Climate Boards: Do Natural Disaster Experiences Make Directors More Prosocial?

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Abstract:

We show that the accumulation of past experiences can shape prosocial preferences of corporate directors, who in turn influence corporate climate policies. Firms significantly reduce their scope 1 and 2 greenhouse gas emission intensities when they have more Directors with Abnormal Disaster Experience (DADEs) on their boards. Firms are also significantly more likely to assign climate policy responsibilities to the board, set explicit emission targets or reduction initiatives, or provide climate-related incentives to management when they have more DADEs on their boards. These results are driven by DADEs who wield influence on firm policy: e.g., directors on governance, audit, or ESG committees, or male directors. However, DADEs on compensation, finance, or risk committees do not have such effects on firm emissions. Importantly, accumulated disaster experiences over directors' careers are far more important than more recent experiences. Director experiences are meaningful primarily for abnormally devastating natural disasters, and among emission-intensive firms or larger firms. Finally, the results are not driven by recent trends in attention to climate change. Overall, the results are more consistent with past accumulated experiences affecting prosocial preferences of directors rather than informing their beliefs about climate risks, and these preferences entering the corporate boardroom.

Keywords: Board of Directors, Climate, Corporate Climate Policy, Experience, Greenhouse Gas Emissions, Preferences, Prosocial Behavior
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1. Introduction

What are the drivers of prosocial preferences among individuals, and how do they influence corporate outcomes (see Navarro, 1988; Bénabou and Tirole, 2006; 2010)? Do managers implement sustainable corporate policies in pursuit of firm *value* or their personal *values* (see Starks, 2023)? Past experiences are powerful, long-lasting determinants of individual beliefs and preferences, which often affect leadership decisions, corporate culture, and asset prices (see Malmendier and Wachter, 2024). For example, early-life macroeconomic experiences heavily influence the financial decisions of households and CEOs (see Malmendier and Nagel, 2011; 2016; Malmendier, Tate, and Yan, 2011). Similarly, the accumulation of past experiences can shape corporate directors' altruistic desires and sense of social responsibility, motivating them to steer the firms they govern to conduct their operations responsibly. Understanding these drivers not only helps explain individual prosocial behavior but also sheds light on how firms navigate trade-offs between profit maximization and broader societal impact.

In this paper, we study whether past experiences of abnormally devastating natural disasters by corporate directors shape their influence on corporate climate policies. This specific context suits our research objective for two operational reasons. First, natural disasters that cause immense property damage and casualties are salient events that are recorded accurately. Because these events cause much suffering within communities, they are likely to leave psychological marks on individuals who observe them up close or experience them firsthand as members of the affected community (see Dessaint and Matray, 2017; Alok, Kumar, and Wermers, 2020). Second, corporate climate policies, such as the intensity of the firm's greenhouse gas emissions or explicit board oversight and managerial incentives related to corporate climate initiatives, are readily measured and of first-order importance to stakeholders (see Krüger, Sautner, and Starks, 2020; Bolton and Kacperczyk, 2021; 2023; Pastor, Stambaugh, and Taylor, 2021; 2022).

Theoretically, experiences of natural disasters by corporate directors and corporate climate policies can be linked for several reasons. We comsider two broad hypotheses. The first hypothesis is that past disaster experiences alter the prosocial preferences of directors. For instance, by remembering the damage and suffering within their community, individuals may develop a desire to contribute to mitigating the likelihood of potential disasters in the future. To

the extent that climate change is expected to cause more extreme disasters, these individuals may exert their influence as directors to push firms to emit less greenhouse gases, primarily for societally beneficial reasons. The second, alternative hypothesis is that directors may derive information from disasters and learn about the likelihood and extent of climate risk that is relevant for the financial performance of the firm. It should be caveated that this second hypothesis is based on two assumptions: that directors who experience disasters attribute them to climate change, and that more disaster experiences unidirectionally lead to updated beliefs of greater climate risk exposure.

We begin by documenting that publicly listed U.S. firms whose boards consist of more directors with abnormal disaster experiences tend to emit less greenhouse gas emissions and are more likely to have formal climate policies in place. To show this, we first construct director experiences using data on natural disasters from the Spatial Hazard Events and Loss Database for the United States (SHELDUS). We retain climate-related disasters that caused damages exceeding $1 billion in 2022 dollars, which are mapped onto locational information of directors' past employment histories excluding boards they currently serve on, extracted from the BoardEx database. We then use the number of Directors with Abnormal Disaster Experiences (DADEs) on a company's board to explain the firm's greenhouse gas emissions as reported in S&P Trucost or other explicit climate policies disclosed in the Climate Disclosure Project (CDP). In our main regressions with granular fixed effects and controls, we find that firms with one more DADE per ten directors exhibit 3% lower scope 1 and 2 emission intensities (metric tons per dollar of sales) and are 5% more likely to have boards with ultimate authority over the firms' climate policies. These are both economically large and statistically significant associations.

Consistent with directors exerting influence on firms' climate policies, we find that these effects are primarily observed if DADEs sit on board committees or are males, but not otherwise. Furthermore, the availability of detailed descriptions of these committees in BoardEx also gives us the opportunity to tease out whether directors are likely channeling their prosocial preferences or prudently managing climate risk on behalf of shareholders. Specifically, we find that firms with more DADEs on their boards have lower emissions if DADEs serve on governance, audit, or ESG/sustainability committees, but not if they sit on compensation, finance, or risk committees. In other words, directors who have the most authority over the financial renumeration and incentivization of management, operation of the firm's financial

resources, and management of the firm's operational risk are not likely to wield their influence to affect the firm's climate policies. These results contradict the hypothesis that past disaster experiences heighten directors' perceptions of climate risk as an important source of risk for the firm, but more consistent with the hypothesis that directors weigh their past experiences and preferences against their roles in the boardroom.

Highlighting the importance of the accumulation of past experiences over time, we also show that directors affect corporate climate policies much more strongly when they have accumulated abnormal disaster experiences over a long period throughout their careers, than when they have experienced disaster shocks only in recent years. For instance, having a director who has experienced abnormal disasters over the last 20 years has twice the effect on reducing the firm's emissions than having a director who has experienced abnormal disasters only within the past 5 years. This underscores the long-lasting impact of early experiences in shaping the prosocial preferences of individuals (see Malmendier and Wachter, 2024).

We conduct several additional tests to corroborate these interpretations. We show that the results hold only with salient, abnormally devastating disasters that caused property and crop damages exceeding $1 billion, but not with smaller, less visible disasters based on alternative thresholds (e.g., $500 million, $100 million). We also document meaningful heterogeneities across firms that highlight the societally beneficial impact DADEs are aiming to achieve: Our results are chiefly observed among the heavier greenhouse gas emitters, with respect to either the median industry or firm, but not among lighter emitters; and also among larger firms rather than smaller firms. To alleviate remaining concerns that our findings might be attributed to recent shifts in attention to climate change or our understanding of its risks rather than to the effects of past experiences on prosocial preferences, we use the 2015 Paris Agreement and the ensuing formation of the Task Force on Climate-Related Financial Disclosures (TCFD) as a shock to attention to climate change. We find no evidence that the effects of DADEs on corporate emissions became stronger only after the Paris Agreement/TCFD.

Overall, our findings are most consistent with the long-lasting role of past experiences on the formation of prosocial preferences among corporate directors, and these preferences affecting decisions in the corporate boardroom. Our study contributes to a strand of literature that investigates the impact of early-life experiences on economic decisions (see Malmendier

and Nagel, 2011; 2016; Malmendier and Wachter, 2024). We complement studies on how these traits can affect managerial behavior and corporate outcomes. Malmendier et al. (2011) show that CEOs who grew up during the Great Depression are risk averse in their financing decisions. Benmelech and Frydman (2015) document that CEOs with military backgrounds are associated with more conservative and ethical corporate policies. Bernile, Bhagwat, and Rau (2017) show that the severity of early-life disaster experiences mediates the risk-taking behavior of CEOs. By broadening this line of inquiry to corporate directors, our findings provide new evidence that past experiences shape not only individual managerial behavior but also collective decision-making dynamics in the boardroom, offering a deeper understanding of how early-life experiences influence corporate governance and outcomes.

