

SHAREHOLDER ACTIVISM AND FIRMS' VOLUNTARY DISCLOSURE OF CLIMATE CHANGE RISKS

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August 2019

ABSTRACT

This paper examines whether—in absence of mandated disclosure requirements—shareholder activism can elicit greater disclosure of firms' exposure to climate change risks. We find that environmental shareholder activism increases the voluntary disclosure of climate change risks, especially if initiated by investors who are more powerful (institutional investors) or whose request has more legitimacy (long-term institutional investors). We also find that companies that voluntarily disclose climate change risks following environmental shareholder activism achieve a higher valuation, suggesting that investors value companies' transparency with respect to climate change risks.

Keywords: shareholder activism; climate risk; disclosure; corporate transparency; corporate governance; climate change.

* All authors contributed equally. We thank Ruth Aguilera, Frank Dobbin, Kira Fabrizio, Alfonso Gambardella, Olga Hawn, Jiao Luo, Mary-Hunter McDonnell, Aldo Musacchio, Yinuo Tang, as well as seminar participants at Bocconi University, Boston University, Chinese University of Hong Kong, George Washington University, Harvard University, KAIST, Korea University, Seoul National University, the 2019 Alliance for Research on Corporate Sustainability Conference (UNC), the 2019 Micro Meets Macro Conference (ASU), and the 2019 Sustainable Finance Forum (Shenzhen) for helpful comments. We are grateful to Melissa Ouellet for excellent research assistance.

INTRODUCTION

Managers increasingly face shareholder pressure to disclose and manage their climate change risks. For example, in May 2017, the shareholders of ExxonMobil voted for a comprehensive assessment of the risks related to climate change (*New York Times*, 2017). Similarly, shareholders of Occidental Petroleum Corporation, PPL Corp, and many other companies have demanded greater disclosure of those firms' exposure to climate change risks (*Wall Street Journal*, 2018a). More generally, companies faced a record high number of climate-related shareholder proposals at their 2019 shareholder meetings (*Wall Street Journal*, 2019). This increase in shareholder pressure is not only reflected in the exploding number of shareholder proposals submitted, but also in the increase in shareholder support and their approval rates (Flammer, 2015; *Wall Street Journal*, 2018a).

One reason behind this surge in climate-related shareholder activism is the growing recognition of increased costs and risks associated with climate change (*New York Times*, 2018). Many of the world's companies—from Silicon Valley tech firms to European financial institutions—are increasingly bracing for the direct and indirect impacts of climate change on their bottom lines, as extreme weather conditions represent major risks that can hurt the firms' operations and supply chains (CDP, 2016; *New York Times*, 2019).¹ Given the global reach of

¹ For example, flooding and fiercer storms recently disrupted U.S. drug maker Eli Lilly's manufacturing facilities in Puerto Rico after Hurricane Maria in 2017. Similarly, the Japanese manufacturer Hitachi Ltd. reports that increased rainfall and flooding in Southeast Asia has the potential to disrupt its supply chain. Banco Santander Brasil, a large Brazilian bank, anticipates that increasingly severe droughts in the region might hurt the ability of borrowers to repay loans. Pacific Gas and Electric (PG&E), California's largest electric utility, faces increased wildfire risk, partly driven by global warming. In fact, the company was held liable (facing at least \$30 billion in fire liabilities) for the 2018 disastrous California wildfire after its power lines sparked what became California's deadliest wildfire to date, and filed for bankruptcy protection in early 2019 (*Forbes*, 2019). Google's parent company, Alphabet Inc., expects that rising temperatures could increase the cost of cooling its energy-intensive data centers. All these examples feature direct impacts of climate change. On top of such direct impacts, climate change may also hurt companies *indirectly*. For example, a significant financial risk energy companies face pertains to so-called "stranded assets"—coal, oil, and gas reserves that companies list as part of their assets, but might in fact be worthless, since those reserves may never be drilled and instead be left stranded by stricter regulations to curb climate change (e.g., *Financial Times*, 2015; *Fortune*, 2015). Such assets include buildings in high-risk flood zones, power plants that may need to shut down, etc.

climate change, firms across industries and regions are exposed to climate change risks, regardless of their own emission levels.

The second reason behind climate-related shareholder activism is the fact that, in many countries (including the U.S.), the disclosure of non-financial information is not mandated by law. For example, the U.S. Securities and Exchange Commission (SEC) currently merely recommends that companies disclose their climate change risks, but does not mandate such disclosure nor does it offer any guidance in terms of what information should be provided.² As a result, companies often provide limited (if any) pertinent information.³

For the above reasons, it is not surprising that investors incorporate the climate risk exposure of their portfolio companies in their investment decision-making process, and are increasingly vested in companies' disclosure of climate risks and their risk management efforts (Ceres, 2018; *Financial Times*, 2017, 2018; Krueger, Sautner, and Starks, 2019; *New York Times*, 2017; *Wall Street Journal*, 2018a, 2019).^{4,5} In fact, a recent survey of 439 institutional investors

(*New York Times*, 2019).

² While the SEC requested public feedback in 2016 about potentially changing climate-related risks required for disclosure in SEC filings, action on this front has stalled since President Donald Trump's election that year. The discussion around mandatory disclosure of climate change risks has since regained traction with several democratic Presidential candidates in 2019 putting forward proposals on how to address climate change (*Politico*, 2019).

³ As Ho (2018) highlights, federal securities law requires public companies to disclose in their annual reports "material risk factors, material impacts of risk events, and known future trends or uncertainties that are reasonably likely to affect the companies' financial performance" (p. 411). Hence, in principle, companies should already disclose non-financial information that is material to investors. Yet, as she further notes, "given these disclosure rules do not specifically address nonfinancial risk and because some issuers do not believe this information to be material to investors under any circumstances, investors increasingly are dissatisfied with the limited nonfinancial information companies currently provide in their financial reports" (p. 411).

⁴ This increase in investors' interest in the disclosure of climate risk information—and ESG information more generally—is also reflected in the rapid increase in the number of signatories of the United Nations' Principles for Responsible Investment (PRI) network. Launched in 2016, this network has grown to approximately 2,250 signatories and \$80 trillion in assets under management in November 2018. Similarly, the Coalition for Environmentally Responsible Economies (Ceres) reports that concerns about environmental and social risks increasingly influence investors' decision-making—in 2016, responsible investment accounted for 26 percent, or \$22.89 trillion, of all professionally managed assets globally—and investors pay close attention to corporate disclosure informing them about companies' climate risk exposure and strategies to address these risks (Ceres, 2018).

⁵ For example, the *Wall Street Journal* (2018a) discusses the case of ExxonMobil: "Most notable was Exxon's 2017 annual meeting, when more than 60 per cent of shareholders, including BlackRock, revolted and voted against the board. Exxon has subsequently improved its disclosure of information around climate change. [...]"

paints a striking picture: the majority believe that climate risk reporting is *as important as* financial reporting, and one-third believe that climate risk reporting is *even more important* (Krueger et al., 2019).

