Strategic Environmental Disclosure and Financial Materiality: Evidence from U.S. Firms on Nasdaq and the NYSE

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Abstract

We study how firms with poor environmental performance manage the tension between the pressure to disclose environmental information and the desire to avoid financial repercussions. While prior work focuses on highlighting environmentally positive information and hiding environmentally negative information in response, recent research suggests counterevidence. We propose and find support for an alternative mechanism that is based on financial materiality. Compared to high environmental performers, low environmental performers increase the disclosures of environmental information that is financially immaterial while decreasing financially material disclosures. Our findings contribute to the business sustainability literature by demonstrating how poor environmental performers make disclosures in ways that mitigate financial impact on firms while exhibiting institutional conformity, and to the literature on impression management by pointing to a unique decoupling mechanism.

Key words: environmental disclosure, sustainability, greenwash, financial materiality, environmental performance

Introduction

With growing awareness of environmental sustainability and demand for environmental transparency, firms increasingly disclose their environmental initiatives and performance. Yet, potential benefits of environmental disclosure, for example, better reputation and legitimacy (York, Vedula, & Lenox, 2018; Reid & Toffel, 2009; King & Lenox, 2000) and easier access to capital (Cheng, Ioannou, & Serafeim, 2014), tend to accrue to those firms that are perceived as superior environmental performers. Firms that reveal poor environmental performance may not benefit and may even be penalized by investors (Klassen & McLaughlin, 1996; Konar & Cohen, 2001; Karpoff, Lott, & Wehrly, 2005; Flammer, 2013). Our research asks how poor environmental performers manage the tension between the pressure to disclose environmental information and the desire to avoid negative consequences.

A prevailing view is that poor environmental performers engage in impression management by publicizing environmentally positive information while hiding environmentally negative information, which is often referred to as "greenwashing" (Delmas & Burbano, 2011; Kim & Lyon, 2015; Marquis, Toffel, & Zhou, 2016). Projecting an environmentally sustainable image can help firms obtain or maintain the support of stakeholders who are critical to their effectiveness and survival (Bansal & Clelland, 2004; Hoffman, 2005), especially in the weak institutional environment surrounding sustainability (Dorobantu, Kaul, & Zelner, 2017). However, prior studies on corporate environmental sustainability present some counterevidence. Firms disclose negative as well as positive environmental information (Aragón -Correa, Marcus, & Hurtado-Torres, 2016), and greenwashing can backfire if considered untruthful (Lyon & Maxwell, 2011; Berrone, Fosfuri, & Gelabert, 2017; Carlos & Lewis, 2018).

Given the limitation of selectively disclosing environmentally positive information, we propose an alternative mechanism that poor environmental performers may employ that withstands the counterevidence described above. In doing so, we pick up on the discrepancy in the prior literature. While high environmental performers may benefit compared to low performing counterparts, good environmental conduct is not always rewarded by superior financial performance (Hawn, Chatterjee, & Mitchell, 2018); likewise, poor environmental conduct is not always penalized financially (Jacobs, Singhal, & Subramanian, 2010).

Accordingly, we posit that corporate efforts to manage impressions through environmental disclosure may involve considerations that go beyond whether the disclosed information is environmentally positive or not, which we term "the environmental impact lens." Although fitting from the environmental sustainability perspective, the environmental impact lens may not fully align with the firms' viewpoint because corporate environmental sustainability inherently involves internalizing negative externalities. Instead, in disclosing environmental information, firms may pay more attention to financial materiality (Khan, Serafeim, & Yoon, 2016), i.e., whether the disclosed environmental information has a significant financial consequence on the firm or not, using what we term "the financial materiality lens."

While financial materiality in environmental, social, governance issues (ESG), or lack thereof, is gaining popularity in recent academic work (Christophe & Lee, 2020; Chen, Dong, & Lin, 2020; Grewal, Hauptmann, & Serafeim, 2020), to our knowledge, how such considerations may influence environmental disclosures remains unexplored. This is an important omission given that there are a variety of environmental issues, which range from climate change and air quality to energy efficiency and biodiversity, and not all environmental issues are financially material for all firms across all industries.

We propose that poor environmental performers make use of such variation across environmental issues in disclosing environmental information. More specifically, through the financial materiality lens, we expect firms with poor environmental performance to disclose less environmental information that is financially material and more environmental information that is financially immaterial, irrespective of whether that information is environmentally positive or negative. This type of informational maneuver will help project an image of conformity to the growing stakeholder demand for environmental transparency while attenuating negative financial consequences on firms. Furthermore, this approach allows firm disclosure of environmentally negative as well as positive information, thereby guarding firms from the potential for backlash attacks that greenwashing may elicit. We further propose that there may even be heterogeneity within the financially immaterial category. That is, firms may manage environmental disclosures more narrowly depending on the type of financially immaterial information. In particular, we

suggest that the salience of environmental issues and the link (or lack thereof) to specific environmental outcomes that facilitate external evaluation will provide important distinctions.

We test our proposition using firm-level environmental disclosure data and financial data for firms that are listed on the NYSE and Nasdaq U.S. stock exchanges and that were headquartered in the U.S. from 2003 to 2016. During our sample period, firms based in the U.S. were under increasing pressure to disclose their environmental information, providing a good setting to test our theory about firms' strategic environmental disclosure. In assessing the financial materiality of environmental issues, following prior work, we use the Sustainability Accounting Standards Board (SASB) materiality standards at the industry level. Previous studies have demonstrated that the standards have significant predictive power over future financial performance (e.g., Khan, Serafeim, and Yoon, 2016). As we explain in more detail in the data section, we create a novel dataset by hand-mapping the environmental disclosure variables at the firm level from the Thomson Reuter's ESG database (previously called Asset4) into the SASB classifications. We use the Thomson Reuter's ESG database because it allows us to separate out firm disclosure-based vs. other environmental variables (see more details under the heading 'Thomson Reuters ESG' on p.13). Consistent with our proposition, we find that firms with poor environmental performance increase financially immaterial relative to financially material disclosures. In particular, among financially immaterial information, poor environmental performers increase disclosures of less salient information and more general commitment-oriented information that lacks links to specific environmental outcomes in managing the tension between the pressure for more environmental disclosures and the desire to minimize potential financial repercussions.

Our study contributes to the prior literature on corporate environmental sustainability and impression management strategies. To the best of our knowledge, the possibility of responding to the increasing demand for environmental disclosures with informational maneuvers using the financial materiality lens has not been explored previously. This is different from most prior work that studies why firms decide whether or not to disclose environment information (e.g., Reid & Toffel, 2009), or how firms make strategic disclosures based on the environmental impact lens, i.e., whether the disclosed information is environmentally positive or not

(Kim & Lyon, 2015; Carlos & Lewis, 2018). We go beyond the popular notion of greenwashing and suggest that poor environmental performers may have an objective different from appearing environmentally sustainable when disclosing environmental information, given their poor conduct. Specifically, we show that poor environmental performers attempt to curtail negative financial consequences by engaging in strategic informational maneuvers based on the financial materiality lens, thereby mitigating potentially negative financial impacts of disclosing environmental information. As a result, greater disclosure by poor environmental performers does not necessarily imply greater transparency from the financial impact perspective.

Our findings also contribute to the impression management literature more broadly. Firms seek institutional conformity to gain legitimacy, but when full conformity is challenging, firms may engage in impression management to project the appearance of conformity (Pfeffer, 1981; Oliver, 1991). While earlier work studies why and how firms may adopt an institutionalized practice but not implement the practice (e.g., Tolbert & Zucker, 1983; Westphal & Zajac, 2001), more recent work highlights that firms use pro-environmental and pro-social claims to manage their impressions on stakeholders (Bansal & Clelland, 2004; McDonnell & King, 2013; Werner, 2015). This line of work focuses on decoupling along the criteria demanded by external stakeholders; for example, stakeholder demand for environmental sustainability would elicit responses that involve corporate environmentalism. We show that impression management through environmental disclosure could be tailored along dimensions other than environmental sustainability, in particular, financial materiality, which is not directly related to stakeholder demands for environmental transparency. Our research thus identifies a unique decoupling mechanism that involves a more subtle and indirect informational strategy.

Balancing Pressure to Disclose and Desire to Minimize Negative Financial Impact

Firms strategically respond to institutional pressures (Oliver, 1991). For example, when full conformity is difficult to achieve, firms may actively manage their informational environment in ways that will favorably shape the impressions of stakeholders (Westphal & Zajac, 1995). This may involve taking preemptive action to protect themselves against possible negative reactions (Graffin, Carpenter, & Boivie, 2011), or casting a

positive light to neutralize negative events (Elsbach & Sutton, 1992). We explore preemptive impression management that may be used in disclosing environmental information.

Growing demand for corporate environmental responsibility has created increasing pressure for environmental disclosures. Disclosing environmental information can be a win-win approach for superior environmental performers who may benefit from ensuing employee satisfaction (Edmans, 2011), consumer satisfaction (Luo & Bhattacharya, 2006; Servaes & Tamayo, 2013), higher returns (Hart & Ahuja, 1996; Russo & Fouts, 1997), or superior market value (Dowell, Hart, & Yeung, 2000). Such firms may also benefit from higher efficiency (Porter & Van der Linde, 1995), better relationships with local communities (Heinisz, *et al.*, 2014), easier access to capital, or lower cost of capital in the financial market (Cheng *et al.*, 2014; Eccles *et al.*, 2014). Even when there is no direct benefit in the financial market (Hawn *et al.*, 2018), superior environmental performance may be able to increase firm visibility among financial analysts and long-term investors (Durand, Paugam, & Stolowy, 2019).

In contrast, poor environmental performers can be penalized. For example, Flammer (2013) conducted an event study around the announcement of corporate news related to environment for all U.S. publicly traded companies from 1980 to 2009, and found that while companies reported to behave responsibly toward the environment experienced a significant stock price increase, firms that behaved irresponsibly faced a significant decrease in stock price. Konar and Cohen (2001) demonstrated that poor environmental performance is significantly negatively correlated with the intangible asset value of firms. Given the discount the financial market imposes on firms with poor environmental performance, such firms face a tension between the pressure to project a transparent environmental image and the desire to mitigate potential negative consequences in disclosing environmental information.