In particular, our focus on corporate climate policies brings new insights to the climate finance literature that struggles to understand the underlying motivations for ESG or sustainability oriented corporate policies. As stressed by Starks (2023), there is a lack of delineation between such corporate policies that are driven by considerations of *value* or *values*. A branch of research in this area emphasizes risk and value as important considerations for corporate responsibility (see Krüger, 2015; Lins, Servaes, and Tamayo, 2017; Albuquerque, Koskinen, and Zhang, 2019). Much of this rationale has also carried over to climate concerns and corporate greenness (see Krüger et al., 2020; Bolton and Kacperczyk, 2021; 2023; Ilhan, Sautner, and Vilkov, 2021; Hoepner, Oikonomou, Sautner, Starks, and Zhou, 2024). However, recent studies scrutinize this line of argument (see Zhang, 2024). Alternatively, several notable studies highlight the role of preferences and values in explaining the demand for responsible businesses (see Riedl and Smeets, 2017; Pastor et al., 2021; 2022; Bauer, Ruof, and Smeets, 2021; Heeb, Kölbel, Paetzold, and Zeisberger, 2023; Döttling and Kim, 2024). Our work joins this conversation and provides support for the notion that personal preferences, built on the long-lasting impact of past experiences, can affect the board's influence on the firm's climate policies.

In this context, our findings are related to a recent study by Huang, Jiang, Xuan, and Zhou (2022), who document that natural disaster "shocks" to firms affect third-party ESG scores of other firms at which their directors hold interlocking board positions by updating directors' beliefs about climate change. There are at least three distinguishing features that differentiates our study. First and foremost, our findings highlight the long-lasting role of accumulated past experiences in the formation of individual prosocial preferences, and their importance relative

to recent and immediate shocks that incrementally update beliefs. Second, our study focuses on precisely defined corporate climate policies as outcome variables, such as scope 1 and 2 emissions, emission targets, the board's climate policy authority, or managerial climate incentives, rather than relying on third party ESG scores. Third, our findings indicate that male directors are more effective at influencing the firm's policy according to their preferences, whereas Huang et al. (2022) document that females directors are quicker to update their beliefs about climate change. In short, our study makes clear and distinct contributions to the literature and complements the findings by Huang et al. (2022).

Finally, our work contributes to the literature on the importance of board experience and expertise. Several studies highlight that industry-related board expertise can be valuable, for instance, in banks or in industries with important information frictions (see Minton, Taillard, and Williamson, 2014; Dass, Kini, Nanda, Onal, and Wang, 2014). Board experience has also been shown to help firms make better acquisitions or navigate structural changes in global trade (see Field and Mkrtchyan, 2017; Chen, Chen, Kang, and Peng, 2020). Other studies consider the impact of more deep-rooted traits of directors, such as gender, race, age, and cognitive ability, to show that board diversity is valuable (see Adams and Ferreira, 2009; Bernile, Bhagwat, and Yonker, 2018). Our study departs from these studies by focusing on the role of board experience in forming directors' preferences that impact the sustainability outcomes of firms.

Understanding the drivers and interactions of individual and corporate prosocial behavior has long been an important goal for economists (see Navarro, 1988; Bénabou and Tirole, 2006; 2010). While our study provides novel insights into how directors' preferences are formed through experiences and imbued into corporate climate policies, it also underscores the importance of aligning *value* and *values* and accounting for the costs of potential conflicts between them (see Masulis and Reza, 2015, Starks 2023).

2. Data and sample overview

2.1. Data

2.1.1. Directors with Abnormal Disaster Experiences

The first step to identifying Directors with Abnormal Disaster Experiences (DADEs) is to identify abnormally devastating natural disasters. To do this, we utilize the Spatial Hazard Events and Loss Database for the United States (SHELDUS) database, which is a county-month-level hazard dataset for the U.S. that covers natural hazards such as thunderstorms, hurricanes, floods, wildfires, and tornados, covering the period from January 1960 to December 2022. The database contains information on the date of an event, affected location (county and state), and the dollar losses caused by the event (i.e., property and crop losses, injuries, and fatalities). From this database, we define and retain abnormal disasters as all climatic disasters (i.e., excluding disasters such as earthquakes or volcanic eruptions) that caused a total property and crop damage of $1 billion or more in 2022 dollars.

Our data on boards of directors come from the BoardEx North America database. We obtain data on directors' current board positions as well as past employment history. For directors' current board positions, we also utilize detailed descriptions of their board committee assignments available in the BoardEx Committee Details file and classify whether they serve on one of the following committees: governance, audit, ESG/sustainability, compensation, finance, or risk. We also collect additional information on directors' profiles, such as gender, age, educational background, and extracurricular activities outside corporate positions. We then manually clean and geocode the headquarter addresses of all firms that directors' have ever been affiliated with in the past or present, and match current and past board positions with the county-month level natural disaster data compiled from SHELDUS.

We then construct our variable of interest, DADE, at the firm-year level by counting the number of directors currently serving on the firm's board who had experienced abnormally devastating natural disasters in previous years while they were employed by different firms. In our analysis, we use the logarithm of this number, or its scaled version divided by board size, as the key explanatory variable.

2.1.2. Corporate climate policies

As our outcome variables, we focus on measures of corporate climate policies. As our main variable, we focus on the intensity of the firm's scope 1 and 2 greenhouse gas emissions (i.e., CO_2 equivalents), obtained from S&P Trucost Environmental. We use a measure of emission intensity that divides emissions by the firm's sales as a proxy for its output, to account for

differences or changes in emissions that could be attributed to the size of the firm's economic activities. We use scope 1 and 2 emissions because scope 1 emissions are produced directly from sources that are controlled or owned by the firm (e.g., emissions associated with fuel combustion in boilers, furnaces, vehicles, etc.), and because scope 2 emissions are associated with the purchase of electricity, steam, heat, or cooling. Although scope 2 emissions physically occur elsewhere, they are accounted for in a firm's emissions because they are a result of its energy use. We do not consider scope 3 emissions, which encompass emissions that are not produced by the company itself and are not the result of activities from assets owned or controlled by the firm, but by other entities up and down the firm's value chain (e.g., suppliers and customers). Scope 3 emissions are not only estimated with significant noise, but also difficult to view as being under the firm's direct control.

To complement the analysis of emissions and to provide more direct evidence on the firm's managerial intent to implement climate policies, we leverage data from the Carbon Disclosure Project (CDP). CDP is a nonprofit organization that solicits companies to disclose their climate impact by responding to an extensive suite of survey questionnaires. CDP has been expanding their coverage rapidly since their beginning in 2003, covering over 23,000 private and publicly listed companies worldwide as of 2023. We focus on publicly listed firms in the U.S. with valid ISINs reported in the CDP database and use survey responses up to 2020.

These surveys include specific questions explicitly asking firms whether they have formal climate policies in place and whether they have a chain of responsibility to implement these policies. We focus on questionnaires related to three aspects relevant for our study: (i) whether the board has the highest responsibility on the firm's climate policy, such as "*Where is the highest level of direct responsibility for climate change within your company?*" or "*Is there board-level oversight of climate-related issues within your organization?*"; (ii) whether the firm has formal emission targets or reduction initiatives in place, such as "*Did you have an emissions reduction target that was active (ongoing or reached completion) in the reporting year?*" or "*Did you have an emissions target that was active in the reporting year?*"; and (iii) whether the firm provides managerial incentives related to climate performance, such as "*Do you provide incentives for the management of climate change issues, including the attainment of targets?*". Firms respond to these questions in varying textual forms, such as "*Yes*", "*No*", "*Individual/Sub-set of the Board or other committee appointed by the Board*", "*No individual or*

committee with overall responsibility for climate change", "*Both absolute and intensity targets*", or "*No target*". We parse these responses into dummy variables taking values of 1 or 0.

