How Disasters Drive Action: Subsidiaries, Supply Chains, and Climate Lobbying*

Laura Comini[†] Hao Zhang[‡]

November 10, 2025

Abstract

Tackling climate change generates non-rivalrous and non-excludable benefits, while the costs of climate action fall on individual firms. This should incentivize firms to free ride on each others' efforts. Yet, corporate lobbying on climate issues has increased steadily across sectors. We develop a framework where exposure to climate disasters reduces free-riding by aligning private incentives with collective good. Disasters update firms' perception of future costs, risk likelihood, and discount rates, motivating present-day action. Ownership and production networks amplify this effect by making costs measurable, concentrated, and attributable to a few firms. Supplier substitutability, however, limits the diffusion of action. Using a comprehensive dataset linking U.S. firms, domestic subsidiaries, and supply chain partners to environmental lobbying, we find that disasters affecting firms or their subsidiaries increase lobbying, while disasters impacting suppliers matter only when alternatives are scarce. These results highlight spatial and structural factors shaping climate action in multi-unit, networked firms.

Key Words: Climate disasters, climate politics, supply chains, free-riding problem

*We thank Iain Osgood, Jim Morrow, Christopher Fariss, Mark Dincecco, Peter Rosendorff, Alastair Smith, and Alex Gazmararian for useful comments and encouragement. We also thank the participants of the PEEG workshop at the University of Michigan, and Catherine Morse, Jennifer Zimmer, and Celia Ross for their support with LSEG Refinitiv and Orbis Historical Data. This research was supported in part through computational resources and services provided by Advanced Research Computing (ARC), a division of Information and Technology Services (ITS) at the University of Michigan, Ann Arbor.

†Ph.D. Candidate, Department of Political Science, University of Michigan, Ann Arbor, Michigan 48104; lcomini@umich.edu, Email: lcomini@umich.edu, URL: https://lsa.umich.edu/polisci/people/graduate-students/laura-comini.html.

‡Assistant Professor, Wilf Family Department of Politics, New York University, New York, NY 10012; hao.z@nyu.edu. Email: hao.z@nyu.edu, URL: https://www.haocharliezhang.com/.

1 Introduction

Addressing climate change at the firm level creates non-rivalrous, non-excludable benefits, while the costs of climate action are borne by individual firms (Olson, 1971). This creates a scenario where firms should free ride on each other's efforts, resulting in little or no action to tackle climate change through costly channels, such as lobbying. However, climate lobbying has tripled in terms of the number of reports and firm clients, and lobbying expenditure on climate has more than doubled since 1999, contradicting the predictions of the free-riding problem.[1] In addition, firms from a broad array of industries - extending beyond the conventional "green" and "brown" sectors - have become politically active in the climate arena.[2] Therefore, we ask the question: why are firms increasingly willing to mobilize on climate issues despite strong incentives not to?

In this paper, we offer a new explanation for the rising mobilization of corporate climate lobbying: increasing climate disasters fundamentally alter firms' perception of the true impact of climate change, which in turn decreases firms' incentives to free ride, and increases corporate climate action. We claim that disasters encourage this perception shift in two ways. First, extreme climate events help firms more accurately assess the expected costs of future disasters, their likelihood, and the appropriate discount rate. This improved understanding makes lobbying on climate issues a rational strategy to mitigate potential future losses. Second, experiencing climate disasters firsthand exposes firms to the broader consequences of climate change, including the hardships faced by employees and local communities, beyond firms' immediate economic costs.[3] As a result, firms are motivated to engage in climate politics, not only out of economic interest but also to address broader societal costs that they cannot internalize. Together, these channels offer a new perspective on how climate disasters can reduce corporate tendencies to free ride in

[1]We also find that the number of firms engaged in pro-climate lobbying increases more than those engaged in anti-climate lobbying. See Figure A.

[2]See many examples in LobbyMap at `https://lobbymap.org/LobbyMapScores`.

[3]See Congressional Hearing HRG-2005-HSG-0092 on Congressional ProQuest.

climate lobbying.

Crucially, we argue that production networks further mitigate the problem of free-riding by measuring, concentrating, and propagating climate-related costs. First, the broader costs of climate disasters become measurable: disasters experienced by subsidiaries or suppliers provide clear information about future losses, making the economic consequences of climate change tangible for connected firms. Second, these costs are concentrated: only a limited number of firms directly connected through ownership or supply chain ties — such as parent firms with affected subsidiaries or customer firms with affected suppliers — bear the immediate impact, rather than the entire industry. Third, these costs propagate through the network, particularly when relationships are difficult to replace. As a result, a broader set of firms with affected subsidiaries or hard-to-substitute suppliers have stronger incentives to lobby on climate issues.

Our theory builds on a series of important studies while extending this literature in several key ways. While Gazmararian and Milner (2024) and Bare, Baehr and Heddesheimer (2023) show that firms exposed to temperature increases or heightened risk perception are more likely to engage politically, we go further by connecting actual climate disasters to corporate climate lobbying. Disasters generate the type of belief updating and social impacts that shift firms' preferences toward climate action (Chen et al., 2024), and they provide a more plausible source of exogenous shocks. Most importantly, we introduce a network perspective by situating firms within their production networks of subsidiaries and supply chain partners. This allows us to theorize how the structure of corporate networks amplifies the impact of climate disasters, explaining the rising mobilization of diverse firms in climate politics.

To test our theory, we construct a comprehensive dataset that integrates all US-based publicly traded firms, their domestic subsidiaries, and their domestic suppliers, drawing on various large-scale data sources such as Compustat, Orbis Historical Data, and FactSet from 2003 to 2022.[4]

[4]Subsidiary data in Orbis Historical Data are available only from 2007. Orbis offers clear advantages in tracking

We merge these firm-level data with Disaster Declaration Summaries by the Federal Emergency Management Agency (FEMA), the Firm-level Climate Change Exposure dataset from Sautner et al. (2023)[5], and LobbyView data on firms' lobbying activities. In doing so, we build a new dataset that bridges disaster exposure, firms' production networks, and political activity, using geocoding and unique firm identifiers. This linkage allows us not only to trace how climate disasters affect firms but also their subsidiaries and suppliers, showing how the effects of climate disasters propagate through production networks to influence parent firms' lobbying behavior.