Prior work has suggested that firms with poor environmental performance may manage this trade-off by engaging in decoupling or loose coupling of their external appearance with actual activities (Meyer & Rowan, 1977; Zajac & Westphal, 2004). For example, on the one hand, firms increasingly reveal their environmental practices as part of their annual reports, or by issuing separate environmental sustainability reports. According to Fabrizio and Kim (2019), environmental information disclosure, once a niche practice,

has become an almost institutionalized practice in recent years: the United Nations Global Reporting Initiatives reports that 92% of the world' s largest 250 corporations disclose their sustainability performance, and the Governance & Accountability Institute reports that over 80% of S&P 500 companies published sustainability reports in 2016. On the other hand, firms attempt to influence stakeholders' perceptions of the firms by engaging in strategic environmental disclosures (Kim & Lyon, 2015; Marquis *et al.*, 2016). This is predominantly manifested in the form of greenwashing that highlights environmentally positive information and hides environmentally negative information (Delmas & Burbano, 2011; Testa, Boiral, & Iraldo, 2018; Szabo & Webster, 2020; Wu, Zhang, & Xie, 2020).

While greenwashing is a possibility, recent studies document that firms disclose environmentally negative as well as environmentally positive information (e.g., Aragón-Correa *et al.*, 2016). Moreover, a growing body of work from the stakeholder perspective suggests that the greenwashing strategy may not be viable because it makes firms more vulnerable to attack for not being genuine or truthful. For example, although some stakeholders may be gullible, such a strategy can expose firms, in particular, to attacks from environmental nongovernmental organizations and activists (Lyon & Maxwell, 2011). Along this line, Berrone, et al. (2017) found that while environmental actions can enhance the social acceptance of firms as long as they ''walk the talk,'' some actions can harm this legitimacy if environmental performance deteriorates, or the firm is subject to intense scrutiny from nongovernmental organizations. Kim and Lyon (2015) and Marquis, Toffel, and Zhou (2016) demonstrated that the extent to which firms engage in greenwashing decreases as the extent of external monitoring increases, not only from nongovernmental organizations and activists, but also from regulators and civil society.

Anecdotal evidence also supports that greenwashing risks repercussions. For example, the former British Petroleum, BP, attempted to portray itself as a green energy enterprise by emphasizing its renewable energy investments and rebranding itself with a new name, Beyond Petroleum. In reality, over 90% of its investment capital was going to oil and gas and less than 10% to renewable energy.[1] The Beyond Petroleum

[1] Greenpeace, "Recapping on BP's long history of greenwashing." May 21, 2010.

campaign generated significant backlash. Environmental activists attacked BP for greenwashing with its Beyond Petroleum campaign and labeled BP "Beyond Preposterous." Afterwards, BP dropped renewable energy projects worth billions of dollars to focus on fossil fuels.[2] Walmart's claim that it is a sustainable company faced NGO and consumer backlash,[3] and Walmart has subsequently ramped up its investment in improving the environmental performance of its suppliers.[4] Indeed, potential backlash imposes such a significant threat that some firms choose not to disclose their environmental achievements to avoid potential accusations of greenwashing (Carlos & Lewis, 2018).

Accordingly, we explore an alternative mechanism that relies on a more subtle indirect informational maneuver, which does not invoke the environmental impact lens (environmentally positive or environmentally negative) and thus is not subject to the counterarguments described above. Whereas prior work has focused on mechanisms whereby firms highlight environmentally positive information, we underscore that firms with poor environmental performance may not aim to project a positive environmental image given their poor performance and the increasing monitoring and scrutiny by external stakeholders described above. Rather, such firms may aspire to avoid potential adverse financial consequences of disclosing poor environmental conduct (*disclose to impress* vs. *disclose to avoid*). This is possible because not all environmental strengths are rewarded by higher financial returns, and likewise, not all environmental weaknesses are punished by lower financial returns (Ullman, 1985; Margolis & Walsh, 2003).

For example, Jacobs *et al.*, (2010) analyzed the stock market reactions to the announcements of corporate environmental initiatives and environmental recognitions granted by third parties, both in aggregate and by sub-category. In aggregate, that is, across all kinds of sustainability initiatives to mitigate the environmental impacts of firms throughout the production processes, product usages, or services, and across all types of environmental awards and certifications, Jacobs *et al*. (2010) did not find a significant effect on the abnormal returns around the corporate announcements. However, they found that some sub-

[2] *The Guardian*, "BP dropped green energy projects worth billions to focus on fossil fuels." April 16, 2015.
[3] *US News and World Report*, "Walmart Struggles to Overcome Environmental Criticism." April 20, 2012.
[4] "Walmart Launches Project Gigaton to Reduce Emissions in Company's Supply Chain." April 19, 2017.

categories generate significant abnormal returns. For instance, sub-categories such as the ISO 14001 certifications led to significant positive abnormal returns, while other sub-categories such as voluntary emission reductions caused significant negative abnormal returns. However, many other sub-categories did not have any significant impact on financial returns, either positive or negative. These findings demonstrate that the financial market is selective in reacting to environmental disclosures, with only certain types of environmental disclosures being financially material.

Because not all environmental information is financially material, we contend that firms may strategically disclose environmental information depending on financial materiality. We refer to this perspective as "the financial materiality lens," which makes use of the financial consequence of corporate environmental conduct, or lack thereof, as the criterion to differentiate numerous corporate environmental issues (e.g., Christophe & Lee, 2020; Khan, *et al*., 2016). Because the financial materiality lens makes it explicit that not all corporate environmental issues have financial consequence across all industries, it helps sort out more vs. less relevant environmental issues from the standpoint of financial impact.

Accordingly, when full conformity to institutional demands for environmental transparency is challenging, firms may employ the financial materiality lens and distinguish between financially material and financially immaterial information in making environmental disclosures. In particular, we argue that firms with poor environmental performance will be likely to have incentives to use this distinction and pursue the appearance of institutional conformity by disclosing environmental information that is more financially immaterial than material. This approach allows poor environmental performers to project an image of conformity by increasing informational, but not necessarily informative, environmental disclosures from the financial consequence perspective, thereby minimizing potential financial damage.

As a result, strategic environmental disclosure using the financial materiality lens looks different from that focusing on environmental impact. Most of all, firms disclose both positive and negative environmental information. This approach to impression management is more delicate than those that involve more explicit decoupling through greenwashing that highlights environmentally positive information while suppressing environmentally negative information. Because the financial materiality lens allows the

disclosure of negative as well as positive environmental information, it is likely to give an impression of veracity and fair, less selective, disclosure. This in turn exposes firms less to negative attacks from external stakeholders and to being accused of greenwashing, while reducing potential financial repercussions.

In sum, we propose that firms with poor environmental performance manage environmental disclosures through strategic informational maneuvers based on the financial materiality lens. By releasing more environmental information that is not financially material, such firms will balance the tension between the pressure for more disclosures and the desire to minimize potential negative financial impact. Thus, we hypothesize that:

H1: Firms with poor environmental performance decrease the proportion of environmental disclosures that are financially material.

A corollary to H1 is that the proportion of financially immaterial disclosures increases given the total level of environmental disclosures.

H1a: Firms with poor environmental performance increase the proportion of environmental disclosures that are financially immaterial. (corollary to H1)

Below, we explore the possibility that there may be heterogeneity within the financially immaterial category. That is, although we argue that *H1a* holds in the aggregate, firms may manage environmental disclosures more narrowly depending on the type of financially immaterial information. In particular, we posit that the salience of environmental issues and the link (or lack thereof) to specific environmental outcomes that facilitate external evaluation, which we discuss in turn below, will provide important distinctions.

First, among environmental issues that are not financially material to the industry, some are more salient than others (Bansal & Roth, 2000). For example, this could be because scientific studies have documented that some issues present significant and irreversible risks to human health or the environment and thus are more widely publicized (Mazur & Lee, 1993). Or, some issues are more appealing or acceptable to the broader community and hence resonate better with stakeholders (Jones, 1991).

We posit that the salience of environmental issues is a more fine-tuned dimension within the financially immaterial category used by poor environmental performers in deciding which environmental

information to disclose. Although not financially material, given the multiplicity in the stakeholder environment (Oliver, 1991; Friedland & Alford, 1991), salient environmental issues can potentially draw attention to poor environmental conduct from stakeholders other than investors, who tend to invoke the financial materiality lens in considering corporate environmental issues (e.g., Khan, *et al.*, 2016). For example, NGOs, environmental activists, or customers may react negatively to such disclosures due to the environmental harm incurred (Eesley & Lenox, 2006; Sine & Lee, 2009) regardless of financial materiality. Poor environmental performers will hence be hesitant to disclose information about salient environmental issues even if financially immaterial. In contrast, non-salient issues will draw less attention. Thus, when a firm is a poor environmental performer, it may desire to create strategic noise (Elsbach, Sutton, & Principe, 1998; Graffin *et al.,* 2011) around environmental performance by disclosing more about non-salient environmental issues that are ordinarily not scanned or scrutinized by external stakeholders. Because external stakeholders pay less attention to non-salient environmental issues compared to more salient ones, we contend that such disclosure is less likely to trigger negative backlash and attacks. Therefore, with this approach, firms with poor environmental performance will project an image of conformity to institutional demands, disclosing environmental information while deflecting stakeholder attention and scrutiny. Therefore, we hypothesize that:

H2: Firms with poor environmental performance decrease the proportion of environmental disclosures that are financially immaterial yet environmentally salient (salient).

H3: Firms with poor environmental performance increase the proportion of environmental disclosures that are financially immaterial and environmentally non-salient (noise).