In addition, to control for observable firm characteristics that might be correlated with DADE and affect corporate climate policies, we compute variables such as total assets, leverage, return on assets (ROA), and Tobin's Q based on financial data from Compustat.

2.2. Sample overview

To be included in our sample, we first retain all U.S. firm-year observations with positive assets and sales larger than $10 million. We also require firms to be covered in the Trucost Environmental emissions database. Finally, we drop firms that have less than three directors on their boards, and firms that have no directors with abnormal disaster experience. After the sample is constructed, we winsorize all unbounded continuous variables at the 1% extremes.

In Table 1, we chronologically list the top 25 abnormal natural disasters in terms of the magnitude of the dollar damages they have caused at the county-month level, experienced throughout the careers of directors included in our sample. These devastating disasters are overwhelmingly related to hurricanes and tropical storms, as well as damages from flooding corresponding to these storms. Wildfires have recently started to cause significant damages as well. The list of major events corroborates the notion that such experiences may instill in directors a desire to help prevent future abnormal disasters by mitigating the climate impact of firms they govern. It is important to note that this reasoning does not require an assumption or stance on whether these past events were attributable to climate change, but only that the reduction of emissions can help prevent extraordinary disasters in the future.

[Table 1 about here]

Table 2 characterizes our sample of firms, which consists of an unbalanced panel of 2,636 firms and 16,353 firm-years in total. As reported later, the inclusion of granular controls including industry-by-year fixed effects results in further sample shrinkage in our regressions. To start with our explanatory variable, the average firm in our sample has approximately two DADEs on its board, which makes up roughly one fifth of all its directors. Figure 1 highlights that there has been a time-trend in this statistic, namely a gradual increase in the board

representation of DADEs within the average firm (i.e., 35% increase in the number of DADEs, or a 10% greater share of the average board, over the past 20 years). This within-firm increase underscores our baseline empirical strategy that controls for firm fixed effects.

[Figure 1 about here]

We also summarize our sample firm's climate policies. The average firm emits 20 metric tons of scope 1 emissions per every dollar of its sales, or 49 metric tons of scope 1 and 2 emissions combined. Many firms that report to CDP have formal climate policies in place: 66% of firms have given boards ultimate authority over their climate policies, 75% have explicit emission targets in place, and 72% provide management incentives to achieve climate goals. On average, these are large firms with ten board members and $20 billion in assets.

Panel B of Table 2 also reports the correlations between our variables. DADE and emissions are positively correlated, a pattern that likely reflects cross-sectional differences across firms. DADE is also positively correlated with the existence of other explicit climate policies. These correlations indicate that there is room for DADEs to contribute to the carbon transition of heavy-emission firms by implementing formal climate policies. Emission intensities are modestly correlated with various firm financial attributes, underscoring the importance of controlling for these variables.

[Table 2 about here]

3. Results

3.1. Baseline

We begin our main analysis with firm-year level OLS regressions of corporate climate policies on DADEs, following the regression equation:

$$ClimatePolicy_{i,t} = \beta \cdot DADE_{i,t-1} + \lambda \cdot Controls_{i,t-1} + \alpha_i + \alpha_{j,t} + \epsilon_{i,t} \quad (1)$$

where i, j, and t each denote firm, industry, and year. The outcome variable, $ClimatePolicy_{i,t}$, is either the logarithm of the firm's scope 1 and 2 greenhouse gas emissions scaled by the firm's sales (metric tons per one dollar of sales), or one of three indicator variables for whether the

firm's board has the highest responsibility on its climate policies, whether the firm has emission targets or reduction initiatives, and whether the firm gives management climate-related incentives. The key explanatory variable, $DADE_{it-1}$, is the number of directors with abnormal disaster experience on the company's board as of year *t-1*. We either log-transform *DADE* or divide it by the total number of directors on the firm's board. As time-varying firm controls, we include firm size computed as the logarithm of total assets, leverage as total debt divided by total assets, return-on-assets (ROA), and Tobin's Q, all measured at *t-1*. To inoculate our results from the influence of time-invariant firm unobservables or time-varying industry factors, we also control for firm and industry-by-year fixed effects, where the firm's industry is defined by its historical 4-digit SIC code. The coefficient of interest is on *DADE*, which estimates the incremental effect of having more directors with past disaster experiences on the board on the firm's emissions or explicit climate policies.

Table 3 reports our baseline results based on scope 1 and 2 emission intensities as our outcome variables. The first two columns use the logarithm of DADEs as the explanatory variable, while the last two use DADEs scaled by board size. Based on either scope 1 or the sum of scope 1 and 2 emissions, the estimates indicate a negative, economically large and statistically significant effect of DADEs on the firm's emissions. To provide an economic interpretation of the first two columns, a 50% increase in the number of DADEs with respect to the mean, roughly corresponding to an increase from 2 to 3 DADEs, results in a 4% reduction in scope 1 emission intensity and a 5% reduction in scope 1 and 2 emission intensity. Alternatively, the last two columns indicate that a firm with one more DADE per ten directors on its board exhibits 2% lower scope 1 emission intensity and 3% lower scope 1 and 2 emission intensity. These are economically important effects, and all of the estimates are statistically significant at the 1% or 5% levels.

[Table 3 about here]

Table 4 reports the results based on dummy variables for whether the firm has one of three types of climate policies in place. The first two columns show that having more DADEs on the board is associated with a significantly higher probability of the board having explicit and ultimate authority over the firm's climate policy. The average firm increasing the number of DADEs by 50% from 2 to 3, or adding an additional DADE per ten directors, is associated with a

10% or 5% higher likelihood of board climate authority, respectively. Similarly, a greater number of DADEs on the board is associated with a higher probability of the firm having explicit emission targets, or the firm providing management with incentives to achieve climate goals, although these results are statistically significant only in specifications using the logarithm of DADEs as the explanatory variable. Overall, the baseline results indicate that directors' past disaster experiences positively impact the firm's climate policies.

[Table 4 about here]

3.2. Director influence

In this section, we provide evidence further cementing the role of directors' influence on the board in shaping corporate climate policies, focusing on firm's scope 1 and 2 emission intensities. Specifically, we leverage board committee membership data from BoardEx to test whether DADEs who sit on board committees have outsized effects on the firm's emissions compared to directors who do not, and whether directors on certain committees have more impact than those on other committees.

Board committees are entrusted with specific responsibilities and authorities for different aspects of the firm's governance to ensure that there is an appropriate level of board attention given to important issues. For instance, all publicly traded firms are required to have audit, governance and compensation committees. In addition, risk and finance committees, though not required, are also widespread in certain industries (see Stulz, Tompkins, Williamson, and Ye, 2022). There also has been a growing number of firms that have included an ESG or sustainability committee to increase the focus on climate, diversity, and other ESG-related issues at the board level. Even when firms do not have separate ESG/sustainability committees, they are often folded into governance committees. Since board members assigned to these committees wield greater influence on the firm than others, we use this information to examine whether more influential directors are better able to channel their experiences and preferences into the firm's climate policies. By exploiting the variety of committees and varying influence across these committees, we also attempt to disentangle whether directors' influence comes from financial considerations related to the firm's value and risk, or from their personal values imbued from past experiences.

We report our results in Table 5. In Panel A, we begin with whether DADEs sit on any of the aforementioned committees or not. We denote the number of DADEs who also currently serve on any of the firm's board committees as *DADE_Comm*, and those who do not as *DADE_Noncomm*. We then test whether each of these variables have varying incremental impact on the firm's emissions. The results show that having more DADEs who serve as committee members is distinctly associated with significantly lower emission intensity. While a higher number of non-committee DADEs is also associated lower emissions, this association is economically smaller, roughly half of that of committee DADEs, and statistically insignificant. These results highlight the role of director influence in impacting the firm's climate policies.