Despite the growing importance of climate change risks, little is known about companies' exposure to climate change risks, their disclosure of such risks, and what strategic actions they take to manage and mitigate these risks. Instead, the focus of scholarly attention has been on the participation in voluntary initiatives (e.g., the Climate Leaders Program) as well as the disclosure of greenhouse gas emissions (e.g., Fisher-Vanden and Thorburn, 2011; Jira and Toffel, 2013; Kim and Lyon, 2011a, 2011b; Krueger, 2015; Lewis, Walls, Dowell, 2014; Lyon and Maxwell, 2011; Matisoff, 2013; Reid and Toffel, 2009). Yet, a firm's carbon footprint and participation in climate-related initiatives are very different from a firm's exposure to climate change risks. The latter is about the threat of damage, injury, liability, loss, or any other negative impact on the company that is caused by a future climate-related event. In particular, climate change risks include physical risks (e.g., flooding, fierce storms, drought, extreme temperatures), regulatory risks arising from current and expected governmental policies related to climate change (e.g., energy efficiency standards, carbon trading schemes), and other climate-related risks (e.g., reputation, changing consumer behavior, increasing humanitarian demands, etc.).⁶ Importantly, firms across industries face exposure to climate change risks, *regardless* of their own emission levels.⁷

This study advances the extant literature by focusing on firms' exposure to climate change risks. Specifically, we examine whether in absence of public governance, private governance—in the form of shareholder activism—can elicit greater disclosure of firms' exposure to climate

⁶ See CDP (2016) for a detailed characterization of climate change risks.

⁷ A case in point is the insurance industry that faces tremendous exposure to climate change risks despite low emission levels (see, e.g., *Wall Street Journal*, 2018b).

change risks along with information on how they are managing those risks (henceforth “climate risk information”). We further explore the heterogeneity among shareholders, characterizing which type of shareholders are particularly effective in eliciting such disclosure. Finally, we examine the valuation implications to assess whether investors value the disclosure of climate risk information.

To guide our theoretical predictions, we extend the salience framework for secondary stakeholders (e.g., Eesley and Lenox, 2006; Mitchell, Agle, and Wood, 1997) to the context of *primary* stakeholders (i.e., shareholders). Specifically, we argue that shareholders’ salience increases with their power and with the legitimacy of their request. Accordingly, we hypothesize that companies are more likely to respond to shareholders’ demands for the disclosure of climate risk information if the shareholder is powerful and the request has legitimacy.

To test these arguments empirically, we merge a novel, proprietary dataset from CDP (formerly, the Carbon Disclosure Project) on the disclosure of climate risk information with the Institutional Shareholder Services (ISS) database that compiles information on shareholder activism. We find that environmental shareholder activism (measured by the number of environment-related proposals submitted by the firm’s shareholders) induces managers to voluntarily disclose climate risk information. Consistent with our arguments, we find that environmental shareholder activism is particularly effective if it is initiated by shareholders who have more power (institutional shareholders) or by shareholders whose request has more legitimacy (long-term institutional shareholders). We also show that companies that voluntarily disclose climate risk information following environmental shareholder activism achieve a higher valuation post disclosure, suggesting that investors value the voluntary disclosure of the firm’s exposure to climate risks and how they are managing these risks. Overall, our findings highlight

shareholders' ability to elicit greater disclosure of climate risk information, and further indicate that such disclosure is valuable to investors.

One issue we considered in our analysis is the potential endogeneity of environmental shareholder activism with respect to climate risk disclosure. Specifically, because environmental shareholder activism is not randomly assigned to companies, such activism might be correlated with unobservables that also affect climate risk disclosure. To address this potential concern, we exploit the fact that shareholder activism often comes in “waves”: a given shareholder adopts an agenda and submits the same proposal to all firms in her portfolio. In such cases, the active shareholder targets a wide set of firms (regardless of their characteristics)—that is, the targeting itself is plausibly exogenous with respect to any specific firm characteristics. Our results continue to hold when using such “waves” as instrument, suggesting that they are unlikely to be driven by endogeneity.

THEORY

Voluntary disclosure of climate risks—a governance issue

Companies can benefit from disclosing climate risk information. For example, transparency can foster trust, allowing companies to strengthen their (long-term) relationship with investors and stakeholders. But the disclosure of climate risk information also has potential downsides. In particular, climate change risks may reflect vulnerabilities that companies would prefer not to reveal to investors, competitors, customers, and other stakeholders. Furthermore, the reactions of these stakeholders might exacerbate the firm's overall climate risk exposure. For example, investors might use this information to inform their investment decisions and rebalance their portfolio, reallocating funds away from the disclosing company to other companies with more

favorable risk-return profiles. Company managers therefore have incentives to not disclose such information unless they feel compelled to do so.

We expect that this reluctance to disclose is further accentuated by the temporal separation between the potential short-term costs and long-term benefits of disclosing climate risk information. Specifically, a large literature in psychology and economics suggests that individuals are “hyperbolic discounters,” that is, they have an excessive preference for the present, preferring short-term rewards over long-term rewards even if the latter are substantially higher (e.g., Ainslie 1975; Frederick, Loewenstein, and O’Donoghue, 2002; Loewenstein and Prelec, 1992; O’Donoghue and Rabin, 1999; Thaler and Shefrin, 1981). This preference for short-term results is reinforced for executives as they face short-term pressures, such as career concerns (e.g., Gibbons and Murphy, 1992) and pressures to meet or beat analysts’ quarterly earnings expectations (e.g., DeGeorge, Patel, and Zeckhauser, 1999). As a result, managers tend to favor investments that pay off in the short run at the expense of long-term investments (e.g., Graham, Harvey, and Rajgopal, 2005; Holmstrom, 1999; Stein, 1988, 1989). It follows that shareholders face a “time-based agency conflict” (Flammer and Bansal, 2017)—that is, managers have an excessive preference for the present, and hence need not act in shareholders’ (long-term) best interest. This time-based agency conflict implies that managers will likely put more weight on the potential short-term costs of climate risk disclosure, as opposed to the potential long-term benefits of managing and mitigating climate risks.

A second implication of this time-based agency conflict is that managers may focus their attention on salient stakeholders that have short-term financial performance implications (e.g., customers and employees) at the expense of less salient stakeholders (e.g., the natural environment and communities) who may be financially material to the company’s operations in the long run

but not necessarily in the short run (Eesley and Lenox, 2006; Flammer et al., 2019; Mitchell et al., 1997). Accordingly, as managers devote less attention to the natural environment (or more broadly the less salient stakeholders), they may simply not be aware of the risks climate change poses to their business.

Taken together, the above arguments suggest that, in absence of public governance, managers may prefer to not disclose their company's exposure to climate change risks. In the following, we explore circumstances under which private governance—through the pressure from different types of shareholders—might be effective in inducing companies to disclose their risks associated with climate change.

Shareholder activism and the voluntary disclosure of climate risk information

To mitigate the gap between what investors demand and what companies provide, investors can exert pressure through shareholder activism demanding managerial actions such as the re-assessment of organizational practices and the disclosure of information. Indeed, extant studies show that investors often engage in shareholder activism pressuring managers to disclose and address social and environmental issues, and this pressure has increased over the years (e.g., Flammer, 2015).

A priori, it is far from obvious whether shareholders can trigger myopic managers to voluntarily disclose climate risk information since most shareholder proposals receive little support at annual meetings.⁸ In other words, the majority of shareholders tend to vote against shareholder-sponsored resolutions. Accordingly, one might reasonably expect management to pay little, if any, attention to the demands of the few shareholders sponsoring and supporting the

⁸ This is a common feature of shareholder proposals. For example, Flammer (2015) finds that the average vote outcome for SRI (socially responsible investing) proposals is 13.5% (p. 2553). Similarly, Cuñat, Giné, and Guadalupe (2012) find that the average shareholder vote on governance proposal is 36.2% (p. 1949).

proposals, and instead maintain their practice of not disclosing the firm's exposure to climate change risks or how the firm is managing them. On the other hand, it could also be that—despite the low support at annual meetings—environmental shareholder activism triggers companies to disclose climate risk information. In the following, we discuss two potential reasons: environmental shareholder activism might i) trigger a re-evaluation of the company's disclosure practice, and ii) increase management's awareness of the firm's exposure to climate risks.