Second, we contend that the link to specific environmental outcomes, or lack thereof, will influence how poor environmental performers choose among financially immaterial information to disclose. Meyer and Rowan (1977) argue that the avoidance of assessment was part of a process involving the decoupling of an organization's internal activities from the external constraints. One strategy of avoiding assessment is simply keeping secret the information that might be necessary or useful for evaluating organizational results (Pfeffer, 1981: p.30). However, since assessment is likely to be desired, firms may provide information that

is defined along criteria more favorable to the organization, measured along criteria which are more readily controlled by the organization, and acceptable to those interested in the organization (*Ibid.*).

While this idea has not been explored much in the subsequent literature, we argue that it is directly applicable to the business sustainability context. Poor environmental performers may desire to hide information that can easily help stakeholders find out about dissatisfactory and inferior environmental outcomes and evaluate them negatively. Instead, in balancing the pressure to disclose environmental information and the desire to avoid potential repercussions, poor environmental performers may choose to disclose information that they regard as more favorable to them and that they have greater flexibility and control over.

One such approach is expressing commitment towards environmental sustainability (Bansal & Clelland, 2004). This could involve, for example, adopting voluntary environmental initiatives or standards such as ISO 14001 (Christmann & Taylor, 2002; King, Lenox, & Terlaak, 2005; Delmas & Montes-Sancho, 2011), or establishing a governance system that supports sustainability, for instance, board committees, advisory board, or executive compensation contracts (Hong, Li, & Minor, 2016; Al-Shaer & Zaman, 2019). While these commitments can help convert firm operations into more environmentally sustainable ones (Hart, 1995; Hart & Dowell, 2011), their link to specific environmental outcomes remains elusive (King & Lenox, 2000; Bagnoli & Watts, 2017; Li & Wu, 2020).

We contend that these commitments are more input-oriented or goal-oriented courses of action, which are more readily controllable by firms than environmental outcomes (Weaver, TreviÑo, & Cochran, 1999). That is, while such commitments certainly demonstrate aspirations and efforts towards environmental sustainability, commitments by themselves do not necessarily reveal how they in turn translate into specific environmental end results.

Therefore, we argue that disclosures of general environmental commitments effectively create another category of strategic noise due to their uncertain link to specific environmental outcomes. Nevertheless, they may help poor environmental performers to be perceived as environmentally sustainable or less harmful. Bansal and Clelland (2004) demonstrate that when a firm's legitimacy is low, investors may

not judge the firm as harshly if it expresses environmental commitment. By expressing commitment to the environment, the firm can deflect the negative criticism by signaling that it does actually care about the environment (*Ibid*., p.96). Thus, we hypothesize that firms with poor environmental performance increase the disclosures of general environmental commitment whose links to specific environmental outcomes are uncertain in order to project an image of institutional conformity, disclosing environmental information while keeping up appearances. Thus, we hypothesize that:

H4: Firms with poor environmental performance increase the proportion of environmental disclosures that have unclear links to specific environmental outcomes (general).

Data and Method

Our main data sources include the Thomson Reuters ESG database (previously called Asset4) for corporate environmental sustainability, the Sustainability Accounting Standards Board (SASB) for financial materiality classifications, and Compustat for firm-level financials. Below, we describe how we construct our dependent variables by hand-mapping the firm-level Thomson Reuters Environmental Sustainability data with the industry-level SASB data.

Thomson Reuters ESG

The Thomson Reuters ESG database provides corporate environmental, social, and governance information at multiple levels, from disaggregated raw data points (i.e., primary data obtained from sources) to aggregated total scores within each ESG category (i.e., processed data by Thomson Reuters). In constructing our dependent variables (financial materiality-based environmental disclosure variables), we make use of the raw data points in the environmental category. There are a total of 178 raw data points related to the environment. Through a series of communications with Thomson Reuters, we learned that these raw variables are based on information disclosed by companies, for example, through annual reports, sustainability reports, CSR reports, proxy statements, corporate governance guidelines, company websites, etc., except for the two raw data points which were collected from a third party media source and a non-governmental organization. Thus, we use the 176 environment-related raw variables released by companies in one form or another in constructing our dependent variables.

SASB Materiality and Mapping with Thomson Reuters Environmental Variables

Following prior studies, we employ the materiality map from the SASB, a 501(c)3 nonprofit organization. The SASB adopts investors' perspectives and provides standards for distinguishing environmental issues as financially material or financially immaterial at the industry level (www.sasb.org). The SASB applies the definition of "materiality" established under U.S. securities laws—information is material if there is "a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the 'total mix' of information made available"—and identifies which environmental issues can have significant financial consequences for each SASB industry. The SASB materiality map varies across two dimensions. One is SASB Industry, where companies are grouped based on shared sustainability risks and opportunities. The other is environmental issue classifications: Greenhouse gas emissions, Air quality, Energy management, Water & wastewater management, Waste & hazardous materials management, and Ecological impact. The SASB materiality map displays the cross sections of these two dimensions and indicates if the cross section is financially material or not (i.e., by SASB industry and environmental issue).

To map the Thomson Reuters environmental variables to SASB materiality, we proceeded in two steps. First, the SASB industry classification is different from the SIC or NAICS codes. Thus, for each company in our sample, we used the SASB Look-up tool one by one and discovered to which SASB industry the company belongs. Second, we carefully examined the description of each SASB issue. For example, the "Air Quality" issue is described as follows. "This category addresses management of air quality impacts resulting from stationary (e.g., factories, power plants) and mobile sources (e.g., trucks, delivery vehicles, planes) as well as industrial emissions. Relevant airborne pollutants include, but are not limited to, oxides of nitrogen (NOx), oxides of sulfur (SOx), volatile organic compounds (VOCs), heavy metals, particulate matter, and chlorofluorocarbons. The category does not include GHG emissions, which are addressed in a separate category." We then referred to more detailed metrics provided by SASB for each issue, if that issue is material for a particular SASB industry. These metrics can go beyond the overall issue description provided above. For instance, for the construction materials industry, SASB states that "Air emissions of the

following pollutants: (1) NOx (excluding N2O), (2) SOx, (3) particulate matter (PM10), (4) dioxins/furans, (5) volatile organic compounds (VOCs), (6) polycyclic aromatic hydrocarbons (PAHs), and (7) heavy metals. Thus, we made use of the more fine-grained details at the SASB industry level as well.

Based on these, we mapped the Thomson Reuters 176 raw environmental variables with the six SASB environmental issues. A majority of the environmental variables can be mapped onto one specific SASB environmental issue (114 out of 176). The rest of the environmental variables are of two types: either not covered by SASB because they are relatively non-salient environmental issues (20 out of 176), or too general to be categorized as one specific SASB environmental issue (41 out of 176), for example, whether the company has an environmental management system or a governance system that broadly supports environmental sustainability. Based on these distinctions, we created our dependent variables. Two research assistants independently conducted coding after extensive training and compared their results along with the authors, and any discrepancies (about 4%) were discussed and resolved with the authors. To the best of our knowledge, there are two original studies that construct similar sustainability-SASB materiality metrics as us. One is Khan *et al*. (2016) that map KLD to SASB. The other is Grewal *et al.* (2020) that use the Bloomberg classifications. We are the first to map the Thomson Reuters Environmental variables to SASB materiality.

Dependent Variables

Types of Environmental Disclosure

Using our unique dataset, which combines the Thomson Reuters' environmental variables and the SASB materiality map, we construct dependent variables that represent the alternative types of environmental disclosures we describe above. The first-order distinction is financially material, or financially immaterial. The second order distinction is within the financially immaterial category: Salient, Noise (Non-Salient), and General. Briefly, salient issues refer to those classified by SASB, and non-salient issues are those not covered by SASB. The general category involves broad environmental commitments that cannot be categorized into one specific SASB environmental issue category, such as having a sustainability governance system in place with unclear links to specific environmental outcome. We use the proportion of each type of environmental disclosures out of the total environmental disclosures as alternative dependent variables.

1) *Financially Material Disclosure (Financially Material)* refers to the proportion of environmental disclosures at the firm level that are classified as financially material.
2) *Financially Immaterial Disclosure (Financially Immaterial)* refers to the proportion of environmental disclosures at the firm level that are classified as financially immaterial.

   2-1) Financially Immaterial and Environmentally Salient (Salient) refers to the proportion of environmental disclosures at the firm level that are classified as financially immaterial and environmentally salient issues.

   2-2) Financially Immaterial and Environmentally Non-Salient (Noise) refers to the proportion of environmental disclosures at the firm level that are classified as financially immaterial and environmentally non-salient issues.

   2-3) Financially Immaterial with Unclear Links to Environmental Outcomes (General) refers to the proportion of environmental disclosures at the firm level that are classified as general with unclear links to specific environmental end results.

Independent Variable

Poor Environmental Performance

The Thomson Reuters ESG database we describe in detail above provides not only the raw environmental variables we use in our mapping with the SASB sustainability classification but also the aggregated performance scores for each E, S, G, dimension, which have been frequently used in recent work (e.g., Hawn & Ioannou, 2016, Eccles *et al.,* 2014). This database has the advantage that the environmental score variable is available for more recent years compared to the KLD environmental variables, which is available only up to 2013. Thus, we use the Thomson Reuters scores in our main analysis and KLD scores in our robustness checks. The Thomson Reuters Environmental Pillar scores range from 0 to 100 for each firm-year. Since our focus is firms with poor environmental performance, to ease interpretations of our results, we reverse code by subtracting the Environmental scores from 100. This means that firms with higher values of this variable display lower Environmental scores than those with lower values. We further divide by 100 such that *Poor Environmental Performance* is within the range of 0 and 1.

As mentioned above, in our robustness checks, in lieu of the Thomson Reuters database, we use the KLD database, which has also been used widely in prior work (e.g., Werner, 2015). We use KLD environmental concerns minus environmental strengths as an alternative measure of *Poor Environmental Performance.* Our results are similar to what we obtain with the Thomson Reuters environmental scores (see Appendix 1).

Controls

We control for an array of variables that reflect firm heterogeneity and factors that are likely to drive environmental disclosure. First, we include two firm-level dummy variables, the United Nations Global Reporting Initiative (*GRI*) and *Global Compact*, where 1 denotes that the firm follows the GRI and *Global Compact* and 0 otherwise. The GRI is different from the SASB in that the GRI adopts a multi-stakeholder viewpoint instead of focusing solely on financial materiality (Etzion & Ferraro, 2010). Global Compact encourages environmentally sustainable and socially responsible governance. Thus, the usage of the GRI or Global Compact may affect firms' environmental disclosures.