[Table 5 about here]

In Panel B of Table 5, we further break down *DADE_Comm* according to the specific committees these directors serve: governance, audit, ESG or sustainability, compensation, finance, and risk. The results show that having more DADEs on the board who are also members of the governance, audit and ESG committees is significantly associated with lower scope 1 and 2 emission intensity. DADEs with ESG committee memberships have an especially outsized impact on emissions, where an additional director per ten directors lowers emission intensity by 8%. In contrast, having more DADEs who serve on compensation, finance, and risk committees has only modestly negative and statistically insignificant effects on emissions. These differences can be explained by the financially oriented roles of compensation, finance, and risk committees, and their focus on prudently monitoring the firm's risk and performance. On the other hand, governance, audit, and ESG committees are more likely have stakeholder-oriented objectives, such as the transparent disclosure of climate performance to outside investors and stakeholders alike. These results have implications for how we interpret our main findings. The fact that past disaster experiences have less impact on emissions when directors' role on the board is focused on risk and financial performance supports the notion that such impacts are driven by experiences shaping personal prosocial preferences rather than informing beliefs about financially material climate risks.

In Panel C of Table 5, we also report differences in the influence of DADEs whose gender are male from those who are female. The results show that the effects of DADEs on firm emissions are entirely driven by the past disaster experiences of male directors and not by

female directors. Recent studies highlight the role of gender-diverse boards in improving the efficiency of monitoring and risk-taking (see Adams and Ferreira, 2009; Bernile, Bhagwat, and Yonker, 2018). Given these previous studies, our result that primarily male directors channel their disaster experiences to the firm's climate policies again points to a preference channel and is inconsistent with these experiences informing more prudent monitoring.

This finding stands in contrast with Huang et al. (2022), who show that recent disaster shocks at interlocking firms have a disproportionate impact on female directors rather than on male directors. This difference can be attributed to the fact that our study focuses on accumulated past disaster experiences that likely shape preferences, whereas Huang et al. (2022) study the effects of recent disaster shocks in a narrow window period that likely affect beliefs. Overall, these results help contextualize how directors leverage their influence to imbue their personal values shaped by their experiences in the corporate decision-making process.

3.3. Accumulated experience vs. recent experience

In this section, we provide more evidence highlighting the importance of the accumulation of past disaster experiences by directors over time, as opposed to recent, incremental disaster shocks. Specifically, we create three past climatic disaster experience windows (past 20 years, past 10 years, and past 5 years) and corresponding DADE variables that count the number of directors on a company's board that have experienced disasters over these window periods, denoted *DADE_Window*. We then use these measures as alternative explanatory variables in our regressions to test whether DADEs with earlier disaster experiences have outsized effects on the firm's emission intensity compared to directors with more recent disaster experiences.

Reported in Table 6, the results confirm that having more DADEs on the company's board who have greater accumulation of past disaster experience over longer window periods is associated with stronger and more significant reductions in scope 1 and 2 emissions, compared to having DADEs who have only experienced disasters recently. While the coefficients on *DADE_Window* are statistically significant for all three windows (i.e., past 20 years, past 10 years, or past 5 years), the negative point estimates are substantially larger in magnitude under longer experience windows. The results hold whether *DADE_Window* is log-transformed or computed as a fraction of board size. For instance, the coefficient on

log(DADE_Window) is twice as large based on the 20 year window compared to that based on the 5 year window (i.e., –0.115 vs. –0.05).

[Table 6 about here]

These results support the hypothesis that directors affect corporate climate policies more strongly due to their prosocial preferences formed through their accumulated disaster experiences over long periods throughout their careers, than due to updated climate beliefs from disaster shocks in recent years. Our findings underscore the long-lasting impact of early experiences in shaping the preferences of individuals (see Malmendier and Wachter, 2024).

3.4. Disaster magnitude and firm heterogeneity

In this section, we perform additional tests to corroborate our interpretations of the main results. In Table 7, we provide supporting evidence that our results are explained by the *salience* of directors' past experiences. Arguments related to the formative nature of early experiences are often made based on the salience of such events (see Malmendier and Nagel, 2011; Malmendier et al. 2011; Bernile et al. 2017). In line with these arguments, we examine whether our results vary with the magnitude of climatic disasters experienced by directors, focusing on whether even modest disaster experiences lead to similar results. Our baseline definition of abnormal climatic disasters are all climatic disasters (i.e., excluding disasters such as earthquakes or volcanic eruptions) that caused a total property and crop damage of $1 billion or more in 2022 dollars. Using the SHELDUS database, we construct three additional climatic damage magnitude groups in 2022 dollars: $1–5 billion, $0.5–1 billion, and $0.1–0.5 billion. We then compute alternate versions of DADE that count the number of directors on the company's board that had experienced past disasters belonging to these alternative damage groups, denoted as *DADE_Damage*. We then use these variables to test whether DADEs that had experienced larger, more devastating climatic disasters in the past have larger effects on the firm's emissions compared to directors with smaller, less devastating disaster experiences.

The results in Table 7 indicate that the association between DADEs and firms' emission intensities are negative and significant only when DADEs are defined as having experienced climatic disasters in the largest damage group (i.e., $1–5 billion, columns 1 and 2), but not for directors who had experienced smaller, less visible disasters based on alternative thresholds

(e.g., $500 million, $100 million). These "placebo" results not only support the hypothesis that directors' influence on corporate climate policies are driven by preferences shaped by salient past experiences, but also help mitigate concerns that disaster experiences may be correlated with confounding director attributes.

[Table 7 about here]

In Table 8, we provide additional evidence supporting our interpretation of DADEs' *prosocial preferences*. Specifically, we test whether DADEs affect their firms' emissions especially when those firms are heavy greenhouse gas emitters to begin with. Intuitively, directors with prosocial objectives would have stronger incentives to influence their firms' climate policies if these firms had heavier carbon footprints to eliminate, much like how socially responsible investors would engage brown firms (see Hoepner et al. 2024). To implement this test, we divide our sample into high- and low-emission industries (firms) each year based on the median industry (firm) in terms of its lagged scope 1 emission intensity.[1] We then estimate our baseline regressions on the high- and low-emission subsamples. In both industry and firm subsamples, the coefficients on the DADE variables are negative and statistically significant only in high-emission industries (columns 1 and 2) or firms (columns 5 and 6), but not among lighter emitters (columns 3, 4, 7, and 8). These results are consistent with DADEs influencing corporate climate policies primarily if their firms are brown and have large emissions to reduce.

[Table 8 about here]

In a similar vein, in Table 9, we examine whether the impact of DADEs on corporate climate policies varies based on firm size. If DADEs had prosocial dispositions, they would want to influence policies at larger firms to achieve greater climate impact. To test this, we divide our sample annually into large and small firms with respect to the median firm. Running our baseline specification on these subsamples, the results show that the associations between our DADE variables and emission intensity are negative and significant only for larger firms (columns 1 and 2), but not for smaller firms (columns 3 and 4). Together, the results in Tables 8 and 9 document meaningful heterogeneities across firms that highlight the societally beneficial impact DADEs are aiming to achieve.

[1] An industry's scope 1 emission intensity is defined as the emission intensity of its median firm.

[Table 9 about here]

3.5. Not driven by recent trends in attention to climate change

One concern about our analysis is that our results might be driven by recent shifts in attention to climate change or our understanding of climate change risks, rather than the effects of past climatic disaster experiences on prosocial preferences. To alleviate this concern, we use the 2015 Paris Agreement and the subsequent formation of the Task Force on Climate-Related Financial Disclosures (TCFD) as a shock to attention to climate change. We test whether the effect of DADEs on corporate emission intensity is different before and after this shock. Specifically, we create an indicator variable, *AfterParis*, that is equal to one for years 2017 or later, and zero for years 2014 or before. We exclude the years 2015 and 2016 from this analysis, as these years were when the Paris Agreement was introduced and signed. We interact *AfterParis* with our DADE measures and include the interaction term in our regressions.