We estimate the long-term effects of disaster exposure using linear network models with a rich set of firm-level controls and alternative specifications. Our results reveal a consistent pattern: firms are significantly more likely to engage in climate lobbying *and* simultaneously heighten their perception of climate risk when their headquarters are directly affected by disasters. This mobilizing effect is even stronger when domestic subsidiaries experience disasters, highlighting the critical role of production networks in transmitting climate risk. Additionally, customer firms whose suppliers are impacted by disasters also increase their climate lobbying, but only when those suppliers are not easily substitutable. We further validate these findings through robustness checks on lobbying direction, alternative distance thresholds, board member networks, and location fixed effects. Together, these results provide new insights that climate disasters impact firms' political behavior on climate, and that this effect propagates through corporate production networks.

This paper makes several distinct contributions to the literature on corporate climate politics. First, we situate the effects of climate disasters on corporate climate action within the framework of the free-riding problem (Olson, 1971), highlighting how extreme events can shift incentives in contexts where free riding is typically expected. Second, we develop a theory that integrates both

corporate ownership structures, which better complement the non-ownership supplier relationships from FactSet.

[5] See https://osf.io/fd6jq/.

economic determinants of corporate climate action[6] and non-economic drivers of climate lobbying.[7] By theorizing that disasters can generate belief updating and social awareness that reshape firms' preferences toward climate action, we depart from the notion that firms care only about their own narrow interests. Finally, we extend this framework by explicitly incorporating firms' production networks of subsidiaries and supply chain partners, and we test its empirical implications using large-scale firm-level network data. By challenging the common assumption that firms act as unitary and isolated political actors, we demonstrate how network structures amplify the effects of climate disasters and help overcome free-riding, ultimately strengthening firms' willingness to mobilize politically on climate issues.

This paper carries important policy implications. As climate disasters are projected to increase as climate change intensifies (Davenport, Burke and Diffenbaugh, 2021; Parks and Abatzoglou, 2020), our findings suggest that corporate lobbying on climate issues is likely to increase, particularly among firms with geographically dispersed subsidiaries and suppliers. This may provide climate-oriented policymakers with greater leverage to pursue more ambitious and effective climate policies. At the same time, our results highlight important limitations of corporate climate lobbying. When suppliers are easily substitutable, firms may refrain from taking meaningful climate action even in the face of disasters, potentially reducing the overall political pressure to address climate change. These findings underscore that the structure of production networks can critically shape firms' willingness and capacity to engage in effective climate advocacy.

2 Theory

Firms engage in climate politics for a variety of economic and strategic reasons. Carbon-intensive industries often oppose climate policies because they increase operating costs relative to less-

[6]See e.g. Brulle (2018); Brulle and Downie (2022); Colgan, Green and Hale (2021); Cory, Lerner and Osgood (2021); Delmas, Lim and Nairn-Birch (2016); Genovese (2019); Genovese and Tvinnereim (2019); Kennard (2020); Svendsen (2011).

[7]See e.g. Chen et al. (2024); Howe et al. (2019); Howe (2021).

polluting competitors, and these costs can propagate along supply chains, leading suppliers dependent on high-polluting customers to resist climate-friendly policies as well (Genovese, 2019; Genovese and Tvinnereim, 2019; Svendsen, 2011; Cory, Lerner and Osgood, 2021). In contrast, firms in green industries support such policies to secure market advantages (Delmas, Lim and Nairn-Birch, 2016; Svendsen, 2011). Beyond this industrial divide, firms with low adjustment costs may lobby for stricter climate policies to weaken competitors (Kennard, 2020), while multinational firms that can offshore pollution are more likely to advocate for climate action (Schmeisser, 2013; Kolcava, Nguyen and Bernauer, 2019; Levy and Kolk, 2002). Moreover, global competition and the exposure of physical and financial assets heighten the strategic incentives shaping firms' climate positions (Colgan, Green and Hale, 2021; Martin and Rice, 2010).

Yet existing research tends to emphasize the regulatory and financial costs of climate policy while largely ignoring the direct and often catastrophic costs of climate change itself (Gazmararian and Milner, 2024, Chapter 4). Climate change generates losses that are deeply uncertain, dispersed over time, and extremely difficult to quantify. These uncertainties intensify firms' incentives to free ride: the benefits of environmental protection are non-rivalrous and non-excludable, while the costs of inaction are diffuse and unpredictable. This structural misalignment makes it less likely that firms, acting in their narrow self-interest, will voluntarily support meaningful climate action.

We argue that climate disasters play a pivotal role in mitigating this dynamic by forcing a radical shift in the way firms perceive climate change. Extreme weather events make climate change *legible* by altering firms' perception of the material costs directly accrued by firms, and the material and non-material costs imposed by disasters on their employees, their communities, and society more broadly. As such, disasters shape firms' beliefs towards climate, which in turns informs their preferences towards climate policy.

Following a disaster, firms update their assessment of the true costs of climate change directly on their operations. More specifically, disasters clarify three key parameters that determine the present value of future climate losses: the *expected costs* of future disasters, their *probability of occurrence*, and the *discount rate*. Disasters increase firms' perception of future costs, make them more likely and more immediate. As a result, they increase the perceived value of future climate-related losses in the present. This heightened valuation of climate risks raises the economic stakes for firms, prompting them to engage in lobbying as a strategic response — whether to influence the design of regulatory frameworks, mitigate anticipated losses, or promote policies that enhance resilience. This effect is particularly pronounced given projections from climate scientists that extreme weather events—such as heatwaves, droughts, and floods—are expected to become more frequent, longer in duration, and more intense as global warming progresses (IPCC, 2014).[8]

Moreover, catastrophic events, such as Hurricane Katrina, have the capacity to affect firms' perception of climate change well beyond the narrow economic losses that disasters impose directly on their operations.[9] The congressional hearing transcripts we reviewed reveal that firms recognize not only the economic disruption to their operations, but also the displacement, destruction, and psychological toll that disasters impose on their employees and the communities in which they operate. We argue that climate disasters are therefore more likely to trigger belief-updating and preference shifts than gradual changes, such as rising average temperatures, which unfold slowly and are harder to detect. Because of their dramatic and highly visible nature, these events are also more likely to spur political action even if they occur infrequently. A useful analogy is the 1986 Challenger disaster: although the explosion of the shuttle seconds after lift-off was a single incident amid hundreds of successful missions, it prompted a fundamental rethinking of risk management procedures at NASA (Gazmararian and Milner, 2024, Chapter 4).