Second, we control for various firm characteristics prior studies have shown to influence environmental disclosures. Firms that operate in environmentally sensitive industries may release more information than other firms because they are subject to greater pressure to report environment-related information (Cho & Patten, 2007). We generate a dummy variable that indicates an Environmentally Sensitive Industry (ESI), which is equal to 1 if the firm's SIC code is 13xx, 26xx, 28xx, 29xx or 33xxx, and 0 otherwise (*Ibid.*). Rapidly growing firms need to get approval from external stakeholders as they grow (Russo & Fouts, 1997), and thus they may disclose greater amounts of environmental information. We create two variables that measure alternative dimensions of firm growth: past growth, captured by revenue growth, and future growth prospects, captured as price-to-earnings ratio (Desarbo & Grewal, 2008; Pandher & Currie, 2013). We also include firm size and ROA as larger firms and more profitable firms tend to disclose more environmental information (Al-Tuwaijri, Christensen, & Hughes, 2004; Brammer & Pavelin, 2006).

Finally, we take into account potential impacts external stakeholder pressures might impose on environmental disclosure. These include pressures from environmental nongovernmental organizations, pro-

environmental political pressure, and regulatory pressures at the state level (Kassinis & Vafeas, 2006; Kim & Lyon, 2015; Dowell & Muthulingam, 2017).

Model Specification

To test our hypotheses, we performed a panel analysis using the following specification:

$$Types\ of\ Environmental\ Disclosure_{ijt} = \alpha + \beta\ Poor\ Environmental\ Performance_{it-1} + \eta\ X_{it-1} + \gamma W_{it} + \delta S_{jt} + \sum SASB\ industry + \sum Year + \varepsilon_{ijt}$$

where $Types\ of\ Environmental\ Disclosure_{ijt}$ refers to the alternative types of environmental disclosures made by firm *i* in state *j* in year *t*. It is *Financially Material* for H1, *Financially Immaterial* for H1a, *Financially Immaterial and Environmentally Salient (Salient)* for H2, *Financially Immaterial and Environmentally Non-Salient (Noise)* for H3, and *Financially Immaterial with Unclear Links to Environmental Outcomes (General)* for H4.

$Poor\ Environmental\ Performance_{it-1}$ is our main variable of interest. X_{it-1} includes lagged firm characteristics, *Firm Size* and *ROA*. W_{it} represents contemporaneous controls, *ESI, Revenue Growth*, *PE ratio, GRI*, and *Global Compact*. Revenue growth proxies for past growth and is measured as the prior three-year moving average, and PE ratio represents future growth potential, and thus the contemporaneous values are used. S_{jt} indicates state-level stakeholder pressure variables. We also include year and SASB industry fixed effects to account for any unobservable heterogeneity across the SASB industries, on which the SASB financial materiality standard is based. Because the SASB industry classification for each firm does not change over time, firm fixed effects cannot be separately included in our regressions. We perform a series of robustness checks to address potential endogeneity concerns in the robustness checks section. Standard errors are clustered at the firm level. Our hypotheses predict that $\beta<0$ for H1 and H2, and $\beta>0$ for H1a, H3, and H4.

Here we briefly describe how we address potential endogeneity due to reverse causality. While we use panel data to reduce the risk of confounding effects by controlling for a wide array of firm- and time-specific observable and unobservable factors that may affect firms' environmental disclosures, there is the possibility of the endogeneity problem caused by reverse causality. For example, poor environmental

performers may engage in greenwashing by strategically disclosing more positive environmental information to avoid external stakeholder pressure (Lyon & Maxwell, 2011), which may affect the environmental scores given by information intermediaries (Fabrizio & Kim, 2019). This suggests that *Poor Environmental Performance* may endogenously depend on recent firm environmental disclosure. If so, then once we control for prior year firm environmental disclosures, the association between *Poor Environmental Performance* and the alternative types of environmental disclosure should disappear. Accordingly, as an alternative model specification, we add the one-year lagged value of the dependent variable to each of our regression models and adjust the standard errors using bootstrap. As shown in Appendix 2, while the lagged value of the dependent variable is positive and highly significant in each regression, the results are very similar to those in our main result table, which we will introduce shortly; *Poor Environmental Performance* remains highly significant and the direction is the same as we hypothesize in our models.

Mapping the Thomson Reuters' environmental variables to the SASB materiality map led to 1,567 unique U.S. headquartered firms listed on the NYSE and Nasdaq stock exchanges from 2003 to 2016. Out of these, over 400 firms belong to the industries that do not have financially material environmental issues according to the SASB. Accordingly, we exclude these firms and combine the rest with the Thomson Reuters and KLD Environmental scores, Compustat, and other data sources. Our final sample consists of 929 unique firms headquartered in the U.S with 5,862 firm-year observations across industries. Appendix 3 reports the SASB industries distribution in our sample and the number of the Thomas Reuters environmental variables categorized as *Financially Material* and *Financially Immaterial and Environmentally Salient (Salient)*.

Results

Table 1 provides descriptive statistics and correlations. All continuous variables are winsorized at the 1st and 99th percentiles. In our sample, on average, financially material information accounts for 22.23% of firms' environmental disclosures. This means that the other 77.77% represents financially immaterial information. Out of the 77.77%, 35.13% relates to environmentally salient issues (Salient); 14.48% pertains to environmentally non-salient issues (Noise); 28.17% covers firms' broad environmental commitment and effort with unclear links to environmental outcomes (General). The mean value of *Poor Environmental*

Performance$_{t-1}$ is 0.54 with the SD of 0.32. As explained earlier, a higher score (closer to 1) indicates poorer environmental performance.

(Insert Table1)

The dummy variable that indicates an Environmentally Sensitive Industry (ESI) shows that 18% of the firm-year observations belong to this category. Our dataset is unbalanced, and thus in terms of unique firms, a slightly smaller percentage, 15.6% (145 out of 929 unique firms) is categorized as ESI. 23% of our firm-year observations are GRI adopters, and 5% are participants in the UN Global Compact. Firm size is measured as the natural log of total assets, and the mean value is 8.85 ($7.0 billion ($= e^{8.85}$)). The mean value of *Revenue Growth* is 0.01, with the SD of 0.17, suggesting that the growth rate for firms in our sample is around 1% based on the prior three-year moving average. The price-to-earnings ratio is calculated as the market value of equity divided by net income, and the average *PE ratio* is 29.27, with the SD of 39.82. The average *ROA* is 7%, with the SD of 0.05.

The last three variables proxy for state-level stakeholder pressures. *League of Conservation Voters* (LCV) Scorecard keeps the voting records of all members of the U.S. Congress on environmental issues every year and assigns a score that indicates a pro-environmental voting record, ranging from 0 to 100, to each Senator and Representative. To measure pro-environmental political pressure at the state level, we use the average values of the LCV scores for all members of Congress, both in the Senate and the House, at the state level (Delmas & Toffel, 2008). The average LCV value is 54 ($= 0.54 * 100$). We also perform robustness checks using the average Senate LCV score and the average House LCV score separately, and the results are very similar. *Sierra Club Memberships* proxies for environmental NGO pressure at the state level, and the mean value is 19,341 ($= e^{9.87}$). The average amount of the *State Government Expenditures for Natural Resources*, which measures regulatory pressure at the state level, is $1.96 million ($= e^{7.58}$). The correlations among variables are generally low. We calculated the variance inflation factors (VIF) to test for multicollinearity. In our regressions, the VIFs are less than 2 for all models, which is much lower than 10. Thus, multicollinearity should not affect our results.

Table 2 shows the panel data analysis results predicting the alternative types of environmental information disclosed by firms. As shown, the regression results in Models (1) and (2) provide strong support for H1and H1a. On average, poor environmental performers disclose less financially material information and more financially immaterial information. The coefficient for *Poor Environmental Performance* is -1.555 ($p = 0.000$) in Model (1). This means that one standard deviation (0.32) increase in *Poor Environmental Performance* will lead to an average decrease of 0.50% (=0.32 * (-1.555)) in financially material disclosure. This corresponds to a 2.25% (= 0.50% / 22.23%) decrease in the mean value of *Financially Material Disclosure.* Conversely, with one standard deviation increase in *Poor Environmental Performance*, firms will increase financially immaterial disclosure by 0.50% (=0.32 * 1.555). This is tantamount to a 0.64% (= 0.50% / 77.77%) increase in the mean value of *Financially Immaterial Disclosure.*

(Insert Table2)

Models (3) to (5) show variations within the financially immaterial disclosure category, testing H2-H4. In all models, the coefficient of *Poor Environmental Performance* is statistically significant and shows the directions we hypothesized. In Model (3) where $\beta = -0.597$ ($p = 0.000$), poor environmental performers will decrease *Financially Immaterial and Environmentally Salient Disclosure* (*Salient*) by 0.19% (=0.32 * (-0.597)) with one standard deviation increase in *Poor Environmental Performance*. This means a 0.54% (=0.19% / 35.13%) decrease in the mean value. Model (4) shows $\beta = 0.822$ ($p = 0.000$), suggesting that firms on average increase *Financially Immaterial and Environmentally Non-Salient Disclosure (Noise)* by 0.26% (=0.32 * (0.822)) with the same one standard deviation increase in *Poor Environmental Performance*. The *Noise* disclosure will increase by 1.80% (= 0.26% / 14.48%) at the mean level. As for *Financially Immaterial with Unclear Links to Environmental Outcomes (General)*, Model (5) shows that the coefficient of *Poor Environmental Performance*$_{t-1}$ is 1.330 ($p = 0.000$). Thus, one standard deviation increase in *Poor Environmental Performance* will lead to a 0.43% (=0.32 * (1.330)) increase in the extent of *General Disclosure*. This amounts to a 1.53% (= 0.43% / 28.17%) increase at the mean level. Overall, the empirical results are consistent with our argument that firms with poor environmental performance systematically manage environmental disclosure through the financial materiality lens. The relationships

between *Poor Environmental Performance* and the alternative types of environmental disclosure are illustrated in Figure1.