Table 10 reports the results. Based on either the logarithm of DADE (column 1) or DADE scaled by board size (column 2), the interaction term is not significant. In contrast, the coefficient estimates on the DADE variables themselves remain negative, economically large, and statistically highly significant. Taken together, there is no evidence that the effects of DADEs on corporate emissions became stronger only after events that raised attention to climate change and its associated risks, such as the Paris Agreement or the formation of TCFD.

[Table 10 about here]

4. Conclusion

In this study, we provide evidence that the past experiences of corporate directors with abnormally devastating natural disasters significantly influence corporate climate policies. Firms with boards containing more Directors with Abnormal Disaster Experiences (DADEs) exhibit reduced scope 1 and 2 greenhouse gas emission intensities and are more likely to implement comprehensive climate policies, such as board oversight of climate issues, explicit emission targets, and management climate incentives.

Our findings suggest that the primary driver of these effects is the shaping of prosocial preferences through the accumulation of directors' salient past experiences over long time periods, rather than updated beliefs about climate risks following recent disaster shocks. DADEs who serve on governance, audit, or ESG committees are particularly influential, emphasizing the role of decision-making authority within firms. However, DADEs who serve on committees that focus on the management of financial risk and performance, such as compensation, finance, and risk committees, do not impact climate policies. Furthermore, the effects of DADEs are more pronounced among high-emission and large firms, underlining the potential for these directors to target impactful changes in corporate emissions. By highlighting the importance of long-term, accumulated disaster experiences over recent events, our findings underscore the enduring impact of early-life experiences on individual values and their translation into corporate governance. These insights contribute to understanding how personal values, shaped by formative experiences, interact with institutional frameworks to drive corporate sustainability initiatives.

Overall, our research advances the literature on the intersection of corporate governance, prosocial preferences, and climate policy, offering implications for boards seeking to balance shareholder value with broader societal responsibilities.

Appendix

Table A1. Variable Descriptions

This table provides definitions for key variables used throughout our analysis and their data sources.

Variable	Definition	Data Source
DADE	Number of directors currently serving on the firm's board who had experienced abnormally devastating natural disasters (defined as causing damages >$1 billion) in previous years while they were employed by different firms	BoardEx + SHELDUS
DADE_Comm	Number of DADEs who also currently serve on any or one of the following board committees: governance, audit, ESG/sustainability, compensation, finance, or risk	BoardEx + SHELDUS
DADE_NonComm	Number of DADEs who do not serve on the corresponding board committee	BoardEx + SHELDUS
DADE_Gender	Number of DADEs whose gender are male or female	BoardEx + SHELDUS
DADE_Window	Number of directors on a company's board that have experienced disasters over one of the three past experience windows: past 20 years, past 10 years, or past 5 years	BoardEx + SHELDUS
DADE_Damage	Number of directors on the company's board that had experienced past disasters belonging to one of three damage groups: $1–5 billion, $0.5–1 billion, and $0.1–0.5 billion.	BoardEx + SHELDUS
Scope 1 Emission Intensity	CO_2 emissions produced directly from sources that are controlled or owned by the firm (e.g., emissions associated with fuel combustion in boilers, furnaces, vehicles, etc.), divided by firm sales	Trucost
Scope 1+2 Emission Intensity	Scope 1 emissions, plus scope 2 emissions associated with the purchase of electricity, steam, heat, or cooling, divided by firm sales	Trucost
Board Climate Authority	Dummy variable indicating whether the board has the highest responsibility on the firm's climate policy	CDP
Emission Targets	Dummy variable indicating whether the firm has formal emission targets or reduction initiatives in place	CDP
Managerial Climate Incentives	Dummy variable indicating whether the firm provides managerial incentives related to climate performance	CDP
AfterParis	Dummy variable equal to one for years 2017 or after, and zero for years 2014 or before	
Board Size	Number of directors on the company's board	BoardEx
Assets	Total assets (at)	Compustat
Debt/Assets	Short-term (dlc) and long-term debt (dltt), divided by total assets (at)	Compustat
Long-Term Debt/Assets	Long term debt (dltt), divided by total assets (at)	Compustat

Return on Assets (ROA)	Earnings before extraordinary items (ib), divided by lagged assets (at)	Compustat
Tobin's Q	Market value of assets (at + csho x prccf - ceq - txdb) divided by book value of assets (at)	Compustat

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Figure 1. Directors with Abnormal Disaster Experience Over Time

These figures illustrate the average within-firm growth trend of Directors with Abnormal Disaster Experience (DADE) on corporate boards. The figures plot the coefficients on year dummy variables from regressing the logarithm of DADE (left) or the share of DADEs on the board (right) on yearly time dummies and firm fixed effects. 90% confidence bands are plotted based on standard errors adjusted for clustering at the firm-level as gray areas surrounding the point estimates. Denoted under the year axis are the variables' cross-sectional mean values as of 2003, the omitted year category.

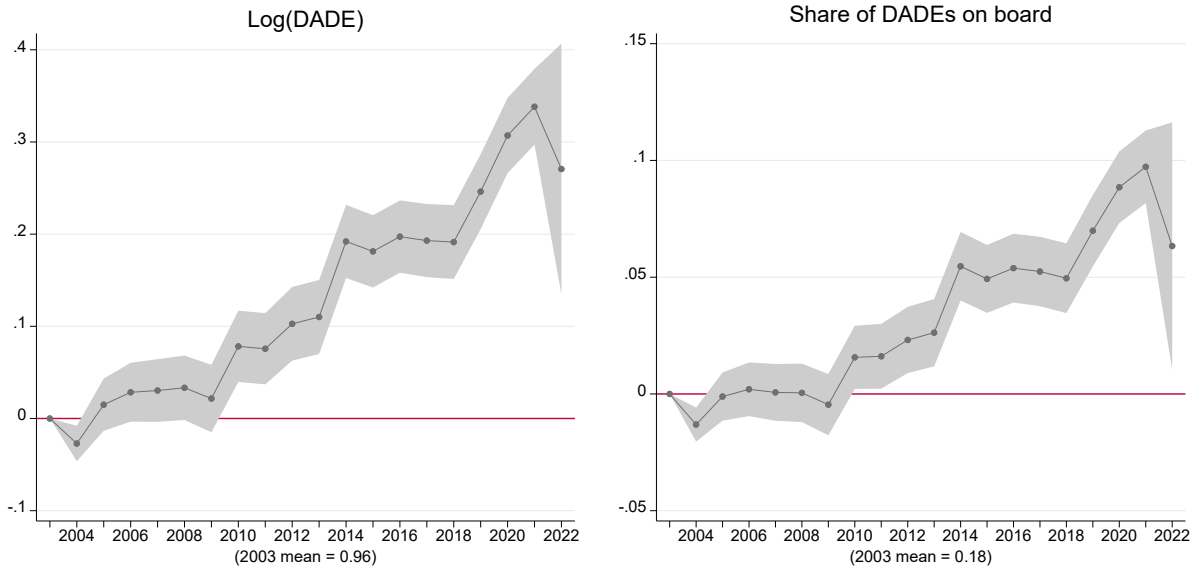

Table 1. Top 25 Abnormal Natural Disasters

This table lists the top 25 abnormal natural disasters experienced by our sample of corporate directors, in terms of their property and crop damage in 2022 U.S. dollars. The table lists the disasters chronologically, and reports the type of natural hazard, the year and month of occurrence, the U.S. county that was impacted, total property and crop damages in 2022 dollars ($ billion), number of fatalities during the event, and the duration of the disaster in days.