A second key contribution of this paper is to introduce a network perspective — situating firms within their webs of subsidiaries and supply chain partners — to complement our explanation of

[8]IPCC, 2014. *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II, and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.*

[9]See Congressional Hearing HRG-2005-HSG-0092 on Congressional ProQuest for an example.

corporate climate lobbying. Prior scholarship often treats firms as unitary and isolated actors. In contrast, we argue that the costs of climate disasters propagate through ownership and production networks: they travel upward from subsidiaries to parent firms and ripple outward from suppliers to customer firms. These network structures make *future costs more quantifiable, concentrated, and attributable to a smaller set of interconnected actors.* By clarifying and highlighting who bears the burden of climate shocks, networks reduce incentives to free ride and increase the likelihood of political action on climate issues.

We further clarify the scope conditions under which network effects shape corporate climate lobbying. Subsidiaries typically represent major, long-term stakes for parent firms and are difficult to substitute. As a result, climate disasters that affect subsidiaries are highly likely to transmit information and costs directly to parent firms. Suppliers, by contrast, present a more conditional channel. In the presence of many substitutable suppliers, customer firms often avoid absorbing climate-related costs by terminating contracts with affected suppliers and switching to alternatives. This is consistent with prior evidence showing that firms tend to rescind contractual obligations with disaster-affected suppliers (Pankratz and Schiller, 2024). However, when substitutable suppliers are scarce, the costs of climate disasters cannot be so easily externalized. In such cases, losses are more likely to travel along the supply chain to customer firms, activating the same belief-updating and preference-shifting mechanisms that increase the likelihood of climate action.

In what follows, we unpack each component of our theoretical framework in greater detail. We begin by examining firms' direct exposure to climate disasters, before turning to the role of subsidiaries whose disaster exposure are difficult for parent firms to externalize. We then extend the analysis to suppliers, highlighting the conditions under which information and costs of climate disasters travel to customer firms. Finally, we connect these mechanisms to our political outcome of interest—corporate lobbying on climate issues.

Climate disasters, firms and lobbying: firms' direct experience with disasters

In the absence of climate disasters, firms may perceive climate change as an uncertain and distant phenomenon — difficult to quantify in terms of costs, unpredictable in its incidence, and therefore easy to discount. Under such conditions, climate change appears as a "long-run externality" whose costs fall too far into the future to shape present decisions. Indeed, prior work shows that analysts and market actors tend to underestimate the costs associated with climate risks (Kruttli, Tran and Watugala, 2023). This should exacerbate free-riding tendencies: when climate-related costs are neither tangible nor immediate, firms lack sufficient incentives to mobilize resources or engage politically to address them, preferring instead to free ride on the actions of others.

Climate disasters break this dynamic by imposing immediate, tangible, and salient economic costs, both directly to firms and to their communities. The empirical record is clear. Temperature extremes negatively affect earnings across nearly 40 percent of industries, far beyond agriculture (Addoum, Ng and Ortiz-Bobea, 2023). The implied volatility of stock options rises for firms with establishments hit by hurricanes (Kruttli, Tran and Watugala, 2023). Prolonged droughts in a given country predict both declining profitability ratios and poor stock returns for food companies located there (Hong, Li and Xu, 2019). In addition, survey evidence shows that firms themselves recognize the multiple pathways through which climate risks increase costs: higher prices for raw materials, higher operating expenses, decreased demand for products and services, and even constraints on location choice.[10]

To understand why these effects matter for firms' political behavior, we need to consider how firms evaluate the present value of future climate-related losses. The logic is straightforward: firms

[10]Federal Reserve Bank of San Francisco, 2021. How Are Businesses Responding to Climate Risk? Evidence from a Survey of Firms. See `https://www.frbsf.org/wp-content/uploads/sites/4/el2022-06.pdf`.

are forward-looking actors that weigh the expected costs of climate disasters against the discount rate and time horizon. When disasters shift these parameters, they may increase the present value of expected climate losses, thereby making inaction more costly and political engagement rational. Formally, this can be represented as below.

$$\text{PV} = \frac{E[C_f + C_s] \times P}{1 + r} \tag{1}$$

PV : Present value of future climate-disaster losses

C_f : Costs to the firm

C_s : Costs to society (e.g. employees, communities, society)

P : Perceived probability of a future disaster occurring

r : Discount rate applied to future disaster costs

Climate disasters alter firms' perception of each parameter in ways that increase the present value of climate losses. First, they make the costs to the firm (C_f) directly observable: firms experience property damage, workforce displacement, and earnings shocks. Second, they heighten the perceived probability (P) of future disasters: insurance premiums, coverage restrictions, and the exit of insurers from high-risk markets send powerful signals about recurrence (Phillips, 2025). Finally, disasters effectively lower the discount rate (r): risks that once seemed distant now appear immediate, making future losses harder to defer. Together, these mechanisms transform climate change from a distant and uncertain concern into a pressing financial liability.

Notably, we include "costs to society" as part of the costs shaping firms' perception of climate risk. Disasters broaden the lens through which firms perceive their vulnerabilities. In our review of congressional hearing transcripts following Hurricane Katrina,[11] firms emphasized not only the

[11] For examples, search Hurricane Katrina at `https://congressional.proquest.com/congressional`.

direct costs to their operations but also the cascading effects on transportation networks, energy provision, the financial system, and real estate markets. Just as importantly, they repeatedly acknowledged the human and social consequences of disasters: the displacement of employees, the destabilization of local communities, and the psychological toll on affected populations. Such recognition underscores that firms' survival depends not only on financial resilience but also on the well-being of their workers, consumers, and surrounding communities. In this sense, climate disasters prompt both economic recalculation and social recognition. This reevaluation of the present value of future climate costs increases the probability of firms' political engagement, as firms with higher stakes are easier to mobilize despite free-riding concerns. A more detailed formal treatment is provided in Appendix C.

In sum, consistent with recent evidence that individuals update their beliefs and preferences after experiencing extreme climate events (Chen et al., 2024), we argue that firms undergo a similar process following disasters. By increasing the present value of climate-related costs and heightening awareness of social and community impacts, disasters prompt firms to reevaluate both economic and non-economic risks. This dual reassessment strengthens incentives to engage politically, particularly through lobbying, as firms seek to mitigate future losses, influence regulatory responses, and promote policies that enhance resilience across their operations and communities.