(Insert Figure1)

Robustness Checks

There are credible alternatives to our core argument that firms with poor environmental performance disclose more environmental information that is financially immaterial. We discuss potential identification concerns and how we address them.

Our identification strategy relies on the assumption that poor environmental performance is exogenous with respect to environmental disclosures. A potential concern is that omitted variables may cause a spurious relationship between environmental performance and disclosures. For example, it could be that firms with poor financial performance lack resources to invest in environmental improvement, and as a result, have poor environmental performance; at the same time, they may avoid disclosing environmental information that is financially material. In such a case, we may erroneously conclude that poor environmental performers disclose less financially material information. As discussed earlier, to mitigate omitted variables concerns such as this one, in our regressions, we control for various factors that prior work has found to influence environmental disclosures. Below, we address this potential issue further.

First, before running our regressions, we match low environmental performers and high environmental performers and prune those observations that are not matched (Eccles, Ioannou, & Serafeim, 2014). We create two sets of matched samples using narrow and broad sets of covariates alternatively and apply both propensity score matching and coarsened exact matching (CEM). We first split our observations into the low environmental performers group and the high environmental performers group using the median value of the Thomson Reuters Environmental Pillar scores for the year 2002 since our sample time period starts in 2003. We replace missing values with the Environmental scores for the earliest year available between 2003 and 2005 and obtain 478 firms with non-missing Environmental score values. For narrow matching, we use three covariates that affect environmental performance: firm size, ROA and Environmentally Sensitive industry. Larger and more profitable firms have more resources to improve their

environmental performance (Moore, 2001; Waddock & Graves, 1997), and firms that operate in Environmentally Sensitive Industries face more stringent environmental regulations that are likely to affect environmental performance (Cho & Patten, 2007). For broad matching, we use all variables in our regressions except *Revenue Growth* as it is calculated as the prior three-year moving average. Table 3 shows the regression results after matching.

(Insert Table 3)

Panel A shows that the regression results after propensity score matching are very similar to those shown in Table 2, and the distributions of the propensity score, which is estimated as the likelihood of being a good environmental performer, are almost equivalent between the high and low environmental performer groups after propensity score matching (N=239 for narrow matching and N=233 for broad matching). Panel B shows the regression results using the CEM weights obtained from CEM matching. The results are qualitatively similar overall, but the significance of the *Salient* disclosure (H2) decreases to the 10% level. This might be due to the small number of the matched firms after broad matching (N=113) compared to narrow matching (N=425). Also, the L_1 statistic is much higher at 0.82 with 53 matched strata for broad matching compared to 0.24 with 31 matched strata for narrow matching. Thus, with CEM, the narrow matching results are more reliable, which shows statistically similar results to those shown in Table 2. The t-test table shows that there are no significant differences between the high and low groups across our covariates. Regression results are very similar if we use the mean value of the Thomson Reuters Environmental Pillar scores instead of the median value to split our sample.

Second, poorly governed firms or poorly monitored firms may misbehave (Ullmann, 1985). It could be that such firms exhibit poor environmental performance and shy away from disclosing financially material information. We address this possibility using several additional control variables that proxy for corporate governance directly or more indirectly. We use the Thomson Reuters Corporate Governance Pillar score as a direct measure. As more indirect proxies, we use three alternative variables: 1) the extent to which a firm is covered by securities analysts, as measured by the number of analysts following, both the raw numbers and the logged values (e.g., Li & You, 2015); 2) the extent to which a firm is owned by large institutional

investors, as measured by the percentage of institutional ownership (e.g., Boone & White, 2015); and 3) whether a firm is audited by high-quality auditing firms, as measured by a dummy variable that takes the value of 1 if the firm was audited by any of the big four auditing firms (Deloitte, PricewaterhouseCoopers, Ernst & Young, and KPMG) during the year, and zero otherwise (e.g., Zorio Garcia-Benau & Sierra, 2013). As shown in Table 4, in all cases, our results are robust to the inclusion of the additional control variables.

(Insert Table 4)

Third, one may argue that the ease with which external stakeholders access and use disclosed information may matter. For example, this could be because information processing costs could affect the stakeholders' use of disclosed information, which in turn could influence how firms make disclosures (Fabrizio & Kim, 2019). To account for this possibility, we make use of a recent innovation in financial reporting, the eXtensible Business Reporting Language (XBRL), which the U.S. Securities and Exchange Commission (SEC) mandated for all firms in a staggered fashion between 2009 and 2011. It makes financial data standardized, tagged, and machine-readable when submitting filings such as 10-Ks and 10-Qs, facilitating the ease of access and use of disclosed information (Blankespoor, 2019). Standardized tagging applies not only to the main menu items in financial reports but also to footnote items (Arnold *et al.,* 2012). Since XBRL lowers the searching and processing cost on the part of the users, we use the XBRL usage for two purposes: as an additional control and as a potential moderator. XBRL as a moderator will test whether the ease of using disclosed information influences the extent to which poor environmental performers employ the financial materiality lens in disclosing environmental information. The result is shown in Table 5.

(Insert Table 5)

In general, using XBRL as an additional control or as a moderator does not qualitatively affect our main findings. However, an interesting result is that our H2 ($p = 0.014$) and H4 ($p = 0.004$) are bolstered by the ease of information usage as proxied by XBRL: poor environmental performers decrease the disclosure of financially immaterial yet environmentally salient information even more and increase the disclosure of financially immaterial and general environmental information even more. For the other dependent variables,

the interaction variable shows the same direction as *Poor Environmental Performance*, suggesting that the ease of information usage exacerbates our findings but is not statistically significant ($p > 0.52$).

Fourth, we use the alternative types of environmental disclosure based on financial materiality as DVs, and one might wonder whether poor environmental performers engage in greenwashing as prior work has argued. Accordingly, we code the Thomson Reuters 176 raw environmental variables based on their content and separate out environmentally positive and environmentally negative information. For binary variables, this distinction is made after checking whether 1 or 0 is positive information for each variable. For continuous variables, we use the median values to differentiate environmentally positive and negative information in each SASB industry. We create a DV calculated as the number of environmentally negative minus positive information to capture the extent to which firms disclose negative relative to positive information. Since this DV is based on the Thomson Reuters' Environmental variables, we use the KLD Environmental Concerns minus Strengths, which we introduced as our alternative independent variable in the variables description section, as an independent variable for this robustness check. The regression results are shown in Appendix 4.

Poor Environmental Performance is positively related to the DV in models (1) and (2), suggesting that low environmental performers disclose relatively more negative information compared to high performers. We further explore whether this relationship changes over time by interacting *Poor Environmental Performance* with a linear time trend variable. The intricate relationship is illustrated for earlier and later years, 2003 and 2013, in the figure below. As shown, both high performers (as we move left on the x axis) and low performers (as we move right on the x axis) increase the disclosure of environmentally positive information over time as demonstrated by the lower y values for 2013 than for 2003, respectively. However, the vertical distance between the two years is greater for high environmental performers than for low environmental performers, suggesting that the extent to which firms engage in greenwashing, if any, is higher for high environmental performers. In addition, the interaction term between *Poor Environmental Performance* and the time trend is not statistically highly significant ($p = 0.100$). Therefore, overall, we do not find evidence that low environmental performers engage in greenwashing more than high counterparts.

Lastly, in our main regressions, we have controlled for NGO pressure, pro-environmental political pressure, and regulatory pressure at the state level to account for differences in the level of external stakeholder pressures prior work has shown to drive environmental disclosure. Our regression results are also robust to the additional inclusion of state fixed effects that account for other unobservable but stable differences across states over time.

Discussion and Conclusion

Firms face increasing demand for environmental sustainability and reporting. This puts significant pressure on firms with poor environmental performance in particular because such firms are more likely to experience repercussions following the disclosure of inferior environmental conduct. We have thus explored how poor environmental performers balance the tension between projecting institutional conformity on the one hand and facing potentially negative reactions on the other.

Our findings demonstrate that firms with poor environmental performance respond to this pressure by employing the financial materiality lens. They increase the disclosure of financially immaterial information and decrease the disclosure of financially material information, thereby reducing potentially negative financial impacts while projecting an image of institutional conformity. In particular, they disclose financially immaterial information about less salient environmental issues and about environmental initiatives with unclear links to specific environmental end results. Below we discuss how these findings extend prior work and prompt new lines of inquiry.

Our paper builds on and extends prior work on corporate sustainability and impression management. Practitioners have long expressed concerns about the possibility that firms may engage in greenwashing (e.g., Gottlieb, 1998; Najam, 1999). (Please note that the concept of greenwashing, despite having an environmental bent, applies to the social and governance context as well). This has led to growing academic work on greenwashing, for example, how firms engage in greenwashing to alter stakeholder impressions in their favor (Ramus & Montiel, 2005; Delmas & Burbano, 2011) and what the boundary conditions are that facilitate or hamper greenwashing (King & Lenox, 2000; Wulfson, 2001; Stoll, 2002; Berrone, et al., 2017). This focus on greenwashing, however, has largely prohibited exploration of other factors that firms may

invoke in attempting to influence stakeholder impressions. Our paper begins to address this limitation by demonstrating how firms utilize the financial materiality lens in making environmental disclosures to lessen financial repercussions. Because this paper is the first in this line of research, we have focused on the main effects. Future work could explore further boundary conditions or alternative strategies firms may employ to shape stakeholder impressions along the corporate sustainability domains.