Hazard	Year/Month	County	Damages ($ billion)	Fatalities	Duration
Hurricane/Tropical Storm	1992/8	Broward	13.1	3.75	1
Hurricane/Tropical Storm	1992/8	Collier	13.1	3.75	1
Flooding	1997/4	Grand Forks	5.3	0	6
Hurricane/Tropical Storm	2001/6	Harris	8.0	22	5
Hurricane/Tropical Storm	2004/9	Mobile	3.8	0	4
Hurricane/Tropical Storm	2004/9	St. Lucie	3.8	0	2
Hurricane/Tropical Storm	2005/8	Harrison	4.3	97	2
Flooding	2005/8	Harrison	8.2	0	1
Hurricane/Tropical Storm	2005/8	Orleans	5.2	638	2
Flooding	2005/8	Orleans	25.9	0	1
Hurricane/Tropical Storm	2005/8	St. Tammany	3.7	2	2
Flooding	2005/8	St. Tammany	4.4	0	1
Hurricane/Tropical Storm	2005/10	Palm Beach	14.5	1	1
Flooding	2008/9	Galveston	5.3	12	3
Flooding	2008/9	Harris	3.9	0	3
Hail	2010/10	Maricopa	3.6	0	1
Flooding	2012/10	Monmouth	12.3	0	2
Flooding	2017/8	Fort Bend	9.1	3	4
Flooding	2017/8	Galveston	11.3	3	5
Flooding	2017/8	Harris	11.3	36	4
Flooding	2017/8	Montgomery	7.9	3	4
Wildfire	2018/11	Butte	6.4	86	18
Wildfire	2018/11	Shasta	6.4	0	18
Hurricane/Tropical Storm	2020/8	Calcasieu	6.5	1	2
Hurricane/Tropical Storm	2022/9	Lee	7.0	60	1

Table 2. Summary Statistics of Firms

This table provides select descriptive statistics for the key variables in our analysis. The sample consists of an unbalanced panel of 2,636 firms and 16,353 firm-years in total over the period from 2003 to 2022. Panel A reports the number of firm-years, mean, standard deviation, and select percentile data for the key variables used in the analysis. Panel B reports the correlation matrix for these key variables. All variables are defined in Appendix Table A1.

Panel A. Key Variable Statistics

Variable	N	Mean	St. Dev.	25%	50%	75%
DADE	16,353	1.80	0.48	1.00	2.00	3.00
DADE/Board Size	16,353	0.22	0.15	0.11	0.17	0.29
Scope 1 Intensity (metric ton per dollar)	16,353	20.41	6.12	4.56	14.65	45.79
Scope 1+2 Intensity (metric ton per dollar)	16,353	49.14	4.24	16.17	40.78	102.47
Board Climate Authority	1,848	0.66	0.47	0.00	1.00	1.00
Emission Targets	1,848	0.75	0.43	1.00	1.00	1.00
Managerial Climate Incentives	1,848	0.72	0.45	0.00	1.00	1.00
Board Size	16,353	9.56	2.31	8.00	9.00	11.00
Assets ($ billion)	16,353	19.74	52.72	1.37	4.26	13.78
Debt/Assets	16,353	0.29	0.22	0.11	0.26	0.42
Long-Term Debt/Assets	16,293	0.26	0.21	0.09	0.23	0.38
Return on Assets (ROA)	16,207	0.02	0.12	0.01	0.03	0.08
Tobin's Q	16,353	1.99	1.45	1.10	1.47	2.24

(continued)

Table 2. Summary Statistics of Firms (continued)

Panel B. Correlations

	DADE	DADE/ BrdSize	Scope 1	Scope 1+2	Board Climate	Emission Targets	Climate Incentive	Board Size	Assets	Debt	LTDebt	ROA	Q
DADE	1.00												
DADE/Board Size	0.93	1.00											
Scope 1 Intensity	0.18	0.21	1.00										
Scope 1+2 Intensity	0.18	0.21	0.96	1.00									
Board Climate Authority	0.14	0.08	0.10	0.11	1.00								
Emission Targets	0.09	0.03	0.02	0.03	0.63	1.00							
Managerial Climate Incentives	0.10	0.01	0.02	0.04	0.57	0.66	1.00						
Board Size	0.14	-0.13	0.01	-0.02	0.20	0.19	0.26	1.00					
Assets	0.09	-0.01	-0.24	-0.22	0.11	0.14	0.17	0.34	1.00				
Debt/Assets	-0.01	0.01	0.28	0.30	0.11	0.06	0.00	-0.11	-0.23	1.00			
Long-Term Debt/Assets	-0.01	0.02	0.30	0.32	0.09	0.04	-0.01	-0.13	-0.30	0.96	1.00		
ROA	-0.08	-0.10	-0.15	-0.16	0.05	0.10	0.12	0.06	-0.15	-0.09	-0.08	1.00	
Tobin's Q	-0.06	-0.05	-0.22	-0.22	-0.04	0.03	0.04	-0.06	-0.23	0.02	0.02	0.56	1.00

Table 3. Directors with Abnormal Disaster Experience and Corporate Emission Intensity

This table reports the results from OLS regressions of Scope 1 or Scope 1 and 2 emission intensities on the number of Directors with Abnormal Disaster Experience (DADE) serving on the company's board, controlling for other firm characteristics. The sample period is from 2003 to 2022. Emission intensities are CO_2 equivalents in metric tons divided by the company's dollar sales. DADE is defined as a director who had previously experienced a climatic natural disaster that caused damages exceeding $1 billion in 2022 dollars while working for a different firm. Log(DADE) is the logarithm of the number of DADEs on a firm's board. DADE/Board Size is the number of DADEs scaled by board size. All other variables are defined in Appendix Table A1. We include firm and industry-by-year fixed effects, where industry is defined at the historical 4-digit SIC level. *t*-statistics are reported in parentheses. Standard errors are clustered at the firm level. *** (**) {*} denote significance at the 1% (5%) {10%} level.

	Dependent variable: Emission intensity			
	Scope 1	Scope 1+2	Scope 1	Scope 1+2
	(1)	(2)	(3)	(4)
Log(DADE)	-0.079**	-0.103***		
	(0.035)	(0.034)		
DADE/Board size			-0.206**	-0.277***
			(0.095)	(0.091)
Size	0.028	0.029	0.025	0.024
	(0.022)	(0.023)	(0.022)	(0.023)
Debt	-0.083	-0.048	-0.083	-0.048
	(0.064)	(0.063)	(0.064)	(0.063)
Tobin's Q	0.010	-0.017*	0.010	-0.017*
	(0.009)	(0.009)	(0.009)	(0.009)
ROA	-0.005	-0.083	-0.004	-0.083
	(0.071)	(0.061)	(0.071)	(0.061)
Observations	13,774	13,774	13,774	13,774
Firm FE	Yes	Yes	Yes	Yes
Industry-by-year FE	Yes	Yes	Yes	Yes
Adj R^2	0.965	0.959	0.965	0.959

Table 4. Directors with Abnormal Disaster Experience and Corporate Climate Policies

This table reports the results from linear probability regressions estimating the likelihood that a firm has a select climate policy as a function of Directors with Abnormal Disaster Experience (DADE), controlling for other firm characteristics. The sample period is from 2003 to 2022. The outcome variable is a dummy variable indicating the existence of one of the following corporate climate policies: the board has the highest responsibility on the firm's climate policies; the firm has emission targets or reduction initiatives; or the firm gives management climate-related incentives. DADE is defined as a director who had previously experienced a climatic natural disaster that caused damages exceeding $1 billion in 2022 dollars while working for a different firm. Odd numbered columns report the results using Log(DADE). Even numbered columns report the results using DADE/Board size. All other variables are defined in Appendix Table A1. We include firm and industry-by-year fixed effects, where industry is defined at the historical 4-digit SIC level. *t*-statistics are reported in parentheses. Standard errors are clustered at the firm level. *** (**) {*} denote significance at the 1% (5%) {10%} level.