A potential concern for our theory is that firms might pursue non-political strategies to mitigate future climate risks. They may invest in innovation, strengthen the climate resilience of facilities and infrastructure, or, in extreme cases, relocate. Among these options, relocation is likely the most effective, but it is also the most expensive: similar to subsidiaries, facilities represent substantial sunk costs. Once capital is invested in physical assets, the investment becomes difficult to recover, creating path dependence. Moreover, post-disaster property values often fall, making assets even harder to sell. As a result, existing work finds little evidence of relocation in response to disasters (Gazmararian and Milner, 2024, Chapter 4). More importantly, firms' pursuing these non-political strategies would bias us against finding any positive relationship between disaster exposure and climate lobbying, making our estimates conservative.

A further concern for our theory is that firms may not perceive disasters as human-caused, and therefore may not attribute them to climate change. While causal attribution for any single event is inherently uncertain, this concern is increasingly less relevant. A growing scientific literature documents that many disasters are caused or at least exacerbated by human action (Sloggy et al., 2021). Moreover, the link between climate change and extreme events has become deeply embedded in public discourse: media coverage routinely frames disasters through a climate lens, and corporate risk assessments increasingly do the same, especially for large firms in our study.[12]

Subsidiaries and supply chains: firms' indirect experience with disasters

In this subsection, we argue that ownership and production networks play an important role in mitigating free-riding dynamics in that the costs incurred by subsidiaries and suppliers travel all the way to the parent firms and customer firms. This makes it possible for costs to become concentrated and for them to affect predominantly a smaller set of firms. This in turn should increase firms' willingness to engage in costly action such as lobbying. An important caveat, however, is the availability of easily substitutable suppliers which prevents costs from propagating along supply chains all the way to customer firms. When suppliers can be easily substituted, customer firms will prefer to change suppliers and avoid the risk of paying future costs incurred by their suppliers. This will reduce customer firms' willingness to engage in climate action.

Incorporating production and ownership networks into the analysis has broader implications. It enables us to view firms not as isolated, unitary actors but as multi-unit and networked organizations embedded in complex supply chains. This perspective helps explain the growing diversity

[12]See Fires and Floods for media connecting disasters with climate change.

of industries participating in climate politics: subsidiaries and suppliers often operate in sectors beyond the conventional "green" or "brown" categories, thereby extending the range of firms with incentives to mobilize on climate issues.

Subsidiaries: Informational linkages and ownership

To fully understand how climate disasters shape corporate lobbying, it is crucial to recognize that firms are not unitary actors. Rather, they are embedded within complex ownership networks, especially domestic subsidiaries whose operations, assets, and employees contribute substantially to the parent firm's overall risk exposure.[13] Disasters affecting these subsidiaries can therefore impact the parent firm as well, creating incentives for the parent to engage politically. By examining subsidiaries, we can trace how climate risks propagate through ownership structures, revealing mechanisms that would be invisible if firms were treated as single, monolithic entities.

We theorize that disasters affecting the domestic subsidiaries of U.S. parent firms may incentivize parent firms to engage in climate lobbying through two complementary mechanisms: the *informational mechanism* and the *sunk cost mechanism*.

The *informational mechanism* rests on the premise that ownership networks facilitate information flow between subsidiaries and parent firms. Disasters affecting subsidiaries are communicated to parent firms through formal reporting channels and ongoing monitoring systems. Anecdotal evidence from congressional hearings supports this notion: for example, in testimony following Hurricane Katrina,[14] Mr. Ratcliffe, President and CEO of Southern Company, stated, "We have a discipline of continuous improvement through rigorous post-storm critique. We learned much from Hurricane Ivan last year and its impact on our Gulf Power subsidiary in the panhandle of Florida

[13]We focus on domestic subsidiaries because they are embedded within the same regulatory, political, and institutional environment as the parent firm, which makes the transmission of information and costs more direct and the political action more effective.

[14]Hearing Id: HRG-2005-HSG-0092 Hurricane Katrina: What can the Government learn from the Private Sector's Response? Nov 6, 2005.

that helped us better prepare for Hurricane Katrina. And, in fact, we are now in the process of debriefing Hurricane Katrina's impact in Mississippi and throughout the Southern Coast." Such examples illustrate how disasters generate knowledge within the network, enabling parent firms to better anticipate the risks that climate events pose to their subsidiaries.

The *sunk cost mechanism* reflects the financial and strategic commitments embedded in subsidiaries. Once a parent firm has acquired, merged with, or built a subsidiary, the initial investment is largely "sunk"—it cannot be easily recovered or liquidated. Consequently, parent firms cannot easily abandon subsidiaries even when they become costly or vulnerable. Disasters that impact subsidiaries therefore transmit costs upward, affecting parent firms' balance sheets and risk assessments. Anticipated future costs incurred by subsidiaries similarly travel up through the ownership network, shaping parent firms' incentives to engage politically to mitigate climate risks.

Importantly, these two mechanisms operate in tandem. The informational mechanism ensures that parent firms are aware of current and potential disaster-related costs within their subsidiaries, while the sunk cost mechanism ensures that these costs carry weight in the parent firm's decision-making. Together, ownership networks make future costs both *visible* and *concentrated*: they allow parent firms to incorporate subsidiary losses into their climate risk assessment and reduce the pool of actors over which costs are spread, thereby mitigating the incentive to free ride. As a result, parent firms whose subsidiaries are affected by disasters are more likely to lobby on climate legislation—not only to reduce the probability of future disasters impacting their subsidiaries, but also to protect the profitability and strategic value of their investments.

Supply chains: Free-riding problem and suppliers' substitutability

Firms should not be considered isolated actors either, as their exposure to climate risks is shaped by complex production networks that extend beyond ownership ties. Arm's-length trade—interactions between firms acting as buyers and sellers without any ownership relationship—creates channels through which climate disasters can transmit both information and economic costs. Just as ownership networks link parent firms and subsidiaries, these supply chain connections allow customer firms to observe and respond to risks faced by their suppliers. By examining supply chain partners, we can capture how climate disasters propagate through production networks, influencing their political behavior.

Similar to the subsidiary context, we expect an *informational mechanism* to operate between customer firms and supply chain partners. Customer firms are in regular contact with suppliers, sharing information on costs, prices, shipping schedules, and operational constraints. As a result, news of disasters impacting suppliers is likely to reach customer firms, allowing them to better anticipate the future costs, probabilities, and timing of climate-related disruptions. This improved visibility can reduce incentives to free-ride.