Our findings also highlight firm heterogeneity in attempts to influence stakeholder impressions. Organizations strategically respond to institutional pressures (Oliver, 1991) and actively manage their informational environment and do so in ways that will favorably shape the impressions of stakeholders (Zajac and Westphal, 1995). We show that "favorable shaping" means different things to different firms depending on their environmental performance. While most prior work has focused on quintessential desires to project an environmentally sustainable image, firms with poor environmental performance may have a different desire given that their environmental performance is not praiseworthy. Our empirical results demonstrate that such firms invoke the financial materiality lens in making decisions about environmental disclosures. This finding is consistent with our argument that firms with poor environmental performance have a different purpose in mind when disclosing environmental information; they aim to attenuate negative financial impacts while projecting institutional conformity by providing financially immaterial information. This line of thought reiterates the importance of considering firm heterogeneity, especially how domain-specific performance may be manifested in impression management strategies (Lange, Lee, & Dai, 2011; Carlos & Lewis, 2018). We explore differences in environmental performance; future work could explore other dimensions of firm heterogeneity.

Our paper speaks to the impression management literature more broadly, particularly prior work that proposes that firms have a motivation to engage in anticipatory impression management when they are uncertain about how stakeholders may react (Elsbach, Sutton, & Principe, 1998). In particular, firms may engage in anticipatory obfuscation by creating strategic noise in order to take preemptive action to minimize direct scrutiny and protect themselves against possible negative reactions to uncertain events (Graffin, *et al.*, 2011). In this paper, we find that firms with poor environmental performance engage in anticipatory

obfuscation using the financial materiality lens in disclosing environmental information. Financially immaterial disclosure is informational but not as informative as financially material disclosure from the financial impact standpoint. Thus, utilizing the financial materiality lens is a clear manifestation of strategic noise created a priori.

However, as we argued, this noise is not random but systematic in the sense that it systematically involves financially immaterial information. Furthermore, while poor environmental performers on average increase disclosures of financially immaterial relative to material information, we demonstrate that there are more subtle yet notable differences within the financially immaterial category. They report more about non-salient issues and general commitments toward sustainability. The former helps avoid stakeholder attention, and the latter helps keep control of the informational environment by disclosing actions that they take and thereby have greater control over while not necessarily revealing how such actions are linked to specific environmental outcomes. Thus, our findings point to the possibility that strategic noise may be created in systematic ways around the favorable criteria defined by the firms. Future research could explore this possibility further.

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Table 1. Summary Statistics and Correlations

Variables	N	Mean	Std. Dev.	Min	Max
Financially Material Disclosure (%) (H1)	5,862	22.23	12.04	4.42	59.85
Financially Immaterial Disclosure (%) (H1a)	5,862	77.77	12.04	40.15	95.58
Salient Disclosure (%) (H2)	5,862	35.13	11.61	4.10	57.14
Noise Disclosure (%) (H3)	5,862	14.48	0.89	10.79	17.05
General Disclosure (%) (H4)	5,862	28.17	1.55	22.22	34.02
Poor Environmental Performance $_{t-1}$	5,862	0.54	0.32	0.03	0.91
ESI	5,862	0.18	0.38	0	1
GRI	5,862	0.23	0.42	0	1
Global Compact	5,862	0.05	0.21	0	1
Firm Size $_{t-1}$(log)	5,862	8.85	1.26	4.80	13.20
Revenue Growth	5,862	0.10	0.17	-0.22	1.94
PE Ratio	5,862	29.27	39.82	4.34	313.61
ROA $_{t-1}$	5,862	0.06	0.06	-0.49	0.27
League of Conservation Voters (divided by 100)	5,862	0.54	0.27	0	1
Sierra Club Memberships (log)	5,862	9.87	0.98	6.22	12.07
State Gov't Expenditure on Natural Resources (log)	5,862	7.58	3.69	0.69	15.23

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Financially Material Disclosure (%) (H1)															
2	Financially Immaterial Disclosure[1] (%) (H1a)	-1														
3	Salient Disclosure (%) (H2)	-0.98	0.98													
4	Noise Disclosure (%) (H3)	-0.26	0.26	0.09												
5	General Disclosure (%) (H4)	-0.26	0.26	0.08	0.76											
6	Poor Environmental Performance $_{t-1}$	-0.28	0.28	0.16	0.62	0.56										
7	ESI	0.41	-0.41	-0.41	-0.10	-0.07	-0.14									
8	GRI	0.23	-0.23	-0.11	-0.61	-0.62	-0.59	0.12								
9	Global Compact	0.07	-0.07	-0.02	-0.28	-0.26	-0.26	0.07	0.29							
10	Firm Size $_{t-1}$(log)	0.09	-0.09	-0.01	-0.45	-0.39	-0.51	0.08	0.38	0.21						
11	Revenue Growth	-0.02	0.02	-0.01	0.17	0.12	0.21	0.08	-0.16	-0.05	-0.12					
12	PE Ratio	-0.03	0.03	0.01	0.10	0.09	0.13	-0.05	-0.09	-0.02	-0.14	0.12				
13	ROA $_{t-1}$	-0.05	0.05	0.05	-0.01	-0.01	-0.05	0.08	0.02	0.03	-0.12	0.03	-0.16			
14	League of Conservation Voters (/100)	-0.10	0.10	0.13	-0.13	-0.10	-0.05	-0.15	0.05	0.10	-0.01	0.01	0.07	0.05		
15	Sierra Club Memberships (log)	-0.04	0.04	0.05	-0.01	-0.02	0.02	-0.07	0.00	0.03	-0.04	0.10	0.09	0.02	0.43	
16	State Gov't Expenditure on Natural Resources (log)	0.02	-0.02	-0.01	-0.04	-0.07	-0.07	0.02	0.10	0.03	0.01	0.01	0.03	0.01	-0.05	0.03

[1] *Financially Immaterial Disclosure* is perfectly negatively correlated with *Financially Material Disclosure* because the sum of the two variables constitutes the total environmental disclosure made by firms.

Table 2. Alternative Types of Environmental Disclosures as a Function of Poor Environmental Performance

Variables	(1) Financially Material (H1)	(2) Financially Immaterial (H1a)	(3)	(4) Financially Immaterial	(5)
			Salient (H2)	Noise (H3)	General (H4)
Poor Environmental Performance $_{t-1}$	-1.555***	1.555***	-0.597***	0.822***	1.330***
	(0.179)	(0.179)	(0.143)	(0.075)	(0.141)
ESI	0.038	-0.038	0.129	-0.141	-0.025
	(0.322)	(0.322)	(0.150)	(0.116)	(0.236)
GRI	1.656***	-1.656***	0.456***	-0.708***	-1.404***
	(0.128)	(0.128)	(0.103)	(0.053)	(0.097)
Global Compact	0.319	-0.319	0.403*	-0.307***	-0.416**
	(0.253)	(0.253)	(0.215)	(0.097)	(0.186)
Firm Size $_{t-1}$	0.102**	-0.102**	0.052	-0.086***	-0.069*
	(0.047)	(0.047)	(0.039)	(0.022)	(0.040)
Revenue Growth	-0.172	0.172	0.048	0.118*	0.005
	(0.147)	(0.147)	(0.117)	(0.064)	(0.123)
PE Ratio	-0.001	0.001	-0.001	0.000*	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA $_{t-1}$	-0.009	0.009	0.129	-0.165	0.045
	(0.560)	(0.560)	(0.364)	(0.203)	(0.345)
League of Conservation Voters	0.330	-0.330	0.082	-0.182	-0.229
	(0.215)	(0.215)	(0.186)	(0.077)	(0.141)
Sierra Club Memberships	0.009	-0.009	-0.025	0.005	0.011
	(0.054)	(0.054)	(0.044)	(0.020)	(0.038)
State Gov't Expenditure on Natural Resources (log)	0.010	-0.010	0.002	0.001	-0.014
	(0.045)	(0.045)	(0.037)	(0.017)	(0.032)
Constant	21.211***	78.789***	34.903***	15.133***	28.753***
	(0.769)	(0.769)	(0.616)	(0.292)	(0.572)
Observations	5,862	5,862	5,862	5,862	5,862
R-squared	0.986	0.986	0.990	0.583	0.544

All models include year and SASB industry fixed effects and robust standard errors are clustered at the firm level.
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Figure 1: Alternative Types of Environmental Disclosures as a Function of Poor Environmental Performance

