's, then the stakeholders refuse to share their firm-specific information in the absence of CSR whenever the CEO refuses to do so. A simple comparison of the two revelation constraints yield that this is the case whenever $b < 2g(h - g)$, or once rearranged,

$$h > g + \frac{b}{2g}. \tag{D.4}$$

In other words, CSR becomes necessary when the stakeholders have sufficiently strong bias of their own, in the same direction as the CEO's. In this instance, the board must engage in some form of compensation to the stakeholders to make up the difference in expected utility, i.e., the gap between $EU_{st}(i = \theta)$ and $EU_{st}(i = \emptyset)$. This provides a more rigorous rationale for the parameter R, namely the minimum CSR expenditure necessary to persuade the stakeholders to reveal θ.

Appendix E: Variable Definitions

In this appendix, we provide a detailed definition of all variables used in our analysis. Data sources are indicated in parentheses following the variable name.

E.1. Firm financial variables

Log assets (Compustat): log of total assets (*AT*).

Book-to-Market (Compustat/CRSP): book value of equity divided by the market value of equity. Book value of equity is defined as total shareholder equity (*SEQ*) minus (1) the liquidating value of preferred stock (*PSTKL*), or if unavailable, (2) the redemption value of preferred stock (*PSTKRV*), or, if neither is available, (3) the total value of preferred stock (*PSTK*). Market value of equity is defined as fiscal year price close (*PRCC_F*) times the number of common shares outstanding (*CSHO*).

Market Leverage (Compustat/CRSP): the sum of debt in current liabilities (*DLC*) plus long-term debt (*DLTT*), divided by the beginning-of-fiscal-year market value of assets. Market value of assets is defined as book value of assets minus book value of equity minus deferred taxes and investment credits (*TXDITC*) plus market value of equity.

Free Cash Flow (Compustat): operating income before depreciation (*OIBDP*) – income taxes (*TXT*) + change in deferred taxes and investment credits (Δ*TXDITC*) – change in working capital (*WCAPCH*) + sale of property, plant, and equipment (*SPPE*) – capital expenditures (*CAPX*), scaled by the beginning-of-fiscal-year book value of total assets (*AT*).

Sales Growth (Compustat): year-on-year percentage change in sales (*SALE*).

Cash Ratio (Compustat): cash and short-term investments (*CHE*) divided by the beginning-of-fiscal year book value of total assets (*AT*).

Return on Assets (Compustat): income before extraordinary items (*IB*) divided by the beginning-of-fiscal-year book value of total assets (*AT*).

1-year Abnormal Stock Return (CRSP): 1-year buy-and-hold return with the CRSP value-weighted return as benchmark.

Size-Adjusted Analyst Forecast Error (Thomson Reuters IBES/Compustat/CRSP): residual of simple regression of analyst forecast error on log assets. Analyst forecast error is defined as the absolute difference between the actual quarterly earnings (i.e., earnings per share multiplied by the number of shares outstanding as reported in CRSP) and the analysts' consensus estimate for the quarter at the last month of the fiscal quarter, normalized by the book value of assets. This forecast error is averaged over all available quarterly observations in a fiscal year to yield an annual figure.

Size-Adjusted Analyst Forecast Dispersion (Thomson Reuters IBES/Compustat/CRSP: residual of simple regression of analyst forecast dispersion on log assets. Analyst forecast dispersion is defined as the standard deviation of the analysts' quarterly earnings estimate at the last month of the fiscal quarter, normalized by the book value of assets. This quarterly forecast dispersion is averaged over all available quarterly observations in a fiscal year to yield an annual figure.

Multiple Segments dummy (Compustat Historical Segments): an indicator variable that equals 1 if and only if the firm reports more than one business segment with non-missing and non-negative sales.

Business Segment Diversification (Compustat Historical Segments): one minus the sales HHI of all business segments of a firm in a given year. All segments reporting negative sales are excluded for the purpose of HHI calculation.

Firm HQ State's Democratic Leaning (Compustat/National Archives): the difference between the percentage of votes that a Democratic candidate received in the firm's headquarter state in the last Presidential Election and the Democratic candidate's national share of votes.

Local Director Pool (Compustat/U.S. Census Gazetteer Files): log of one plus the number of Compustat firms (with non-missing assets) within the sixty-mile radius during the same fiscal year that do not share the same four-digit SIC code. 2010 U.S. Census Gazetteer Files is used to identify the latitude-longitude coordinates of firm headquarter ZIP codes.

Big City (Compustat/U.S. Census): an indicator variable that equals 1 if and only if the firm headquarter ZIP code as reported in Compustat belongs to one of the top 10 most populous Metropolitan Statistical Areas (MSAs) as reported in 2010 U.S. Census.

Medium City (Compustat/U.S. Census): an indicator variable that equals 1 if and only if the firm headquarter ZIP code as reported in Compustat belongs to MSAs ranked between 11-50 by their population as reported in 2010 U.S. Census.

E.2. Board variables

Log Board Size (BoardEx): log of the number of directors as reported in BoardEx, which is included as a control due to Yermack (1996).

Board Independence (BoardEx or ISS): the number of independent directors as defined by either BoardEx or ISS, divided by the number of directors.

Industry Median Board Independence (BoardEx): median value of board independence for each SIC two-digit industry-year.

Majority Independence dummy (BoardEx): an indicator variable that equals 1 if and only if board independence exceeds 50% according to the BoardEx definition.

CEO-Chair duality (BoardEx): an indicator variable that equals 1 if and only if the CEO is also the chair of the board.

Busy Board (BoardEx): an indicator variable that equals 1 if and only if a majority of independent directors serve concurrently on three or more boards, following Fich and Shivdasani (2006).

Old Independent Director dummy (BoardEx): an indicator variable that equals 1 if and only if at least one of the independent directors is aged 70 or older.

Average Independent Director Equity Ownership (ISS): the average number of shares held by a firm's independent directors, divided by the fiscal year-end number of common shares outstanding.

E-index (ISS): entrenchment index of Bebchuk, Cohen, and Ferrell (2009).

E.3. CEO-related variables

CEO Age (BoardEx): CEO age as reported in BoardEx.

CEO Tenure (BoardEx): CEO tenure as reported in BoardEx.

Inside-Succession CEO dummy (BoardEx): an indicator variable that equals 1 if and only if the CEO's time spent in company exceeds his or her CEO tenure by more than one year.

CEO Turnover dummy (Execucomp): an indicator variable that equals 1 if the CEO's departure date as reported in Execucomp falls on the third or fourth quarter of the current fiscal year or the first two quarters of the next fiscal year.

Suspected Forced CEO Turnover dummy (Execucomp/Compustat): an indicator variable that equals 1 if, at the time of a CEO turnover event, the CEO is less than 60 years of age and he/she does not re-emerge as CEO of another firm within the one-year window.

CEO Total Pay (Execucomp): log of CEO total annual compensation (Execucomp item TDC1) in constant January 2002 dollars.

CEO Equity Ownership (Execucomp): number of shares held by the CEO divided by fiscal year-end common shares outstanding.