In contrast, the *sunk cost mechanism* is generally weaker in the supply chain context. While terminating supplier contracts entails some losses, these are typically small relative to the costs a parent firm incurs when a subsidiary fails. When alternative suppliers are readily available, customer firms can mitigate exposure by abandoning relationships with affected suppliers, thereby avoiding future climate-related costs. Consistent with Pankratz and Schiller (2024), firms respond to perceived increases in suppliers' climate risk by terminating contracts. This ability to externalize risk, however, reduces incentives to engage in lobbying. When substitutable suppliers are scarce, by contrast, the costs incurred by affected suppliers cannot be easily avoided and are transmitted upward to customer firms. In this scenario, the mechanisms resemble those in the parent-subsidiary context: information about supplier losses becomes salient, and the concentration of costs strengthens incentives for customer firms to participate in climate lobbying, mitigating free-riding and promoting political action.

The case of Walmart illustrates how supplier exposure to disasters can generate strong incentives for firms to lobby on climate issues, particularly when suppliers are not easily substitutable. Hurricane Katrina in 2005 severely disrupted Walmart's Gulf Coast supplier networks, exposing the firm to costly operational breakdowns that it could not easily shift elsewhere. In response, Walmart expanded its strategy to include political engagement, advocating for climate-friendly logistics policies and more resilient supply chains, and joining the U.S. Climate Action Partnership.

We summarize our argument in a simple illustration below.

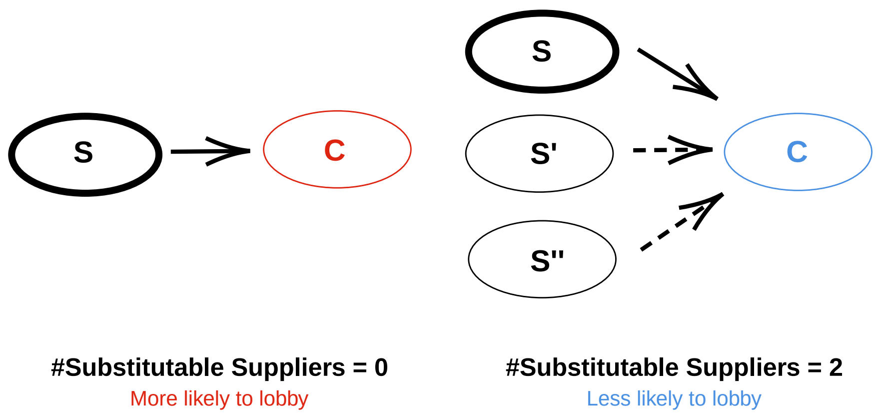

Figure 1: **Supplier Substitutability and Climate Lobbying.** This figure illustrates the core logic of our argument. When a customer firm relies on a single supplier, it is more likely to engage in climate lobbying if that supplier is affected by disasters (left panel). In contrast, when the firm has multiple alternative suppliers, it can more easily substitute away from the affected one, making lobbying less likely (right panel).

Corporate climate action: Firm Lobbying

Corporate climate action encompasses a wide range of strategies that firms use to influence climate politics, including campaign contributions (Ard, Garcia and Kelly, 2017), ex ante and ex post lobbying (Brulle, 2018; You, 2017), information campaigns (Oreskes and Conway, 2011), and ad hoc coalitions (Cory, Lerner and Osgood, 2021; Brulle, 2019). Firms also engage through participation in government-formed committees, providing testimony at congressional hearings, and submitting comments in response to new regulations and legislative proposals (Cory, Lerner and Osgood, 2021).

In this paper, we use lobbying activity and lobbying expenditure by individual firms as a systematic measure of corporate climate action. Lobbying is a central channel through which firms and other interest groups exert political influence in Washington (Baumgartner et al., 2009). It provides a unique window into corporate engagement with climate policy for several reasons. First, lobbying is one of the most direct and consequential forms of political activity available to firms. Second, because lobbying disclosure is mandated under the Lobbying Disclosure Act of 1995, researchers gain consistent, systematic data on who lobbies, on what issues, and with what level of financial commitment. Third, lobbying entails substantial costs in both time and money, which makes it a credible signal of corporate priorities. Finally, because firms may engage in other forms of climate action, focusing on lobbying may lead us to underestimate the impact of disasters on firms' climate responses.

Furthermore, the set of climate-related bills reflects a diverse array of policies with varying scopes, ranging from broad, systemic frameworks to more targeted, sector-specific measures. Despite this diversity, all of these bills generate externalities that create potential incentives for firms to free-ride on others' efforts. Broadly, the legislation falls into three complementary categories: Administrative & Public Programs, which promote planning and infrastructure for low-carbon development (e.g., H.R. 4722-111); Energy & Tax Incentives, which encourage clean technology adoption through targeted fiscal tools (e.g., H.R. 5019-111); and Environmental Protection & Natural Resources initiatives, which link ecosystem restoration with climate adaptation (e.g., H.R. 2030-112).[15] Focusing on these climate-related bills provides a potentially hard test of our theory on disaster exposure and corporate mobilization.

Overall, our theory can be summarized by the following figure:

[15] See Appendix B for more explanations about these bills.

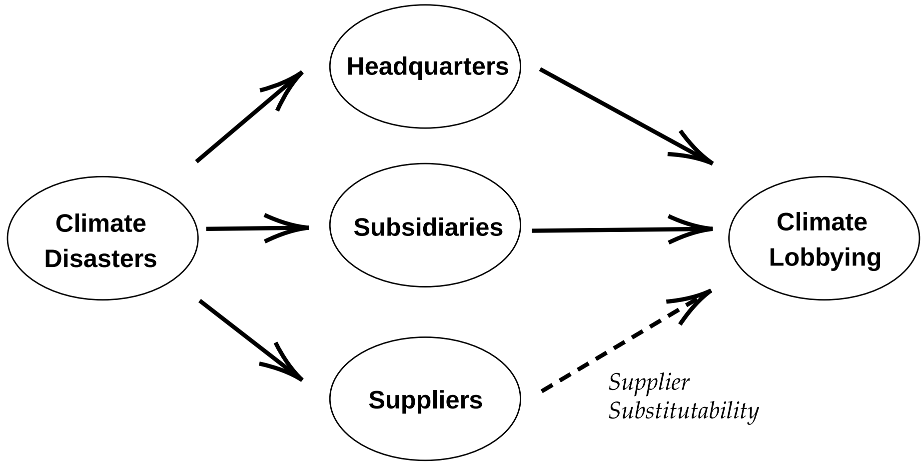

Figure 2: **Theory Diagram.** This figure shows our theory from climate disasters to firms' climate lobbying through three distinct mechanisms.