First, despite the low support that shareholder proposals garner, extant studies indicate that shareholder activism—pertaining to a wide range of subject matters (e.g., executive compensation, antitakeover provisions, social and environmental practices)—can nevertheless be impactful and lead management to re-evaluate and adjust their business practices in line with the aims of the shareholder proposals (e.g., Cuñat, Giné, and Guadalupe, 2012; Flammer, 2015; Flammer and Bansal, 2017; McDonnell, King, and Soule, 2015; Vasi and King, 2012).⁹ As such, environmental shareholder activism may lead managers to reconsider their company's climate risk disclosure practices and become more transparent.

Second, environmental shareholder activism might increase managers' awareness of the firm's exposure to climate risks. Specifically, environmental shareholder activism may induce managers to pay more attention to the natural environment—a stakeholder that myopic managers might neglect otherwise (Flammer et al., 2019)—making them more aware of the firm's vulnerability to climate change risks. In turn, this could induce managers to conduct an assessment of the firm's exposure to climate change risks, consider how to manage those risks, and disclose information about these risks and management efforts in mitigating them.

⁹ Relatedly, other environmental activist campaigns (such as boycotts, protests, and private politics) are found to improve firms' environmental practices (Lenox and Eesley, 2009) and elicit greater corporate transparency (Reid and Toffel, 2009).

Taken together, the above arguments suggest that companies are more likely to disclose their climate risk information in the face of shareholder pressure. This motivates the following baseline hypothesis:

Hypothesis 1. Environmental shareholder activism increases companies' voluntary disclosure of climate change risk information.

In the following, we refine our arguments and explore how the effectiveness of shareholder activism to induce the disclosure of climate change risk information depends on the active shareholders' power and the legitimacy of their request.

Heterogeneity in shareholders demands for climate risk disclosure

Extending Eesley and Lenox (2006) and Mitchell et al.'s (1997) salience framework for secondary stakeholders to the context of *primary* stakeholders (i.e., shareholders), we argue that the salience of active shareholders increases with i) their power and ii) the legitimacy of their request. That is, we expect that companies are more likely to respond to shareholders' demands for climate risk disclosure if the shareholder is more “powerful” and the request has more legitimacy.¹⁰

Shareholder power

In contrast to individual investors, institutional investors—which include a large variety of investors (e.g., public pension funds, mutual funds, hedge funds, etc.)—tend to hold large stakes in their portfolio companies. As such, they are particularly vulnerable to climate-related risks. Accordingly, institutional investors have a strong interest in monitoring their portfolio companies, identifying potential governance issues, and raising these issues to the management's attention requesting them to take proper actions (Bethel and Liebeskind, 1993; Ilhan et al., 2019; Krueger

¹⁰ In addition to “power” and “legitimacy,” the third component of Eesley and Lenox (2006) and Mitchell et al.'s (1997) salience framework is “urgency.” This element is held constant in our context as we only consider one type of shareholder activism—namely, shareholder activism pertaining to the environment.

et al., 2019; Shleifer and Vishny, 1986). This active monitoring and engagement with their portfolio companies allows institutional investors to play an important and leading role in the governance of these companies (Gillan and Starks, 2000). In contrast, other (non-institutional) shareholders have less incentive (and capacity) to monitor and actively engage with the management as they are smaller in size, are more likely to be resource constrained, and can free-ride on the monitoring and costly engagement of institutional investors (Grossman and Hart, 1980; Shleifer and Vishny, 1986). Moreover, even if they do actively engage with the management, they are likely less able to coordinate with other shareholders and garner broad support for their shareholder proposals (see, e.g., Gillan and Starks, 2000).

Shareholder activism initiated by institutional investors tends to receive more support among shareholders (e.g., Flammer, 2015; Gillan and Starks, 2000). Moreover, institutional investors tend to be more successful than other investors in actively engaging with management (Dimson, Karakas, and Li, 2015). This suggests that institutional investors benefit from greater power than other investors, and hence are likely to be more salient to the companies in which they invest.

The salience of institutional investors is likely reinforced by the potential downside of not addressing their demands. In particular, failing to disclose relevant information may lead institutional investors to sell their shares and rebalance their portfolios toward companies that are willing to disclose climate risk information.

In sum, we expect that environmental shareholder activism initiated by institutional investors is more likely to be salient, and ultimately induce managers to assess and report on the firm's climate risk information. This motivates the following hypothesis:

Hypothesis 2. Management is more likely to voluntarily disclose climate change risk information if the environmental shareholder activism is initiated by institutional investors.

Legitimacy of the shareholder's request

Climate change is an especially complex issue and—despite extensive scientific evidence—it has been disputed by climate change deniers and other vocal critics.¹¹ Given the complex and contested nature of climate change, we expect that management is more likely to consider a request to be desirable, proper, and appropriate—and hence more legitimate (Suchman, 1995)—if it is brought forward by shareholders whose interests are aligned with the long-term value of the firm. As we discuss below, long-term institutional investors are likely to be such shareholders.

Long-term institutional investors hold stocks for a longer period of time and are less transaction-oriented than “transient investors” (such as hedge funds) whose holdings tend to be driven by short-term speculation (Bushee, 1998, 2001). Accordingly, long-term institutional investors are less likely to withdraw their funds in the short run upon the announcement of negative information (Starks, Venkat, and Zhu, 2017). Instead, they have a vested interest in improving the firms’ business practices and are more inclined to actively engage with their portfolio companies in order to improve corporate governance and the long-term value of the firm (Krueger et al., 2019). As such, long-term institutional investors—as opposed to short-term (i.e., transient) institutional investors—who demand the disclosure of climate change risk information are more likely to help their portfolio companies manage and mitigate their climate risk exposure going forward. This also implies that management is less likely to face an “exit” (i.e., a divestment) of these investors in case the voluntarily disclosed information on climate risks sheds a negative light

¹¹ See, e.g., the scientific controversy as to whether East Antarctica is gaining or losing mass, summarized in *Scientific American* (2017).

on the company.

In sum, we posit that the requests of long-term institutional investors are more likely to be perceived as legitimate on a long-term issue such as climate change. As such, they are likely more effective in eliciting the voluntary disclosure of climate change risk information. This leads to the following hypothesis:

Hypothesis 3. Management is more likely to voluntarily disclose climate change risk information if the environmental shareholder activism is initiated by long-term institutional investors.

Implications for valuation

A direct implication of the previous arguments is that shareholder activism is effective in motivating companies to disclose climate risk information. In this regard, it serves as an important tool in improving the firm's transparency, thereby mitigating information asymmetries between investors and the firm. Greater transparency about a firm's climate risk information may, in turn, translate into higher valuation. Indeed, the argument that greater transparency brings about higher valuation has a long tradition in the accounting literature (for a survey, see Healy and Palepu, 2001). The rationale is intuitive—investors dislike uncertainty and are willing to pay a premium for less opaque companies. In this vein, greater transparency with respect to climate change risks is likely valuable to investors, as it resolves uncertainty with regard to a potentially important source of risks.¹²

Investors gain insights not only on the firm's assessment of its exposure to climate change risks but also—and perhaps more importantly—on the actual steps it is taking to manage and mitigate its exposure going forward. For example, firms may report that they are diversifying their

¹² This argument is in line with the findings of Ioannou and Serafeim (2019) and Krueger (2015), who document higher valuations following the mandatory disclosure of non-financial information.

supplier base across geographic regions to minimize potential disruptions in case of flooding and fierce storms. Or they may be shifting their product mix towards energy-efficient products to appeal to shifting consumer preferences, improve their reputation, and meet current or expected governmental climate policies. As these examples illustrate, the management and mitigation of climate risks is likely valuable to investors.