	Dependent variable:					
	Board has highest responsibility on climate		Firm has emission target or reduction initiative		Firms gives management climate-related incentives	
	(1)	(2)	(3)	(4)	(5)	(6)
Log(DADE)	0.196***		0.104*		0.164**	
	(0.062)		(0.062)		(0.074)	
DADE/Board size		0.469***		0.236		0.301
		(0.176)		(0.184)		(0.211)
Size	0.112***	0.120***	0.131***	0.135***	0.128***	0.134***
	(0.026)	(0.026)	(0.026)	(0.026)	(0.029)	(0.030)
Debt	0.173	0.159	0.257	0.249	0.209	0.192
	(0.192)	(0.195)	(0.199)	(0.201)	(0.224)	(0.229)
Tobin's Q	-0.011	-0.010	0.001	0.002	0.016	0.018
	(0.021)	(0.022)	(0.023)	(0.023)	(0.028)	(0.027)
ROA	0.443	0.419	0.617	0.601	0.830*	0.791
	(0.302)	(0.314)	(0.380)	(0.378)	(0.485)	(0.482)
Observations	1,162	1,162	1,162	1,162	1,162	1,162
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-by-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.205	0.197	0.133	0.129	0.138	0.126

Table 5. Influence of Directors

This table reports the results from OLS regressions of Scope 1 or Scope 1 and 2 emission intensities on the number of Directors with Abnormal Disaster Experience (DADE) with varying committee roles (Panels A and B) and gender (Panel C). The sample period is from 2003 to 2022. Emission intensities are CO_2 equivalents in metric tons divided by the company's dollar sales. In Panel A, DADE_Comm is the number of DADEs who currently serve on any of the following committees: governance, audit, ESG/sustainability, compensation, finance, or risk. DADE_NonComm is the number of DADEs who do not currently serve on any of these committees. In Panel B, DADE_Comm and DADE_NonComm are defined separately for each of the six committee types. In Panel C, DADE_Gender is the number of DADEs whose gender are male (columns 1 and 2) or female (columns 3 and 4). All other variables are defined in Appendix Table A1. We include firm and industry-by-year fixed effects, where industry is defined at the historical 4-digit SIC level. *t*-statistics are reported in parentheses. Standard errors are clustered at the firm level. *** (**) {*} denote significance at the 1% (5%) {10%} level.

Panel A. Committee vs. Non-Committee

	Dependent variable: Scope 1+2 emission intensity			
	(1)	(2)	(3)	(4)
Log(DADE_Comm)	-0.057**			
	(0.027)			
DADE_Comm/Board size		-0.232**		
		(0.093)		
Log(DADE_NonComm)			-0.028	
			(0.024)	
DADE_NonComm/Board size				-0.119
				(0.130)
Size	0.029	0.026	0.025	0.024
	(0.023)	(0.023)	(0.023)	(0.023)
Debt	-0.053	-0.053	-0.051	-0.051
	(0.063)	(0.063)	(0.064)	(0.064)
Tobin's Q	-0.016*	-0.017*	-0.017*	-0.017*
	(0.009)	(0.009)	(0.009)	(0.009)
ROA	-0.079	-0.079	-0.082	-0.082
	(0.061)	(0.061)	(0.061)	(0.061)
Observations	13,774	13,774	13,774	13,774
Firm FE	Yes	Yes	Yes	Yes
Industry-by-year FE	Yes	Yes	Yes	Yes
Adj R^2	0.959	0.959	0.959	0.959

(continued)

Table 5. Influence of Directors (continued)

Panel B. Subcommittees

	Dependent variable: Scope 1+2 emission intensity											
Subcommittee:	Governance		Auditing		ESG or Sustainability		Compensation		Finance		Risk	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Log(DADE_Comm)	-0.042*		-0.051**		-0.146**		-0.028		-0.021		-0.038	
	(0.024)		(0.023)		(0.073)		(0.026)		(0.033)		(0.048)	
DADE_Comm/Board size		-0.188*		-0.240**		-0.789*		-0.170		-0.119		-0.231
		(0.107)		(0.107)		(0.452)		(0.114)		(0.184)		(0.301)
Size	0.027	0.026	0.027	0.026	0.027	0.027	0.026	0.025	0.026	0.025	0.026	0.025
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Debt	-0.054	-0.054	-0.052	-0.053	-0.055	-0.055	-0.054	-0.054	-0.052	-0.052	-0.052	-0.052
	(0.064)	(0.063)	(0.064)	(0.064)	(0.063)	(0.063)	(0.064)	(0.063)	(0.064)	(0.064)	(0.064)	(0.064)
Tobin's Q	-0.016*	-0.016*	-0.016*	-0.016*	-0.017*	-0.017*	-0.017*	-0.017*	-0.016*	-0.016*	-0.016*	-0.016*
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
ROA	-0.079	-0.079	-0.076	-0.075	-0.089	-0.090	-0.079	-0.079	-0.080	-0.080	-0.080	-0.080
	(0.061)	(0.061)	(0.062)	(0.061)	(0.061)	(0.062)	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)
Observations	13,774	13,774	13,774	13,774	13,774	13,774	13,774	13,774	13,774	13,774	13,774	13,774
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-by-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.959	0.959	0.959	0.959	0.959	0.959	0.959	0.959	0.959	0.959	0.959	0.959

(continued)

Table 5. Influence of Directors (continued)

Panel C. Male vs. Female Directors

	Dependent variable: Scope 1+2 emission intensity			
Gender:	Male		Female	
	(1)	(2)	(3)	(4)
Log(DADE_Gender)	-0.100***		0.009	
	(0.030)		(0.040)	
DADE_Gender/Board size		-0.322***		-0.016
		(0.099)		(0.240)
Size	0.029	0.024	0.025	0.025
	(0.023)	(0.023)	(0.023)	(0.023)
Debt	-0.051	-0.049	-0.053	-0.052
	(0.064)	(0.063)	(0.064)	(0.064)
Tobin's Q	-0.017*	-0.018**	-0.016*	-0.016*
	(0.009)	(0.009)	(0.009)	(0.009)
ROA	-0.085	-0.083	-0.080	-0.080
	(0.061)	(0.061)	(0.061)	(0.061)
Observations	13,774	13,774	13,774	13,774
Firm FE	Yes	Yes	Yes	Yes
Industry-by-year FE	Yes	Yes	Yes	Yes
Adj R^2	0.959	0.959	0.959	0.959

Table 6. Accumulated vs. Recent Experience

This table reports the results from OLS regressions of Scope 1 or Scope 1 and 2 emission intensities on the number of Directors with Abnormal Disaster Experience (DADE) who have accumulated past abnormal disaster experience over varying window periods throughout their careers. The sample period is from 2003 to 2022. Emission intensities are CO_2 equivalents in metric tons divided by the company's dollar sales. DADE_Window is the number of DADEs who had experienced disasters within the past 20 years (columns 1 and 2), past 10 years (columns 3 and 4), or past 5 years (columns 5 and 6). All other variables are defined in Appendix Table A1. We include firm and industry-by-year fixed effects, where industry is defined at the historical 4-digit SIC level. *t*-statistics are reported in parentheses. Standard errors are clustered at the firm level. *** (**) {*} denote significance at the 1% (5%) {10%} level.

	Dependent variable: Scope 1+2 emission intensity					
Experience Window:	Past 20 Years		Past 10 Years		Past 5 Years	
	(1)	(2)	(3)	(4)	(5)	(6)
Log(DADE_Window)	-0.115***		-0.076***		-0.050***	
	(0.036)		(0.028)		(0.018)	
DADE_Window/Board size		-0.298***		-0.280***		-0.193**
		(0.093)		(0.100)		(0.078)
Size	0.028	0.024	0.026	0.023	0.025	0.023
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Debt	-0.047	-0.047	-0.046	-0.046	-0.052	-0.051
	(0.064)	(0.063)	(0.063)	(0.063)	(0.063)	(0.063)
Tobin's Q	-0.017*	-0.017*	-0.017*	-0.017*	-0.017*	-0.017*
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
ROA	-0.084	-0.083	-0.078	-0.081	-0.080	-0.081
	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)
Observations	13,774	13,774	13,774	13,774	13,774	13,774
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-by-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.959	0.959	0.959	0.959	0.959	0.959

Table 7. Smaller Disasters

This table reports the results from OLS regressions of Scope 1 or Scope 1 and 2 emission intensities on the number of Directors with Abnormal Disaster Experience (DADE) who have past experiences of natural disasters that caused varying degrees of property and crop damage. The sample period is from 2003 to 2022. Emission intensities are CO_2 equivalents in metric tons divided by the company's dollar sales. DADE_Damage is the number of DADEs who had experienced disasters that caused damages of $1–5 billion (columns 1 and 2), $0.5–1 billion (columns 3 and 4), or $0.1–0.5 billion (columns 5 and 6), in 2022 dollars. All other variables are defined in Appendix Table A1. We include firm and industry-by-year fixed effects, where industry is defined at the historical 4-digit SIC level. *t*-statistics are reported in parentheses. Standard errors are clustered at the firm level. *** (**) {*} denote significance at the 1% (5%) {10%} level.