3 Empirical Analysis

Data Sources

We test whether firms are more likely to engage in climate lobbying after being exposed to natural disasters, and whether such a relationship operates through the disaster exposure of their domestic subsidiaries and suppliers as well. To examine these hypotheses, we construct a large-scale dataset linking firms to natural disasters using detailed geographical coordinates. We then combine this data with multiple firm-level datasets that contain information about firms' subsidiaries and supply chain partners. This unique firm-year panel dataset allows us to move beyond self exposure and explore the broader organizational and relational channels through which the effects of natural disasters propagate. In doing so, we uncover the extent to which firms internalize disaster risks not only through direct experience, but also through the vulnerabilities of the firms they own and source from.

For firms' exposure to natural disasters, we utilize the FEMA Disaster Declarations Summaries dataset, a comprehensive and authoritative record of all federally declared disasters in the United States since 1953. This dataset includes over 66,000 entries and covers more than 20 types of disasters related to climate change. For the purpose of this paper we include only the following disasters related to climate change: fire, hurricane, severe storm, flood, snow, coastal storm, tornado, severe ice storm, typhoon, freezing, drought, or other. Other types of disasters, such as earthquakes and tsunamis, are not connected to human action and therefore were not included in the sample (Nissen, 2025).[16] One of the key strengths of the FEMA Disaster Declarations Summaries dataset lies in its detailed geographical information, specifying affected areas down to the county level, which enables highly precise matching of disaster events to business entities. Additionally, the dataset is accessible in machine-readable formats through the OpenFEMA platform, facilitating seamless integration with other firm-level datasets.

In parallel, we construct a comprehensive panel dataset of all U.S.-based publicly traded parent firms, joint with network statistics of their domestic subsidiaries and domestic supply chain partners from 2003 to 2022. This dataset draws on two large-scale commercial sources: Orbis Historical Data, which provides detailed information on domestic subsidiaries beginning in 2007, and FactSet's Supply Chain Relationships database, which offers systematic coverage of supplier and customer linkages starting in 2003. We focus on parent firms that are designated as Global Ultimate Owners with at least a 50 percent ownership stake (GUO.50) in their subsidiaries, allowing us to accurately capture corporate control and strategic influence. By centering on publicly traded parent companies, we also benefit from more precise and reliable measures of intra- and inter-firm relationships. Using unique firm identifiers such as BVDID, CUSIP, and GVKEY, we merge these sources with firm-level financial attributes from Compustat. This integrated dataset enables us to systematically examine how natural disaster exposure — both direct and indirect through subsidiaries and supply chain partners — shapes firms' political actions, while accounting for other important covariates.

One of our important data contributions lies in the linkage of large-scale disaster data with firm-

[16]For the geographical distribution of climate disasters, see Figure E.

level data through geographic matching. This task poses significant computational challenges due to the scale and heterogeneity of the datasets involved. To overcome these obstacles, we leverage high-performance cluster computing resources hosted by the University of Michigan to geocode the physical locations of both disaster events and business entities using the Google Maps API. Each geocoding run, which processes hundreds of thousands of addresses, requires approximately 180 hours to complete. Once geographic coordinates are assigned, we algorithmically match firms, subsidiaries, and supply chain partners to disaster locations using a spatial proximity threshold of 10 kilometers.[17] This approach allows us to identify not only direct disaster exposure at the parent firm level, but also indirect exposure through networked entities. To ensure the robustness of our results, we also examine alternative thresholds and report these sensitivity checks later in the main text and in the appendix.

As for firms' engagement with climate-related policy, we leverage LobbyView, a comprehensive database of lobbying reports at the federal level filed under the Lobbying Disclosure Act (LDA) since 1999 (Kim, 2018). LobbyView offers granular information on lobbying activities by issue area, client identity, and bills lobbied, making it an ideal source for tracing firms' political activity over time. To identify lobbying efforts related to climate and environmental issues, we follow existing approaches in the literature and identify filings associated with the following general issue codes: ENV (Environment), CAW (Clean Air and Water), FUE (Fuels), and ENG (Energy) (Bare, Baehr and Heddesheimer, 2023). These codes collectively capture a broad spectrum of lobbying efforts on environmental protection, decarbonization, climate regulations, energy policy, and resource management—domains in which firms may respond to climate risks through policy influence.[18] Following Bare, Baehr and Heddesheimer (2023) and Gazmararian and Milner (2024), we focus only on federal lobbying in this paper. This is because climate lobbying at the federal

[17]For example, see AT&T supplier disaster map in Figure D.

[18]Please note that we do not study lobbying related to compensation in the aftermath of disasters, which is categorized under DIS (Disaster Planning/Emergencies). The incentives for lobbying in such cases are likely to differ from those outlined in our theoretical framework.

level poses a greater challenge for firms, as the benefits are more widely shared, making free riding a more attractive option.

Finally, to complement firms' lobbying activities, we incorporate a measure of climate risk perception at the firm level. Specifically, we use the climate risk perception index developed by Sautner et al. (2023), which leverages natural language processing to score the content of quarterly earnings call transcripts for publicly traded firms. This index reflects the extent to which firms themselves express concern or awareness about climate-related risks in their public communications. All in all, our data sources can be summarized in the following figure, and the summary statistics are in Appendix F.

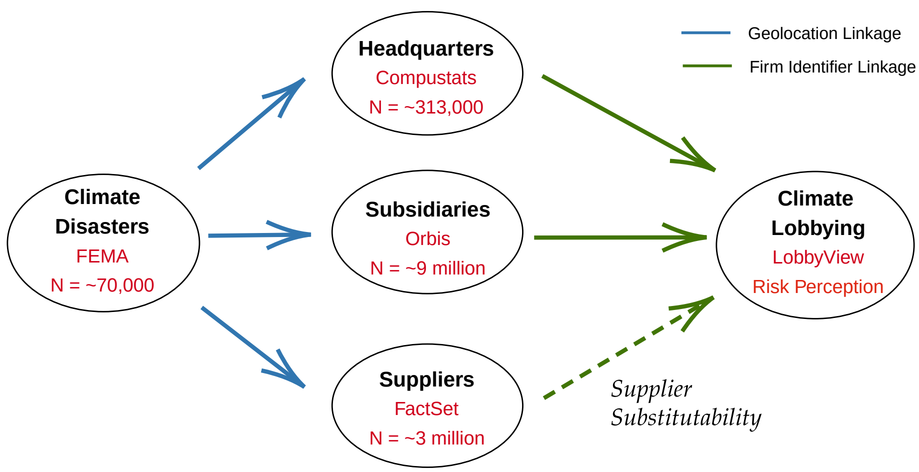

Figure 3: **Data Sources.** This figure displays our key data sources and their linkages.