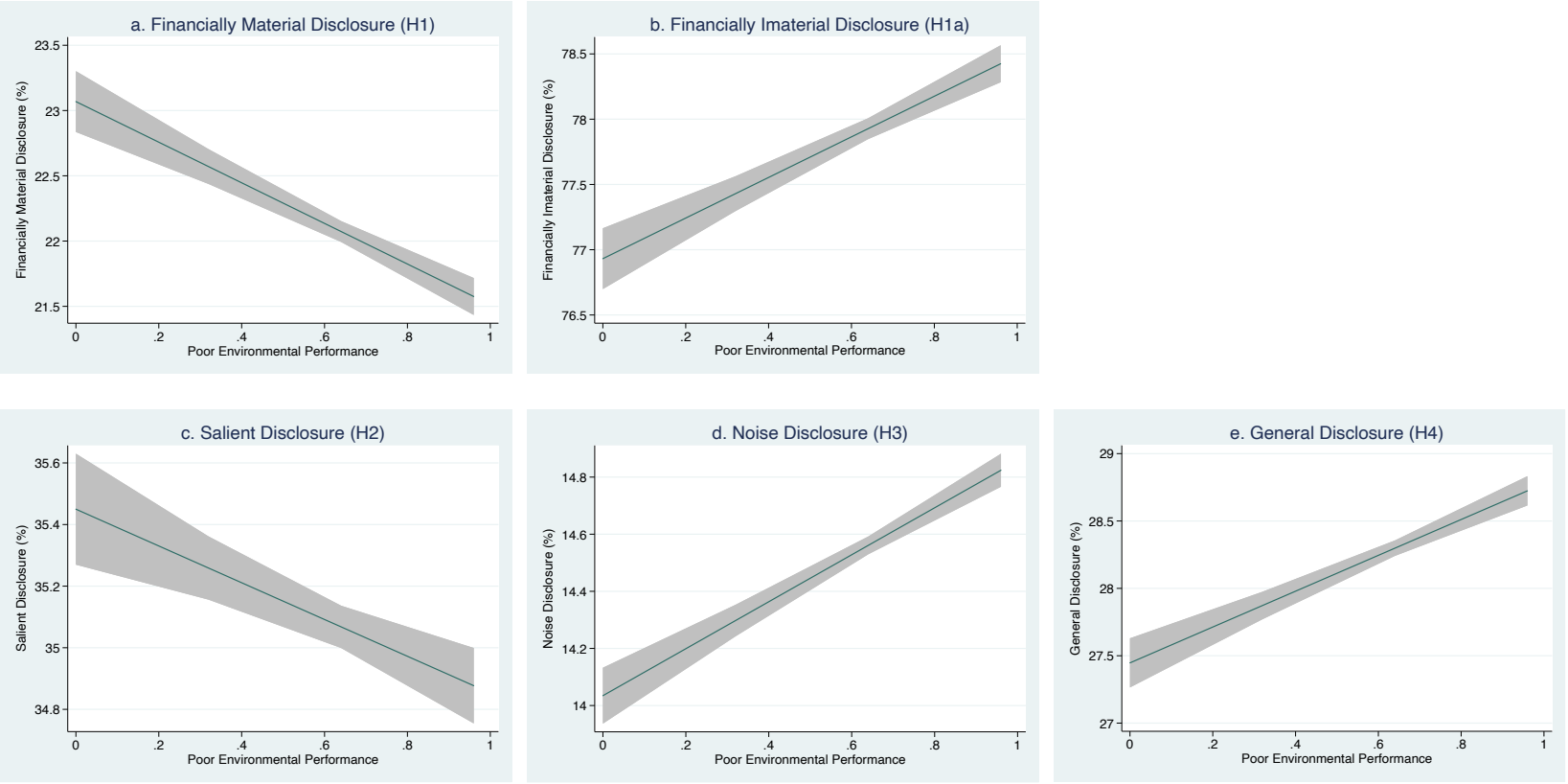


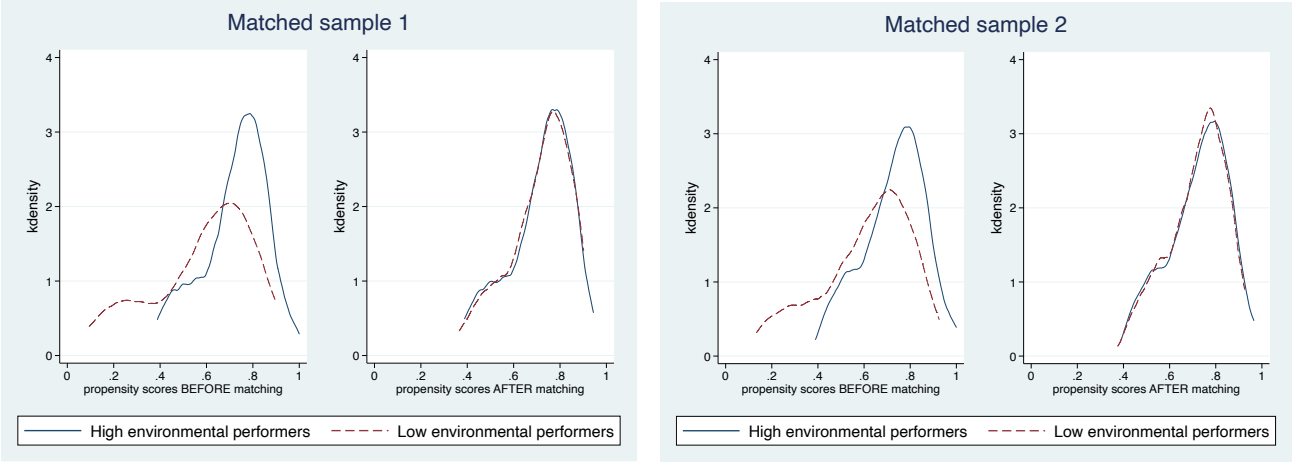
Table 3. Robustness Checks: Using Matched Samples[1]

Panel A: Propensity Score Matching

Variables	(1) Financially Material (H1)	(2) Financially Immaterial (H1a)	(3)	(4) Financially Immaterial	(5)
			Salient (H2)	Noise (H3)	General (H4)
Matched Sample 1: using Firm size, ROA, and *ESI*					
Poor Environmental Performance $_{t-1}$	-1.477***	1.477***	-0.736***	0.893***	1.320***
	(0.266)	(0.266)	(0.224)	(0.104)	(0.192)
Constant	19.300***	80.700***	37.367***	14.708***	28.625***
	(1.459)	(1.459)	(1.205)	(0.512)	(0.928)
Observations	2,621	2,621	2,621	2,621	2,621
R-Squared	0.983	0.983	0.988	0.571	0.531
Matched Sample 2: using Firm size, ROA, ESI, GRI, Global Compact, PE ratio, and *External Stakeholder Pressures*					
Poor Environmental Performance $_{t-1}$	-1.261***	1.261***	-0.800***	0.837***	1.225***
	(0.279)	(0.279)	(0.254)	(0.115)	(0.200)
Constant	18.646***	81.354***	38.352***	14.719***	28.283***
	(1.665)	(1.665)	(1.392)	(0.619)	(1.078)
Observations	2,118	2,118	2,118	2,118	2,118
R-Squared	0.984	0.984	0.987	0.552	0.536

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

[1] We first match high environmental performers and low environmental performers in our sample to obtain a more comparable set (described in more detail on pp.22-23) and then replicate the same regressions presented in Table 2 with the same controls and fixed effects and the error terms clustered at the firm level.



Panel B: Coarsened Exact Matching (CEM)

Variables	(1) Financially Material (H1)	(2) Financially Immaterial (H1a)	(3)	(4) Financially Immaterial	(5)
			Salient (H2)	Noise (H3)	General (H4)
Matched sample 1: using Firm size, ROA, and *ESI*					
Poor Environmental Performance $_{t-1}$	-1.280***	1.280***	-0.699***	0.810***	1.169***
	(0.204)	(0.204)	(0.163)	(0.091)	(0.169)
Constant	20.023***	79.977***	35.228***	15.233***	29.516***
	(1.136)	(1.136)	(0.901)	(0.408)	(0.852)
Observations	3,382	3,382	3,382	3,382	3,382
R-Squared	0.986	0.986	0.990	0.594	0.547
Matched sample 2: using Firm size, ROA, ESI, GRI, Global Compact, PE ratio, and *External Stakeholder Pressures*					
Poor Environmental Performance $_{t-1}$	-1.550***	1.550***	-0.481*	0.803***	1.228***
	(0.310)	(0.310)	(0.288)	(0.143)	(0.222)
Constant	20.444***	79.556***	35.327***	14.839***	29.389***
	(1.413)	(1.413)	(1.727)	(0.651)	(1.360)
Observations	1,423	1,423	1,423	1,423	1,423
R-Squared	0.983	0.983	0.987	0.595	0.584

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

T-Tests between the Low Environmental Performers Group and the High Environmental Performer Group in the CEM Sample

Variables	*Matched Sample 1*				*Matched Sample 2*			
	Treated Group Mean	*Control Group* Mean	*t-stats*	*p-value*	*Treated Group* Mean	*Control Group* Mean	*t-stats*	*p-value*
ESI	0.09	0.11	0.69	0.49	0.03	0.04	0.11	0.92
Firm size	8.77	8.23	0.36	0.72	8.98	8.80	-0.65	0.52
PE ratio	31.48	25.27	-1.63	0.10	19.19	17.01	-1.19	0.24
ROA	0.04	0.04	0.41	0.68	0.05	0.05	0.07	0.95
League of Conservation Voters	0.53	0.52	-0.41	0.68	0.57	0.54	-0.40	0.69
Sierra Club Memberships	10.06	9.95	-1.11	0.27	10.30	10.20	-0.63	0.53
State Gov't Expenditure on Natural Resources	3.38	3.28	-1.45	0.15	3.23	3.09	-0.86	0.39
GRI[1]	0.00	0.01	1.50	0.14	0	0	.	.
Global Compact[1]	0.00	0.00	0.08	0.94	0	0	.	.

[1] The *t-stats* and *p-value* for *GRI* and *Global Compact* are missing in Matched Sample2 because the limited number of GRI adopters and Global Compact adopters are dropped during the matching process, which is described in more detail on pp. 22-23.

Table 4. Robustness Checks: Additional Controls for Corporate Governance

Variables	(1) Financially Material (H1)	(2) Financially Immaterial (H1a)	(3)	(4) Financially Immaterial	(5)
			Salient (H2)	Noise (H3)	General (H4)
Corporate Governance Performance					
Poor Environmental Performance$_{t-1}$	-1.454***	1.454***	-0.576***	0.791***	1.239***
	(0.178)	(0.178)	(0.147)	(0.076)	(0.142)
Corporate Governance Scores	0.005***	-0.005***	0.001	-0.002*	-0.004***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Observations	5,862	5,862	5,862	5,862	5,862
R-squared	0.986	0.986	0.990	0.584	0.545
Analyst Coverage[1]					
Poor Environmental Performance$_{t-1}$	-1.628***	1.628***	-0.593***	0.840***	1.381***
	(0.180)	(0.180)	(0.146)	(0.076)	(0.141)
Number of Analysts	0.002	-0.002	-0.002	0.002	-0.001
	(0.004)	(0.004)	(0.003)	(0.002)	(0.003)
Observations	5,692	5,692	5,692	5,692	5,692
R-squared	0.986	0.986	0.990	0.585	0.544
Institutional Ownership					
Poor Environmental Performance$_{t-1}$	-1.676***	1.676***	-0.571***	0.851***	1.395***
	(0.188)	(0.188)	(0.154)	(0.078)	(0.145)
Institutional Ownership	-0.055	0.055	0.139	0.007	-0.091
	(0.212)	(0.212)	(0.180)	(0.104)	(0.164)
Observations	5,221	5,221	5,221	5,221	5,221
R-squared	0.986	0.986	0.990	0.578	0.547
Audit Quality					
Poor Environmental Performance$_{t-1}$	-1.555***	1.555***	-0.597***	0.823***	1.330***
	(0.179)	(0.179)	(0.143)	(0.075)	(0.141)
Big 4 Auditor	-0.082	0.082	0.127	-0.030	-0.015
	(0.108)	(0.108)	(0.131)	(0.098)	(0.115)
Observations	5,862	5,862	5,862	5,862	5,862
R-squared	0.986	0.986	0.990	0.584	0.544
Control variables	Yes	Yes	Yes	Yes	Yes

All models include year and SASB industry fixed effects and robust standard errors are clustered at the firm level.
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

[1] The results are similar if we use the log value of the number of analysts instead.