	Dependent variable: Scope 1+2 emission intensity					
Damage (in 2022 US Dollars):	$ 1 - 5 billion		$ 0.5 - 1 billion		$ 0.1 - 0.5 billion	
	(1)	(2)	(3)	(4)	(5)	(6)
Log(DADE_Damage)	-0.071***		0.024		0.038	
	(0.027)		(0.035)		(0.033)	
DADE_Damage/Board size		-0.250***		0.174		0.053
		(0.088)		(0.209)		(0.078)
Size	0.028	0.025	0.025	0.025	0.023	0.025
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Debt	-0.049	-0.049	-0.052	-0.052	-0.052	-0.053
	(0.064)	(0.063)	(0.064)	(0.064)	(0.063)	(0.064)
Tobin's Q	-0.017*	-0.017*	-0.016*	-0.016*	-0.016*	-0.016*
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
ROA	-0.083	-0.082	-0.078	-0.080	-0.077	-0.078
	(0.061)	(0.061)	(0.061)	(0.061)	(0.061)	(0.062)
Observations	13,774	13,774	13,774	13,774	13,774	13,774
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-by-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.959	0.959	0.959	0.959	0.959	0.959

Table 8. High-Emission vs. Low-Emission Subsamples

This table reports the results from OLS regressions of Scope 1 or Scope 1 and 2 emission intensities on the number of Directors with Abnormal Disaster Experience (DADE) for subsamples consisting of high-emission and low-emission industries (columns 1 to 4) and firms (columns 5 to 8). The sample period is from 2003 to 2022. Emission intensities are CO_2 equivalents in metric tons divided by the company's dollar sales. DADE is defined as a director who had previously experienced a climatic natural disaster that caused damages exceeding $1 billion in 2022 dollars while working for a different firm. The sample is divided into high- and low-emission industries or firms each year based on the median industry or firm in terms of its lagged scope 1 emission intensity. All other variables are defined in Appendix Table A1. We include firm and industry-by-year fixed effects, where industry is defined at the historical 4-digit SIC level. *t*-statistics are reported in parentheses. Standard errors are clustered at the firm level. *** (**) {*} denote significance at the 1% (5%) {10%} level.

	Dependent variable: Scope 1+2 emission intensity							
	Industry Subsamples				Firm Subsamples			
	High-Emission		Low-Emission		High-Emission		Low-Emission	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(DADE)	-0.161***		-0.066		-0.125***		-0.098*	
	(0.060)		(0.041)		(0.048)		(0.058)	
DADE/Board size		-0.407***		-0.170		-0.337***		-0.268
		(0.152)		(0.109)		(0.125)		(0.174)
Size	0.055	0.042	0.023	0.021	0.019	0.011	0.032	0.029
	(0.044)	(0.043)	(0.028)	(0.027)	(0.029)	(0.029)	(0.045)	(0.045)
Debt	-0.072	-0.073	-0.037	-0.036	-0.101	-0.099	0.021	0.020
	(0.135)	(0.133)	(0.072)	(0.072)	(0.080)	(0.079)	(0.120)	(0.120)
Tobin's Q	0.018	0.016	-0.022**	-0.022**	-0.002	-0.002	-0.034*	-0.034*
	(0.021)	(0.021)	(0.010)	(0.010)	(0.008)	(0.008)	(0.018)	(0.018)
ROA	-0.179	-0.180	-0.059	-0.058	-0.078	-0.076	0.015	0.014
	(0.142)	(0.141)	(0.067)	(0.067)	(0.078)	(0.078)	(0.103)	(0.103)
Observations	4,230	4,230	9,329	9,329	6,476	6,476	5,258	5,258
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-by-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R^2	0.935	0.935	0.915	0.914	0.941	0.941	0.904	0.904

Table 9. Large and Small Firms

This table reports the results from OLS regressions of Scope 1 or Scope 1 and 2 emission intensities on the number of Directors with Abnormal Disaster Experience (DADE) for subsamples consisting of large (columns 1 and 2) and small firms (columns 3 and 4). The sample period is from 2003 to 2022. Emission intensities are CO_2 equivalents in metric tons divided by the company's dollar sales. DADE is defined as a director who had previously experienced a climatic natural disaster that caused damages exceeding $1 billion in 2022 dollars while working for a different firm. The sample is divided into large and small firms each year based on the median firm's lagged asset size. All other variables are defined in Appendix Table A1. We include firm and industry-by-year fixed effects, where industry is defined at the historical 4-digit SIC level. *t*-statistics are reported in parentheses. Standard errors are clustered at the firm level. *** (**) {*} denote significance at the 1% (5%) {10%} level.

	Dependent variable: Scope 1+2 emission intensity			
	Larger Firms		Smaller Firms	
	(1)	(2)	(3)	(4)
Log(DADE)	-0.138**		-0.032	
	(0.055)		(0.049)	
DADE/Board size		-0.320*		-0.195
		(0.166)		(0.131)
Size	0.003	-0.006	0.047**	0.045*
	(0.058)	(0.058)	(0.024)	(0.024)
Debt	-0.084	-0.090	-0.039	-0.036
	(0.189)	(0.191)	(0.068)	(0.068)
Tobin's Q	-0.055**	-0.057**	-0.001	-0.001
	(0.023)	(0.023)	(0.008)	(0.008)
ROA	-0.228	-0.231	-0.066	-0.067
	(0.153)	(0.153)	(0.069)	(0.069)
Observations	5,641	5,641	6,492	6,492
Firm FE	Yes	Yes	Yes	Yes
Industry-by-year FE	Yes	Yes	Yes	Yes
Adj R^2	0.970	0.970	0.945	0.945

Table 10. Are the Effects Driven by Recent Trends in Attention to Climate Change?

This table reports the results from OLS regressions of Scope 1 or Scope 1 and 2 emission intensities on the number of Directors with Abnormal Disaster Experience (DADE) and its interaction with *AfterParis*, a dummy variable equal to one for years 2017 or later, and zero for years 2017 or before. The sample period is from 2003 to 2022. Emission intensities are CO_2 equivalents in metric tons divided by the company's dollar sales. DADE is defined as a director who had previously experienced a climatic natural disaster that caused damages exceeding $1 billion in 2022 dollars while working for a different firm. We exclude the years 2015 and 2016 from this analysis, as these years were when the Paris Agreement was introduced and signed. All other variables are defined in Appendix Table A1. We include firm and industry-by-year fixed effects, where industry is defined at the historical 4-digit SIC level. *t*-statistics are reported in parentheses. Standard errors are clustered at the firm level. *** (**) {*} denote significance at the 1% (5%) {10%} level.

	Dependent variable: Scope 1+2 emission intensity	
	(1)	(2)
Log(DADE) × AfterParis	0.046	
	(0.064)	
Log(DADE)	-0.135***	
	(0.049)	
DADE/Board size × AfterParis		0.257
		(0.174)
DADE/Board size		-0.429***
		(0.137)
Size	0.022	0.016
	(0.026)	(0.026)
Debt	-0.031	-0.029
	(0.067)	(0.067)
Tobin's Q	-0.022**	-0.022**
	(0.010)	(0.010)
ROA	-0.094	-0.092
	(0.067)	(0.066)
Observations	11,669	11,669
Firm FE	Yes	Yes
Industry-by-year FE	Yes	Yes
Adj R^2	0.959	0.959