Research Design

Recall that our key quantities of interest are the effects of disaster exposure on firms' climate lobbying—through the firms themselves, their domestic subsidiaries, and their suppliers. Using a firm-year panel dataset covering all U.S. publicly traded firms, we construct several measures of disaster exposure. For headquarter exposure, we assign a binary indicator of whether a firm is located within the geographical threshold of a disaster in a given year. For subsidiary exposure, we create both (i) a binary variable indicating whether any publicly traded subsidiary experienced a disaster in that year, and (ii) a count variable capturing the number of such subsidiaries exposed. Restricting to publicly traded subsidiaries ensures a clearly defined sample, though our results are robust to including all subsidiaries reported in Orbis. For supplier exposure, we follow the same procedure to measure the existence and number of publicly traded suppliers affected by disasters, which would allow us to examine heterogeneity based on the degree of substitutability among these suppliers. FactSet also provides the highest-quality data on publicly traded firms. Finally, recognizing that natural disasters often have long-lasting impacts on firms' perception and strategic behavior, we code disaster exposure as a staggered adoption variable rather than treating it as a one-time shock. This approach allows us to capture persistent changes in firms' political behavior following initial exposure.[19]

The main outcomes of interest are (1) a binary indicator for whether a firm engages in climate-related lobbying (the extensive margin), and (2) the amount of climate lobbying expenditures (the intensive margin). As control variables, we first include lagged outcomes given temporal dependence in climate lobbying. We also include firm-level financial attributes from Compustat to account for key dimensions of firm size, scale, and operational capacity that may influence lobbying behavior. Total assets, market value, and number of employees capture overall firm size, while capital expenditures and property, plant, and equipment (PPE)[20] reflect investment intensity and physical capital resources/fixed costs. Cost of goods sold provides a measure of operational scale and resource allocation, and productivity measures that help control for efficiency differences across firms that may influence their ability and incentives to engage in lobbying (Kim, 2017; Zhang, 2025). To accommodate potential non-positive values and skewness in the data, all continuous variables are transformed using the inverse hyperbolic sine (IHS) function. Our findings are robust

[19] Our theory suggests that supplier exposure may or may not have long-run impacts depending on substitutability. Accordingly, we use both staggered and non-staggered versions of disaster exposure in our analysis, and the results are similar.

[20] Due to large missingness in PPE, we include a dummy variable indicating its missingness and the value of PPE, but all our results are robust with the original value of PPE.

to alternative log transformations when non-positive observations are excluded.

$$y_{it} = \rho_1 D_{i,t-1} + \phi y_{i,t-1} + \mathbf{X}_{i,t-1}^T \beta + \alpha_{k[i]t} + \epsilon_{it} \tag{2}$$

$$y_{it} = \rho_1 D_{i,t-1} + \phi y_{i,t-1} + \rho_2 \mathbf{W}_{i,t-1}^T \mathbf{D}_{t-1} + \mathbf{X}_{i,t-1}^T \beta + \alpha_{k[i]t} + \epsilon_{it} \tag{3}$$

Our main empirical specification is a linear network model with industry-year fixed effects, as shown above. In these expressions, y_{it} denotes firm-level lobbying activity (our outcome of interest), D_{it} represents disaster exposure, $\mathbf{W}$ captures firms' subsidiary or supplier networks, $\mathbf{X}$ includes a set of control variables, and ϵ_{it} is the error term. We employ industry-year fixed effects, $\alpha_{k[i]t}$, to account for industry-specific time trends, e.g., green technology development. Note that we define industry at the four-digit NAICS level, which allows us to control for a sufficiently detailed level while retaining most firms in Compustats. Estimating firm fixed effects is not appropriate here. First, disaster exposure exhibits very limited within-firm variation—less than 5% of its total variance—because disasters are rare events. Therefore, cross-sectional variation across firms provides a more reliable source of identification. Second, since we include lagged outcome variables to account for temporal dependence in climate lobbying, incorporating firm fixed effects would raise concerns about Nickell bias, especially given the relatively short time period of our panel. That being said, our results are robust when we employ the difference-in-differences estimator given the set-up of staggered treatment and multiple time periods (Callaway and Sant'Anna, 2021). For this analysis reported in the Appendix H, we treat firms as the unit of analysis and include the same set of control variables except the lagged dependent variable.

Empirical Results

Headquarter Exposure and Climate Lobbying

We begin by presenting the direct relationship between disaster exposure and firms' climate lobbying activities. Columns (1) and (2) of Table 1 present results from our baseline specification with industry and year fixed effects, while Columns (3) and (4) incorporate industry-year fixed effects as our main specification. Across all specifications, we find that disaster exposure significantly increases both the probability that a firm engages in climate-related lobbying, and the amount it spends on such lobbying. Specifically, disaster exposure is associated with a 0.3 percentage point increase in the probability of lobbying[21] and an increase of approximately 4 to 5 percent in lobbying expenditure, both statistically significant at conventional levels. These results remain stable across different fixed effect specifications and after controlling for lagged lobbying behavior and a rich set of firm-level financial characteristics. Taken together, these findings provide consistent evidence that experiencing a climate-related disaster prompts firms to become more politically active on environmental issues, suggesting that direct exposure to climate risks increases firms' incentives to shape regulatory outcomes.[22]

To complement our lobbying analysis and shed light on the underlying mechanisms, we examine whether disaster exposure influences firms' perception of climate risk. Table 2 presents evidence using the climate risk perception index.[23] Across both specifications, we find that disaster exposure is associated with a statistically significant increase in perceived climate risk. These results support the interpretation that lobbying responses are driven not only by economic considerations, but also by heightened awareness and salience of climate-related threats.

[21] Given that firms rarely engage in lobbying in the first place, this represents a 50% increase in the average probability of firm-level lobbying.

[22] For complete results of this and subsequent regression analyses, see Appendix G.

[23] Note that the number of observations is reduced because the original dataset reports climate risk perception for only a subset of firms.