Furthermore, by disclosing their climate risk information, firms allow their investors to engage with them in a more informed fashion. This is likely valuable to investors as well. Indeed, the survey of Krueger et al. (2019) suggests that investors prefer to actively engage with their portfolio companies to manage and minimize climate risks, as opposed to divesting from firms with high risk exposure.

In sum, we expect companies to achieve a higher valuation following the (shareholder-induced) disclosure of climate risk information. This leads to our final hypothesis:

Hypothesis 4. Firms that voluntarily disclose climate change risk information following environmental shareholder activism achieve a higher valuation.

DATA

Data sources

Climate change risk disclosure

The data on climate change risk disclosure are obtained from CDP (formerly Carbon Disclosure Project), a non-profit organization based in London, UK. Each year, CDP asks large public companies to disclose information about the risks and opportunities posed by climate change, the strategies they pursue to address them, and the extent of their greenhouse gas emissions. In 2017, 63% of the S&P 500 companies responded to this request by disclosing at least some portion of the requested information. By participating in this process, companies are able to voluntarily

disclose information to investors in a structured fashion. We obtained annual CDP data for the years 2010-2016, the time frame during which CDP's survey consistently asked about climate risk information. We focus on S&P 500 companies because this is the sole overlap between the coverage of CDP and Institutional Shareholder Services (ISS), described next.

Shareholder activism

The data on shareholder activism are obtained from the Institutional Shareholder Services (ISS) database. ISS compiles information about shareholder proposals that were submitted to S&P 1,500 companies from 1997 onward. The database distinguishes between shareholder proposals on governance topics and socially responsible investing (SRI) topics. For each proposal, the ISS database provides a description of the proposal, the date of the annual meeting, the proposal's sponsor, the voting requirement, and several other proposal attributes.

In our baseline analysis, we restrict the sample to firms that are targeted by SRI proposals during the sample period. For each firm, we include the years within 2010-2016 that range from its earliest SRI proposal through its most recent one. This approach ensures that the firms in our sample face a credible risk of being the target of SRI-related shareholder activism.¹³ Our baseline sample consists of 1,110 firm-year observations pertaining to 265 U.S. public firms.

Definition of variables

Dependent variable

In the CDP questionnaire (question CC5.1), companies can disclose information pertaining to three types of climate change risks: 1) regulatory risks, 2) physical risks, and 3) other risks. For each

¹³ Our results are not sensitive to this criterion. In robustness checks, we obtain similar results when we use the broader sample of firms that are targeted by either governance or SRI proposals. In principle, we could further expand the sample by including firms that are never targeted by shareholder proposals. Yet, such firms are unlikely to provide an appropriate comparison group—for those firms, the notion “shareholder activism” is not well defined as they do not have active shareholders in the first place.

type of climate risk they disclose, companies are asked to: describe the risk and its potential impact; characterize its timeframe, likelihood, and magnitude of impact; estimate its financial implications before taking mitigating actions; and describe how the risk is being managed and the costs associated with those actions. *Regulatory risks* arise from current and expected (local, national, or global) governmental policy related to climate change. Such risks include, among others, the imposition of emissions limits, energy efficiency standards, and carbon trading schemes. *Physical risks* are those arising from dramatic extreme weather events or subtle changes in weather patterns. *Other risks* include, among others, reputation, changing consumer behavior, induced changes in human and cultural environments, fluctuating socio-economic conditions, and increasing humanitarian demands. (For more information on these three types of risks, see CDP, 2016.)

Our main dependent variable, *disclosure of climate change risks*, counts how many of these three climate change risks the company discloses (i.e., it ranges from 0 to 3). In auxiliary analysis, we examine each disclosure category separately by using three indicator variables for the disclosure of regulatory, physical, and other climate change risks, respectively.

Independent variable

To measure environmental shareholder activism—and hence shareholder pressure to disclose and address environmental issues—we count the number of environment-related proposals submitted by the company’s shareholders in a given year (*environmental shareholder activism*). Specifically, we take all shareholder proposals in ISS for which the field “resolution type” is SRI (socially responsible investment). We then read the description of each proposal within this set to determine which ones are related to the environment. In our baseline sample, 26% of the 1,110 firm-year observations have at least one environment-related shareholder proposal. Among those, the number of environment-related proposals ranges from 1 to 5.

It is important to note that most of the proposals are defeated in shareholder meetings. This is a common feature of shareholder-sponsored (as opposed to management-sponsored) proposals (see Cuñat et al., 2012; Flammer, 2015). Nevertheless, shareholders often submit proposals not so much because they expect the proposals to pass, but rather to bring important issues to the attention of the management (Loss and Seligman, 2004). As such, the very act of submitting an environment-related proposal is intended to pressure management to disclose and address environmental issues.

Controls

All control variables are constructed from Compustat, which we merge to the ISS-CDP dataset by firm-year. *Size* is the natural logarithm of the book value of total assets. *Return on assets* (ROA) is the ratio of operating income before depreciation to the book value of total assets. *Market-to-book* is the ratio of the market value of common stock to the book value of common stock. *Leverage* is the ratio of debt (long-term debt plus debt in current liabilities) to the book value of total assets. *Cash holdings* is the ratio of cash and short-term investments to the book value of total assets. To mitigate the impact of outliers, all ratios are winsorized at their 5th and 95th percentiles.

Summary statistics

Table 1 reports descriptive statistics and correlations. We note the positive correlation between *environmental shareholder activism* and *disclosure of climate change risks*, which is suggestive of Hypothesis 1 (the correlation is 10%, with a *p*-value of 0.002).

-----Insert Table 1 about here-----

In Appendix Table A1, we report summary statistics of these two variables by industry (partitioned according to the ten SIC divisions). This reveals that the *disclosure of climate change risks* tends to be greatest in mining, manufacturing, and utilities—all industries for which the

natural environment is financially material to the firm's operations (based on the materiality scores of the Sustainability Accounting Standards Board (SASB)).^{14,15} A similar pattern is found for *environmental shareholder activism*, with the interesting nuance that retail trade is also subject to a high degree of environmental shareholder activism (which is likely reflective of consumers' sensitivity to environmental issues). Finally, Appendix Table A2 reports summary statistics of these two variables by year, which indicates that both the disclosure of climate change risks and environmental shareholder activism have become more prevalent over the years.

METHODOLOGY

Baseline regression

To examine whether environmental shareholder activism induces firms to voluntarily disclose climate change risks, we estimate the following regression:

$$\begin{aligned} & \text{disclosure of climate change risks}_{it} \\ &= \alpha_i + \alpha_t + \beta \times \text{environmental shareholder activism}_{it-1} + \gamma' \mathbf{X}_{it-1} + \varepsilon_{it}, \end{aligned} \quad (1)$$

where i indexes firms; t indexes years; α_i are firm fixed effects; and α_t are year fixed effects. All the right-hand side variables are lagged by one year. \mathbf{X} is the vector of control variables, which includes *size*, *ROA*, *market-to-book*, *leverage*, and *cash holdings*. ε is the error term. The regression is estimated by Ordinary Least Squares (OLS). To account for dependence across firms within the same industry, we cluster standard errors at the industry level (using SIC divisions to partition industries). The coefficient of interest is β , which captures the change in the voluntary disclosure of climate change risks following environmental shareholder activism.