Table 5. Robustness Checks: Ease of Access to Firm Disclosures

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Financially Material (H1)		Financially Immaterial (H1a)		Financially Immaterial					
					Salient (H2)		Noise (H3)		General (H4)	
Poor Environmental	-0.015***	-0.015***	0.015***	0.015***	-0.006***	-0.003*	0.008***	0.007***	0.013***	0.010***
$Performance_{t-1}$	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
XBRL Usage[1]	0.135	0.211	-0.135	-0.211	-0.061	0.184	0.039	-0.028	-0.113	-0.368***
	(0.158)	(0.201)	(0.158)	(0.201)	(0.165)	(0.206)	(0.054)	(0.072)	(0.107)	(0.140)
Poor Environmental		-0.001		0.001		-0.004**		0.001		0.005***
$Performance_{t-1}$ * XBRL		(0.002)		(0.002)		(0.002)		(0.001)		(0.002)
Constant	21.279***	21.217***	78.721***	78.783***	34.887***	34.689***	15.127***	15.181***	28.708***	28.913***
	(0.829)	(0.842)	(0.829)	(0.842)	(0.644)	(0.654)	(0.302)	(0.304)	(0.602)	(0.608)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,862	5,862	5,862	5,862	5,862	5,862	5,862	5,862	5,862	5,862
R-squared	0.986	0.986	0.986	0.986	0.990	0.990	0.584	0.584	0.544	0.545

All models include year and SASB industry fixed effects and robust standard errors are clustered at the firm level.
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
[1]XBRL Usage is a dummy that equals one if a firm uses XBRL, and 0 otherwise. XBRL makes firm disclosures to the SEC such as annual and quarterly filings standardized, tagged, and machine-readable, thereby lowering the searching and processing cost of disclosed information (described in more detail on p.24).

Appendix 1. KLD Environmental Score as an Alternative Independent Variable (in lieu of Thomas Reuters' Environmental Scores)[1]

Variables	(1) Financially Material (H1)	(2) Financially Immaterial (H1a)	(3)	(4) Financially immaterial	(5)
			Salient (H2)	Noise (H3)	General (H4)
Poor Environmental Performance (KLD Environmental Concerns Minus Environmental Strengths) $_{t-1}$	-0.122***	0.122***	-0.087**	0.062***	0.147***
	(0.047)	(0.047)	(0.035)	(0.018)	(0.032)
Constant	19.155***	80.845***	33.426***	16.470***	30.949***
	(0.824)	(0.824)	(0.609)	(0.296)	(0.584)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	4,629	4,629	4,629	4,629	4,629
R-squared	0.986	0.986	0.990	0.551	0.517

All models include year and SASB industry fixed effects and robust standard errors are clustered at the firm level.
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
[1] This table shows the results using KLD environmental concerns minus environmental strengths as an alternative measure of *Poor Environmental Performance* (described in more detail on p. 16-17).

Appendix 2. Reverse Causality Test on the Alternative Types of Environmental Disclosure and Poor Environmental Performance[1]

Variables	(1) Financially Material (H1)	(2) Financially Immaterial (H1a)	(3)	(4) Financially immaterial	(5)
			Salient (H2)	Noise (H3)	General (H4)
Financially Material$_{t-1}$	0.858***				
	(0.010)				
Financially Immaterial$_{t-1}$		0.858***			
		(0.010)			
Salient Disclosure$_{t-1}$			0.824***		
			(0.015)		
Noise Disclosure$_{t-1}$				0.843***	
				(0.012)	
General Disclosure$_{t-1}$					0.860***
					(0.009)
Poor Environmental Performance$_{t-1}$	-0.385***	0.385***	-0.096***	0.169***	0.302***
	(0.062)	(0.062)	(0.045)	(0.027)	(0.048)
Constant	2.669	11.509	5.960	2.607	4.322
	(0.316)	(0.819)	(0.510)	(0.208)	(0.314)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	5,664	5,664	5,664	5,664	5,664
R-squared	0.995	0.995	0.996	0.849	0.838

All models include year and SASB industry fixed effects and adjust standard errors using Bootstrap. *** p<0.01, ** p<0.05, * p<0.1
[1] This table shows the results addressing reverse causality concerns by replicating the models in Table 2 while additionally controlling for the one-year lagged dependent variable (described in more detail on pp. 18-19).

Appendix 3. The distribution of SASB industries in our sample and the number of the Thomas Reuters' raw environmental variables categorized as *Financially Material* and *Financially Immaterial and Environmentally Salient* (*Salient*) in each SASB industry[1]

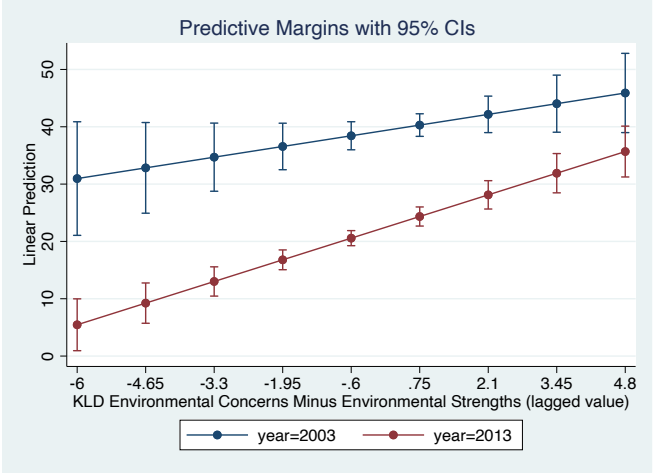
SASB industry	Freq.	# financially material	# financially immaterial (Salient)	SASB industry	Freq.	# financially material	# financially immaterial (Salient)
Aerospace & Defense	147	57	57	Household & Personal Products	117	14	100
Agricultural Products	30	72	42	Industrial Machinery & Goods	328	35	79
Air Freight & Logistics	69	27	87	Internet Media & Services	60	35	79
Airlines	34	10	104	Iron & Steel Producers	60	100	14
Alcoholic Beverages	26	50	64	Leisure Facilities	36	35	79
Auto Parts	49	57	57	Marine Transportation	15	41	73
Automobiles	37	21	93	Meat, Poultry & Dairy	33	75	39
Biotechnology	90	31	83	Medical Equipment & Supplies	299	55	59
Building Products & Furnishings	95	35	79	Metals & Mining	49	114	0
Cable & Satellite	28	34	80	Multiline and Specialty Retailers & Distributors	458	35	79
Casinos & Gaming	35	35	79	Non-Alcoholic Beverages	35	61	53
Chemicals	272	100	14	Oil & Gas - Exploration & Production	244	85	29
Coal Operations	10	83	31	Oil & Gas - Midstream	46	55	59
Construction Materials	55	114	0	Oil & Gas - Refining & Marketing	35	64	50
Containers & Packaging	126	100	14	Oil & Gas - Services	139	83	31
Cruise Lines	28	41	73	Pharmaceuticals	63	55	59
Drug Retailers & Convenience Stores	33	35	79	Processed Foods	129	50	64
E-commerce	26	35	79	Pulp & Paper Products	11	78	36
Electric Utilities	352	64	50	Rail Transportation	46	27	87
Electrical & Electronic Equipment	176	57	57	Real Estate Owners, Developers & Investment Trusts	465	50	64
Electronic Manufacturing Services & Original Design Manufacturing	21	36	78	Restaurants	101	72	42
Engineering & Construction Services	52	13	101	Road Transportation	19	27	87
Food Retailers & Distributors	52	68	46	Semiconductors	255	83	31
Forestry & Logging	18	13	101	Software & IT Services	522	35	79
Health Care Delivery	113	57	57	Solar Energy	13	86	28
Health Care Distributors	50	10	104	Telecommunications	82	35	79
Home Builders	70	13	101	Waste Management	34	49	65
Hotels & Lodging	56	64	50	Water Utilities	18	50	64
				Total	5,862		

[1] 114 out of 176 Thomas Reuters environmental variables are classified as material or immaterial but salient issues (more details on pp. 14-15). The other 61 environmental variables are classified as either *Financially Immaterial and Environmentally Non-Salient Disclosure (Noise)* or *Financially Immaterial with Unclear Links to Environmental Outcomes (General)*. The number of the environmental variables under *Noise* and *General* disclosure is 20 and 41, respectively.

Appendix 4. Firm Disclosures of Negative relative to Positive Environmental Information[1] (in lieu of Financial Materiality/ Immateriality)

	Disclosure of Negative minus Positive Environmental Information		
Variables	(1)	(2)	(3)
Poor Environmental Performance (KLD Environmental Concerns Minus Environmental Strengths) $_{t-1}$	2.448***	2.369***	-282.188
	(0.394)	(0.375)	(173.030)
Time Trend		-1.664***	-1.701***
		(0.147)	(0.146)
Poor Environmental Performance (KLD Environmental Concerns Minus Environmental Strengths) $_{t-1}$ * Time Trend			0.142
			(0.086)
Constant	119.263***	3,448.526***	3,522.336***
	(7.983)	(296.661)	(295.341)
Controls	Yes	Yes	Yes
Observations	4,366	4,366	4,366
R-squared	0.746	0.741	0.742

All models include year and SASB industry fixed effects and robust standard errors are clustered at the firm level.
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
[1] The dependent variable is calculated as negative minus positive environmental information as disclosed by firms based on the Thomson Reuters' Environmental variables (more detail on pp. 24-25). The independent variable is the lagged value of the KLD environmental concerns minus strengths.



Note: This graph is based on the regression results of Model (3) in Appendix 4 (more details are provided on pp. 25).