¹⁴ For a description of the SASB data, see Khan, Serafeim, and Yoon (2016).

¹⁵ Construction also displays a high disclosure of climate change risks, but represents only a small fraction of the overall sample.

The inclusion of control variables mitigates the possibility that our findings are driven by omitted variables. For example, it could be that larger companies are more likely to voluntarily disclose climate change risks (e.g., due to more intense public scrutiny) and more likely to be targeted by environmental shareholder activism. Controlling for size addresses this potential confound. Similarly, the other controls account for differences in performance (*ROA* and *market-to-book*) and financing policies (*leverage* and *cash holdings*) that may correlate with both the decision to disclose climate change risks and environmental shareholder activism. The inclusion of firm fixed effects accounts for unobserved heterogeneity at the firm level. The inclusion of year fixed effects accounts for any time trend that could affect both the voluntary disclosure of climate change risks and environmental shareholder activism. In our main analyses, we also estimate a variant of model (1) in which we include the full set of industry by year fixed effects (i.e., $\alpha_j \times \alpha_t$, where j indexes industries), thereby allowing for industry-specific time trends.

Two-stage least squares (2SLS) regression

While the controls and fixed effects help address potential confounds, they do not fully rule out the possibility that *unobservable* time-varying firm characteristics might drive a spurious relationship between environmental shareholder activism and companies' disclosure of climate change risks. In robustness checks, we alleviate this concern by using an instrumental variable.

To construct an instrument for environmental shareholder activism, we exploit the fact that shareholder activism often comes in “waves.” That is, a particular shareholder (e.g., BlackRock, CalPERS) adopts an agenda (e.g., requesting companies to provide a climate risk report) and then submits a similar proposal to all firms in which the shareholder has non-trivial holdings (e.g., Gillian and Starks, 2007; Yermack, 2010). In such case, the active shareholder targets a wide range of firms across industries and geographies, and the motive of doing so is orthogonal to

(unobservable) characteristics of individual firms. In other words, environment-related proposals that are submitted as part of a “wave” are more likely to be exogenous with respect to any specific firm characteristics. (See also Flammer and Bansal (2017), who use a similar instrument for the submission of long-term compensation proposals.)

More precisely, the instrument that we use is an indicator variable that is equal to one if the company is targeted by a shareholder who submits the same environment-related proposal to at least five companies in the same proxy season (*environmental activism wave*).¹⁶ We then re-estimate model (1) via 2SLS, instrumenting *environmental shareholder activism* with *environmental activism wave* in the first stage.¹⁷

RESULTS

Shareholder activism and the voluntary disclosure of climate change risks

Table 2 presents our main results. In columns (1) and (2), we estimate our baseline specification in equation (1) without and with controls. As can be seen, we find that environmental shareholder activism increases the voluntary disclosure of climate change risks. Specifically, the coefficient of *environmental shareholder activism* lies between 0.101 and 0.103, and is statistically significant at conventional levels (*p*-values between 0.043 and 0.046). Since companies in our sample report an average of 2.2 climate change risks (see Table 1), the coefficients of 0.101-0.103 imply that companies increase their voluntary disclosure of climate change risks by 4.6-4.7% following the

¹⁶ In robustness checks described below, we show that our results are not sensitive to the choice of a five-company cutoff.

¹⁷ Specifically, in the first-stage specification, we regress environmental shareholder activism on the instrument:

$$\text{environmental shareholder activism}_{it} = \alpha_i + \alpha_t + b \times \text{environmental activism wave}_{it} + \mathbf{c}'\mathbf{X}_{it-1} + e_{it}. \quad (2)$$

The predicted values from this regression provide *environmental shareholder activism (instrumented)*. In the second stage, we then re-estimate equation (1) using *environmental shareholder activism (instrumented)* in lieu of *environmental shareholder activism*:

$$\begin{aligned} \text{disclosure of climate change risks}_{it} \\ = \alpha_i + \alpha_t + \beta_{2SLS} \times \text{environmental shareholder activism (instrumented)}_{it-1} + \boldsymbol{\gamma}'\mathbf{X}_{it-1} + \varepsilon_{it}. \end{aligned} \quad (3)$$

submission of an environment-related shareholder proposal. In column (3), we obtain similar results when we include the full set of industry-by-year fixed effects. Overall, the results in Table 2 are consistent with Hypothesis 1, predicting that environmental shareholder activism increases companies' voluntary disclosure of climate change risks.

-----Insert Table 2 about here-----

2SLS analysis

In Table 3, we estimate the 2SLS specification described in the methodology section, where we use *environmental activism wave* as instrument. As discussed above, if a shareholder targets companies in a wave, the targeting itself is plausibly exogenous with respect to a given individual company.

-----Insert Table 3 about here-----

We re-estimate the three specifications considered in Table 2 using 2SLS. The first-stage regressions are provided in columns (1)-(3) of Table 3. The coefficient on the instrument (*environmental activism wave*) is positive and highly significant in all three specifications. Importantly, the instrument qualifies as “strong” in statistical terms. The F -statistic of the instrument ranges from 65.1 to 101.8, which is well above the $F = 10$ threshold of Staiger and Stock (1997) and the critical values of Stock and Yogo (2005) for strong instruments. The respective second-stage regressions are provided in columns (4)-(6) of Table 3. The coefficient on *environmental shareholder activism (instrumented)* is large and significant in all three specifications, ranging from 0.337 to 0.392 (with p -values from 0.000 to 0.022). Compared to the OLS estimates, the 2SLS estimates are larger in economic terms.¹⁸ Overall, the 2SLS analysis

¹⁸ The standard errors are larger as well, which is intuitive since we rely on a subset of the variation in environmental shareholder activism—namely the variation that is triggered by the “wave” component of environmental shareholder activism—and hence have less power in the regression.

confirms that our results are unlikely to be driven by endogeneity bias.

Robustness

Table 4 provide a series of robustness checks. All these tests are variants of the specification in column (2) of Table 2 (henceforth “baseline specification”).

-----Insert Table 4 about here-----

Dynamics. In column (1) of Table 4, we examine the dynamics to rule out reverse causality concerns. Specifically, we augment our baseline specification in equation (1) by including leads and lags of *environmental shareholder activism* (in addition to the $t-1$ term used in the baseline specification). As is shown, only the $t-1$ term is large and statistically significant, while the other terms are small and statistically insignificant. This confirms that environmental shareholder activism leads to subsequent increases in the voluntary disclosure of climate change risks (not the other way around), and that it takes about a year after the shareholder activism occurs for the higher disclosure to materialize.¹⁹

External validity. In our baseline analysis, the sample is restricted to firms that are targeted by SRI proposals during the sample period. This criterion ensures that the comparison firms (i.e., the “control” group) faces similar exposure to SRI-related shareholder activism. In column (2) of Table 4, we relax this criterion, extending the sample to firms that are targeted by *any* type of shareholder proposals during the sample period. Specifically, for each firm, we now include the years within 2010-2016 that range from its earliest shareholder proposal of any type through its most recent proposal (“ISS sample”). We find that our main results continue to hold in this broader sample. As such, our findings are generalizable to the broader set of companies with active

¹⁹ If, for some reason, the disclosure of climate risks were to induce more environmental shareholder activism (either contemporaneously or with a lag), the coefficient of *environmental activism wave_{it}* and *environmental activism wave_{it+1}*, respectively, would be significant.

shareholders.

Functional form. In our regressions, the dependent variable—*disclosure of climate change risks*—is a count variable (ranging from 0 to 3). In column (3) of Table 4, we re-estimate our baseline specification using a Poisson regression (in lieu of OLS). The results are very similar to our baseline OLS results: the 0.043 coefficient value is comparable to the 4.6% magnitude of our OLS estimate, and the effect remains highly statistically significant (p -value = 0.004).

Alternative definition of environmental activism waves. In our main 2SLS approach, we coded “waves” based on a 5-company threshold (that is, to qualify as a wave, the submitting shareholder needs to target at least 5 companies with the same proposal in the same proxy season). The threshold level seeks to balance two considerations. On one hand, the threshold needs to be sufficiently high such that the notion of “wave” is meaningful. On the other hand, too high a threshold reduces the number of waves and hence the power of the instrument. In columns (4) and (5) of Table 4, we re-estimate our 2SLS regression using a 4- and 6-company threshold, respectively, and find that the results are robust to these alternative thresholds.

Types of voluntary climate change risk disclosure

We further explore whether our results vary depending on what types of climate risks are disclosed. To do so, we re-estimate our baseline specification, splitting the dependent variable into three dummy variables that indicate the disclosure of climate risk information pertaining to i) regulatory risks, ii) physical risks, and iii) other risks.

The results, reported in Table 5, indicate that the voluntary disclosure of all three types of climate risks increases in response to environmental shareholder activism. All three point estimates are similar (ranging from 0.028 to 0.039, with p -values from 0.022 to 0.098), and do not significantly differ from one another.

-----Insert Table 5 about here-----

Shareholder pressure by shareholder type

In Table 6, we examine how the effectiveness of shareholder activism to induce climate risk disclosure depends on the active shareholders' power as well as the legitimacy of their request. To do so, we refine our baseline analysis by decomposing *environmental shareholder activism*—that is, the submission of environment-related shareholder proposals—by shareholder type.

-----Insert Table 6 about here-----

Institutional versus non-institutional shareholders. In column (1) of Table 6, we distinguish between environment-related shareholder proposals that are submitted by institutional versus non-institutional shareholders. To empirically distinguish between the two, we use the field “sponsor type” in the ISS database. Sponsor type “individual” is coded as non-institutional, while all other sponsor types are coded as institutional. The latter comprises a broad range of institutional owners, including pension funds, SRI funds, and hedge funds. The coefficient of *environmental shareholder activism* is large and statistically significant for institutional shareholders, while it is small and statistically insignificant for non-institutional shareholders. This lends support to Hypothesis 2, predicting that institutional owners are more effective in inducing the voluntary disclosure of climate risk information.²⁰

Long-term versus short-term institutional shareholders. In column (2) of Table 6, we further distinguish between institutional shareholders that have a long- versus short-term orientation. We code institutional shareholders as short-term if they are classified as “transient” in

²⁰ We caveat that the difference between the two coefficients is not significant at conventional levels. As we are relying on subsets of the data, we may not have sufficient power to identify cross-sectional differences, even if they are present.

Bushee’s (1998, 2001) database.²¹ The other institutional shareholders are coded as long-term. We find that the coefficient of *environmental shareholder activism* is large and statistically significant for long-term institutional owners, but small and insignificant for short-term institutional owners. This is consistent with Hypothesis 3, suggesting that long-term institutional owners are more effective in inducing the voluntary disclosure of climate risk information.

Valuation implications

Finally, we examine whether companies achieve higher valuation following their (shareholder-induced) disclosure of climate risk information. To conduct this analysis, we regress *market-to-book*_{it} (that is, the market valuation of the firm’s equity per dollar of book value) on a dummy variable equal to one for companies that disclose climate change risks after being targeted by environmental shareholder activism (*disclosure of climate change risks induced by environmental shareholder activism*_{it-1}), as well as controls, firm fixed effects, and year fixed effects.²² For robustness, we also present a variant of this regression that includes industry-by-year fixed effects, thereby accounting for industry trends in market valuation.

The results, presented in Table 7, indicate that firms that voluntarily disclose climate change risks following environmental shareholder activism do achieve a higher valuation. Since the average market-to-book is 3.30 (Table 1), the coefficients of 0.158-0.162 implies that valuation increases by 4.8-4.9%.²³ These estimates are significant at conventional levels (*p*-value between 0.025). This finding lends support to Hypothesis 4—companies achieve a higher valuation post

²¹ Bushee (2001) defines “transient” institutional owners as those who are “characterized as having high portfolio turnover and highly diversified portfolio holdings. These traits reflect the fact that transient institutions tend to be short-term-focused investors whose interest in the firm’s stock is based on the likelihood of short-term trading profits” (p. 214).

²² This regression mirrors our baseline specification in equation (1).

²³ The magnitude is in the ballpark of the valuation gains that have been documented for the mandatory disclosure of sustainability-related information (e.g., Ioannou and Serafeim, 2019; Krueger, 2015). In particular, Ioannou and Serafeim (2019) find that a one-standard deviation in the degree of mandatory ESG disclosure increases firm value by about 10%.

disclosure, as investors value the (voluntary) disclosure of climate change risks.

-----Insert Table 7 about here-----

DISCUSSION AND CONCLUSION

Can shareholder activism successfully induce management to voluntarily disclose the firm's exposure to climate change risks and efforts to manage those risks? In this study, we shed light on this question and explore what type of shareholders are more effective in improving the voluntary disclosure of climate risk information. Moreover, we examine the valuation implications of such voluntary disclosure.

To guide our theoretical arguments, we extend the salience framework for secondary stakeholders (e.g., Eesley and Lenox, 2006; Mitchell et al., 1997) to the context of *primary* stakeholders (i.e., shareholders). Specifically, we argue that the salience of active shareholders increases with i) their power and ii) the legitimacy of their request—that is, we expect that firms are more likely to respond to shareholders' demands for the disclosure of climate risk information if the shareholder is powerful and the request has legitimacy.

The results of this study are supportive of these arguments. We find that environmental shareholder activism induces managers to voluntarily disclose climate change risks. Moreover, environmental shareholder activism is particularly effective if it is initiated by institutional investors (that is, investors who have more “power”), and even more so if it is initiated by long-term institutional investors (that is, investors whose request has more “legitimacy”). Finally, we find that companies that voluntarily disclose climate risk information following environmental shareholder activism achieve a higher valuation post disclosure, consistent with the notion that shareholders value the voluntary disclosure of climate risk information. Overall, our findings

indicate that active shareholders can elicit greater climate risk disclosure, thereby improving the governance of their portfolio companies.

This study contributes to several strands of the literature. First, by showing that shareholder activism can elicit greater corporate transparency with respect to climate risks, and that companies achieve higher valuation following this (shareholder-induced) increase in transparency, this study contributes to the literature on shareholder engagement (e.g., Aguilera et al., 2019; Dimson et al., 2015; Ferraro and Beunza, 2018; Gillan and Starks, 2000; Krueger et al., 2019). In particular, our study complements prior work on the value implications of *mandatory* disclosure of non-financial information (e.g., Ioannou and Serafeim, 2019; Krueger, 2015). Our paper adds to this line of work by showing that—independent of (the lack of) government regulation—shareholder activism demanding the *voluntary* disclosure of *climate change risk information* has positive value implications, consistent with the notion that investors value the voluntary disclosure of the firm’s exposure to and management of climate change risks.

Second, we add to the literature on voluntary disclosure of non-financial information. While the extant literature mainly examines the question of *whether* a firm discloses environmental information (such as GHG emissions) or participates in voluntary environmental initiatives (e.g., Jira and Toffel, 2013; Kim and Lyon, 2011a; Lewis, Walls, Dowell, 2014; Lyon and Maxwell, 2011; Reid and Toffel, 2009), our data allows us to go deeper: we explore *how much* and *what type* of environmental information—and more specifically what type of *climate risk information*—is disclosed.

More broadly, the disclosure of climate risk information has received surprisingly little attention in the academic literature.²⁴ Yet, it is a key concern for investors (e.g., *Financial Times*,

²⁴ A firm’s exposure to climate change risks is very different from a firm’s environmental footprint. Firms across industries—whether emission-intensive or not—are exposed to climate change risks. As previously mentioned,

2018; Krueger et al., 2019). For example, in the aforementioned survey by Krueger et al. (2019), the majority of investors responded that climate risk reporting is as important as financial reporting, and about one-third reported that climate risk reporting is even more important. Accordingly—while this paper provides a first step in this direction—more research is needed to shed light on the determinants and implications of the (voluntary) disclosure of climate risks. Making ground on these questions is both a promising and important avenue for future research.

Third, this study adds to the strategy and management literature by taking a finer-grained view at shareholders and their influence on corporate behavior. Specifically, the existing literature that studies how shareholders help shape corporate behavior—e.g., Chen and Feldman (2019), David, Hitt, and Gimeno (2001), Lenox and Eesley (2009), Reid and Toffel (2009)—typically i) considers shareholders as one homogenous group (instead of distinguishing between different types of shareholders, or ii) only considers one specific subset of shareholders (such as hedge funds). Yet, there are considerable differences among shareholders (e.g., in terms of their time horizons, preferences, and objectives), and these differences are likely to have important implications for their interactions with their companies. In this study, we account for the heterogeneity among shareholder types and examine how these differences influence corporate behavior (in the specific context of shareholders' ability to elicit greater corporate transparency). As such, our findings add to the small but burgeoning literature (e.g., Connelly et al., 2019; Hoskisson et al., 2002; Tihanyi et al., 2003) that highlights the importance of distinguishing between different types of shareholders in strategy and management research.

climate change risks are about the threat of damage, injury, liability, loss, or any other negative impact on the company that is caused by a future climate-related event. They include physical risks, regulatory risks, and other climate-related risks.

Lastly, our findings have important implications for practice as they highlight the ability of investors to elicit greater corporate transparency with respect to firms' climate change risks—even in absence of mandatory disclosure requirements—and hereby contribute to their portfolio companies' governance. In absence of mandatory disclosure requirements imposed by the government, this greater ability also implies a greater responsibility of investors (particularly of long-term institutional investors) to be *active* owners and engage with the management to elicit the disclosure of climate risks.

On this note, we caution that, while our results indicate that private governance (in the form of shareholder activism) is effective in eliciting the disclosure of climate change risks, it is unlikely to substitute for public governance (Ho, 2018; Light and Orts, 2015; Vandenberg, 2013). Indeed—and this is speculative—the latter might be more effective in i) improving the quantity and quality of disclosure, ii) fostering the standardization of disclosure (thereby facilitating investors' assessments of their portfolio companies), and iii) ultimately achieving progress in the fight against climate change. As such, long-term institutional investors may find it worthwhile to pursue both i) shareholder activism and ii) engage with the government to impose mandatory climate change risk disclosure. Understanding how to effectively engage with companies and governments to induce greater climate risk disclosure—and what the optimal combination of these engagements is—is fertile ground for future research.

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Table 1. Summary statistics

	N	Mean	Std. dev.	Min	Max	1	2	3	4	5	6	7	8	9
1 Disclosure of climate change risks	1,110	2.206	1.161	0.000	3.000									
2 Disclosure of regulatory climate change risks	1,110	0.761	0.427	0.000	1.000	0.87								
3 Disclosure of physical climate change risks	1,110	0.760	0.427	0.000	1.000	0.88	0.65							
4 Disclosure of other climate change risks	1,110	0.685	0.465	0.000	1.000	0.89	0.65	0.69						
5 Environmental shareholder activism	1,110	0.341	0.682	0.000	5.000	0.10	0.09	0.05	0.11					
6 Size	1,110	10.502	1.332	7.577	14.761	0.02	-0.02	0.05	0.03	0.14				
7 ROA	1,110	0.139	0.071	0.018	0.302	-0.03	-0.02	-0.07	0.00	0.05	-0.47			
8 Market-to-book	1,110	3.297	2.519	0.706	9.971	-0.11	-0.10	-0.12	-0.07	-0.01	-0.33	0.60		
9 Leverage	1,110	0.256	0.140	0.002	0.579	0.16	0.18	0.09	0.14	0.00	-0.04	-0.07	0.14	
10 Cash holdings	1,110	0.121	0.110	0.006	0.415	-0.05	-0.09	-0.03	-0.02	-0.14	-0.02	0.20	0.15	-0.31

Table 2.
Environmental shareholder activism and the voluntary disclosure of climate change risks

Dependent variable:	Disclosure of climate change risks _{<i>t</i>}		
	(1)	(2)	(3)
Environmental shareholder activism _{<i>t-1</i>}	0.103 (0.045)	0.101 (0.043)	0.078 (0.040)
Size _{<i>t-1</i>}		-0.206 (0.280)	-0.316 (0.265)
ROA _{<i>t-1</i>}		0.471 (1.616)	-0.457 (1.770)
Market-to-book _{<i>t-1</i>}		0.024 (0.021)	0.018 (0.026)
Leverage _{<i>t-1</i>}		0.989 (0.551)	0.838 (0.569)
Cash _{<i>t-1</i>}		1.443 (0.989)	1.449 (0.939)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	–
Industry × year fixed effects	No	No	Yes
R-squared	0.746	0.750	0.778
# Observations	1,110	1,110	1,110
# Firms	265	265	265

Notes. OLS estimates with standard errors (clustered at the industry level) in parentheses.

Table 3. 2SLS—wave of environmental shareholder activism

Dependent variable:	First stage			Second stage		
	Environmental shareholder activism _{<i>t</i>-1}			Disclosure of climate change risks _{<i>t</i>}		
	(1)	(2)	(3)	(4)	(5)	(6)
Environmental shareholder activism (instr.) _{<i>t</i>-1}				0.337 (0.148)	0.350 (0.126)	0.392 (0.107)
Environmental activism wave _{<i>t</i>-1}	0.911 (0.113)	0.913 (0.109)	0.937 (0.093)			
Size _{<i>t</i>-1}		-0.003 (0.083)	-0.034 (0.085)		-0.196 (0.227)	-0.295 (0.221)
ROA _{<i>t</i>-1}		-0.234 (0.506)	-0.370 (0.390)		0.553 (1.389)	-0.355 (1.506)
Market-to-book _{<i>t</i>-1}		0.016 (0.016)	0.009 (0.013)		0.020 (0.018)	0.015 (0.024)
Leverage _{<i>t</i>-1}		-0.069 (0.545)	-0.209 (0.539)		1.020 (0.464)	0.933 (0.483)
Cash _{<i>t</i>-1}		0.249 (0.717)	-0.027 (0.762)		1.435 (0.834)	1.529 (0.814)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	—	Yes	Yes	—
Industry × year fixed effects	No	No	Yes	No	No	Yes
R-squared	0.597	0.598	0.642	0.746	0.751	0.779
# Observations	1,110	1,110	1,110	1,110	1,110	1,110
# Firms	265	265	265	265	265	265

Notes. 2SLS estimates, with standard errors (clustered at the industry level) in parentheses.

Table 4. Robustness

Dependent variable:	Disclosure of climate change risks _{<i>t</i>}				
	Dynamics	Broader ISS sample	Poisson regression	2SLS – Activism wave based on 4+ proposals	2SLS – Activism wave based on 6+ proposals
	(1)	(2)	(3)	(4)	(5)
Environmental shareholder activism _{<i>t</i>+1}	-0.002 (0.066)				
Environmental shareholder activism _{<i>t</i>}	0.060 (0.064)				
Environmental shareholder activism _{<i>t</i>-1}	0.114 (0.044)	0.064 (0.032)	0.043 (0.015)		
Environmental shareholder activism _{<i>t</i>-2}	0.050 (0.038)				
Environmental shareholder activism (instr.) _{<i>t</i>-1}				0.235 (0.053)	0.331 (0.195)
Size _{<i>t</i>-1}	-0.332 (0.306)	-0.058 (0.205)	-0.088 (0.117)	-0.201 (0.237)	-0.197 (0.226)
ROA _{<i>t</i>-1}	-0.735 (2.032)	-0.402 (1.572)	0.345 (0.621)	0.515 (1.413)	0.547 (1.372)
Market-to-book _{<i>t</i>-1}	0.033 (0.019)	0.012 (0.009)	0.012 (0.007)	0.022 (0.019)	0.021 (0.017)
Leverage _{<i>t</i>-1}	0.809 (0.534)	0.916 (0.526)	0.391 (0.216)	1.006 (0.465)	1.018 (0.467)
Cash _{<i>t</i>-1}	1.504 (0.918)	0.770 (0.917)	0.794 (0.450)	1.439 (0.841)	1.436 (0.837)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
R-squared	0.769	0.733	–	0.751	0.751
# Observations	997	1,631	1,110	1,110	1,110
# Firms	254	346	265	265	265

Notes. OLS estimates in columns (1) and (2); Poisson estimates in column (3), and 2SLS estimates in columns (4) and (5). Standard errors (clustered at the industry level) in parentheses.

Table 5. Types of voluntary climate change risk disclosure

Dependent variable:	Disclosure of regulatory climate change risks _{<i>t</i>}	Disclosure of physical climate change risks _{<i>t</i>}	Disclosure of other climate change risks _{<i>t</i>}
	(1)	(2)	(3)
Environmental shareholder activism _{<i>t-1</i>}	0.028 (0.015)	0.039 (0.014)	0.035 (0.019)
Size _{<i>t-1</i>}	-0.038 (0.102)	-0.100 (0.113)	-0.068 (0.101)
ROA _{<i>t-1</i>}	0.278 (0.541)	0.310 (0.387)	-0.117 (0.759)
Market-to-book _{<i>t-1</i>}	0.011 (0.004)	0.006 (0.008)	0.007 (0.011)
Leverage _{<i>t-1</i>}	0.452 (0.217)	0.262 (0.205)	0.275 (0.231)
Cash _{<i>t-1</i>}	0.399 (0.215)	0.447 (0.345)	0.597 (0.576)
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
R-squared	0.734	0.742	0.738
# Observations	1,110	1,110	1,110
# Firms	265	265	265

Notes. OLS estimates, with standard errors (clustered at the industry level) in parentheses.

Table 6. Environmental shareholder activism by shareholder type

Dependent variable:	Disclosure of climate change risks _{<i>t</i>}	
	(1)	(2)
Environmental shareholder activism by...		
... institutional shareholders _{<i>t-1</i>}	0.105 (0.041)	
... non-institutional shareholders _{<i>t-1</i>}	0.036 (0.102)	0.043 (0.102)
... institutional shareholders with long-term focus _{<i>t-1</i>}		0.111 (0.042)
... institutional shareholders with short-term focus _{<i>t-1</i>}		-0.050 (0.122)
Size _{<i>t-1</i>}	-0.208 (0.278)	-0.209 (0.278)
ROA _{<i>t-1</i>}	0.496 (1.630)	0.522 (1.635)
Market-to-book _{<i>t-1</i>}	0.025 (0.020)	0.025 (0.020)
Leverage _{<i>t-1</i>}	1.003 (0.552)	0.999 (0.551)
Cash _{<i>t-1</i>}	1.442 (0.990)	1.428 (0.973)
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
R-squared	0.751	0.751
# Observations	1,110	1,110
# Firms	265	265

Notes. OLS estimates, with standard errors (clustered at the industry level) in parentheses.

Table 7. Valuation implications

Dependent variable:	Market-to-book _{<i>t</i>}	
	(1)	(2)
Disclosure of climate change risks induced by environmental shareholder activism _{<i>t-1</i>}	0.158 (0.066)	0.162 (0.060)
Size _{<i>t-1</i>}	-0.635 (0.219)	-0.544 (0.331)
ROA _{<i>t-1</i>}	-0.139 (3.442)	1.001 (4.891)
Market-to-book _{<i>t-1</i>}	0.728 (0.077)	0.754 (0.086)
Leverage _{<i>t-1</i>}	1.088 (1.221)	0.609 (0.982)
Cash _{<i>t-1</i>}	1.165 (2.290)	1.310 (2.297)
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	—
Industry × year fixed effects	No	Yes
R-squared	0.888	0.898
# Observations	1,110	1,110
# Firms	265	265

Notes. OLS estimates, with standard errors (clustered at the industry level) in parentheses.

Appendix Table A1. Disclosure of climate change risks and environmental shareholder activism by industry

	N	Disclosure of climate change risks				Environmental shareholder activism			
		Mean	Std. dev.	Min	Max	Mean	Std. dev.	Min	Max
Agriculture, forestry, and fishing	7	2.143	1.464	0	3	1.000	0.816	0	2
Construction	2	3.000	0.000	3	3	0.000	0.000	0	0
Finance, insurance, and real estate	191	1.953	1.202	0	3	0.131	0.353	0	2
Manufacturing	412	2.386	1.071	0	3	0.371	0.808	0	5
Mining	72	2.417	0.818	1	3	0.611	0.848	0	4
Retail trade	116	1.828	1.334	0	3	0.534	0.665	0	2
Services	84	2.214	1.173	0	3	0.202	0.460	0	2
Utilities	197	2.335	1.120	0	3	0.299	0.586	0	3
Wholesale trade	16	1.938	1.237	0	3	0.250	0.447	0	1
Nonclassifiable	13	0.692	1.316	0	3	0.615	0.650	0	2
All	1,110	2.206	1.161	0	3	0.341	0.682	0	5

Appendix Table A2. Disclosure of climate change risks and environmental shareholder activism by year

	N	Disclosure of climate change risks				Environmental shareholder activism			
		Mean	Std. dev.	Min	Max	Mean	Std. dev.	Min	Max
2010	167	1.772	1.279	0	3	0.281	0.710	0	5
2011	174	2.063	1.245	0	3	0.305	0.658	0	4
2012	171	2.170	1.188	0	3	0.263	0.580	0	4
2013	175	2.274	1.121	0	3	0.314	0.685	0	5
2014	165	2.333	1.073	0	3	0.418	0.716	0	4
2015	145	2.421	1.018	0	3	0.434	0.725	0	4
2016	113	2.558	0.944	0	3	0.416	0.691	0	2
All	1,110	2.206	1.161	0	3	0.341	0.682	0	5