Table 1: The effect of headquarter exposure on climate lobbying

	Dependent variable:			
	Lobby	Expenditure	Lobby	Expenditure
	(1)	(2)	(3)	(4)
Disaster Exposure	0.003***	0.047***	0.003***	0.041***
	(0.001)	(0.015)	(0.001)	(0.015)
Lobby (lagged)	0.817***		0.827***	
	(0.007)		(0.007)	
Lobbying Expenditure (lagged)		0.756***		0.765***
		(0.009)		(0.009)
Observations	116,950	116,950	116,973	116,973
Firm Characteristics	✓	✓	✓	✓
Industry FE	✓	✓		
Year FE	✓	✓		
Industry-year FE			✓	✓

Note: Clustered standard errors at firm level. *p<0.1; **p<0.05; ***p<0.01

Table 2: The effect of headquarter exposure on climate risk perception

	Dependent variable:	
	Climate Risk Perception	
	(1)	(2)
Disaster Exposure	0.052**	0.050**
	(0.022)	(0.023)
Observations	67,222	67,225
Firm Characteristics	✓	✓
Industry FE	✓	
Year FE	✓	
Industry-year FE		✓

Note: Cluster standard errors at firm level.
*p<0.1; **p<0.05; ***p<0.01

Subsidiary Exposure and Climate Lobbying

We further investigate whether the exposure of a firm's domestic subsidiaries to climate disasters influences the parent firm's lobbying behavior. To do so, we proceed in several steps. First, we confirm that for standalone firms without any recorded publicly traded subsidiaries, headquarter exposure to disasters has a significant effect on both climate lobbying and lobbying expenditure. The coefficients are reported in Models (1) and (2) of Table 3. Second, we examine whether subsidiary exposure exerts an additional mobilizing effect on climate lobbying. When we extend the analysis to all firms in the sample, we find in Models (3) to (6) that headquarter exposure is no longer a significant predictor of lobbying.[24] In contrast, subsidiary exposure remains consistently significant, whether measured as a binary or a continuous variable. In fact, the effect size of subsidiary exposure is comparable to, if not larger than, that of headquarter exposure.

One reason for this pattern is that, once we include both standalone and multi-unit firms, direct headquarter exposure becomes a noisier and less systematic predictor: parent firms may diversify their climate-vulnerable operations geographically, mitigating the importance of their own local shocks, or they may rely on subsidiaries as the main production units facing climate risks. Therefore, subsidiary exposure more clearly captures the disruptions and vulnerabilities that reverberate through a firm's broader organizational network. All in all, this suggests that firms do not only respond to direct local shocks but also internalize risks that arise deeper within their structure. In this sense, subsidiary relationships serve as organizational pathways through which environmental shocks translate into greater political engagement.

[24]The sample size is smaller than in Table 3 because subsidiary data are only available starting in 2007.

Table 3: The effect of disaster exposure on climate lobbying through subsidiaries

	Dependent variable:					
	Lobby	Expenditure	Lobby	Expenditure	Lobby	Expenditure
	(1) Standalone	(2) Standalone	(3) All	(4) All	(5) All	(6) All
Headquarter Exposure	0.002**	0.024*	0.001	0.018	0.001	0.018
	(0.001)	(0.013)	(0.001)	(0.016)	(0.001)	(0.016)
Subsidiary Exposure (Binary)			0.008***	0.116***		
			(0.003)	(0.040)		
Subsidiary Exposure (Continuous)					0.008***	0.113***
					(0.003)	(0.041)
Lobbying (lagged)	0.863***		0.852***		0.852***	
	(0.013)		(0.008)		(0.008)	
Lobbying Expenditure (lagged)		0.808***		0.795***		0.795***
		(0.017)		(0.010)		(0.010)
Observations	51,670	51,670	75,713	75,713	75,713	75,713
Firm Characteristics	✓	✓	✓	✓	✓	✓
Industry-year FE	✓	✓	✓	✓	✓	✓

Note: Clustered standard errors at firm level. *p<0.1; **p<0.05; ***p<0.01

Supplier Exposure and Climate Lobbying

We next explore whether firms respond to climate-related supply chain disruptions by increasing climate lobbying, and how this response varies depending on the structure of their supplier networks. Due to space constraints, we focus on the count measure of supplier exposure and leave the binary version in Appendix M, but the results are essentially the same. As shown in Models (1) and (2) in Table 4, a greater number of affected suppliers does not consistently increase the probability of engaging in lobbying and the amount firms spend on it. This then suggests potential heterogeneities across suppliers, as customer firms can substitute away their affected suppliers and avoid costly political commitments.

Therefore, in Models (3) and (4), we include an interaction term between supplier exposure and supplier substitutability. We measure supplier substitutability by the number of U.S. public firms in the same four-digit NAICS industry classification in a given year (IHS-transformed). Compared with the estimated product differentiation (Broda and Weinstein, 2006), this measure provides a more direct indicator of the availability of alternative suppliers in the United States. A higher level of supplier substitutability indicates that customer firms are more likely to switch to alternative suppliers rather than engage in lobbying. Consistent with this expectation, we find that the interaction term is a significant predictor of both the probability of lobbying and lobbying expenditure. Figure 4 visualizes this result: when substitutability is low, supplier exposure prompts downstream firms to lobby, whereas this effect disappears when substitutability is high. These results suggest that the diffusion of pro-climate interests faces an important barrier—namely, the availability of substitutable suppliers.

Table 4: The effect of disaster exposure on climate lobbying through suppliers

	Dependent variable:			
	Lobby	Expenditure	Lobby	Expenditure
	(1)	(2)	(3)	(4)
Supplier Exposure	0.004*	0.061	0.040***	0.636***
	(0.002)	(0.038)	(0.012)	(0.198)
Supplier Substitutability	0.001	0.011	0.001	0.026*
	(0.001)	(0.015)	(0.001)	(0.015)
Supplier Exposure × Substitutability			−0.007***	−0.105***
			(0.002)	(0.034)
Observations	30,638	30,638	30,638	30,638
Headquarter & Subsidiary Exposure	✓	✓	✓	✓
Lagged Dependent Variable	✓	✓	✓	✓
Firm Characteristics	✓	✓	✓	✓
Industry-year FE	✓	✓	✓	✓

Note: Clustered standard errors at firm level. *p<0.1; **p<0.05; ***p<0.01

(a) Lobbying

(b) Lobbying Expenditure

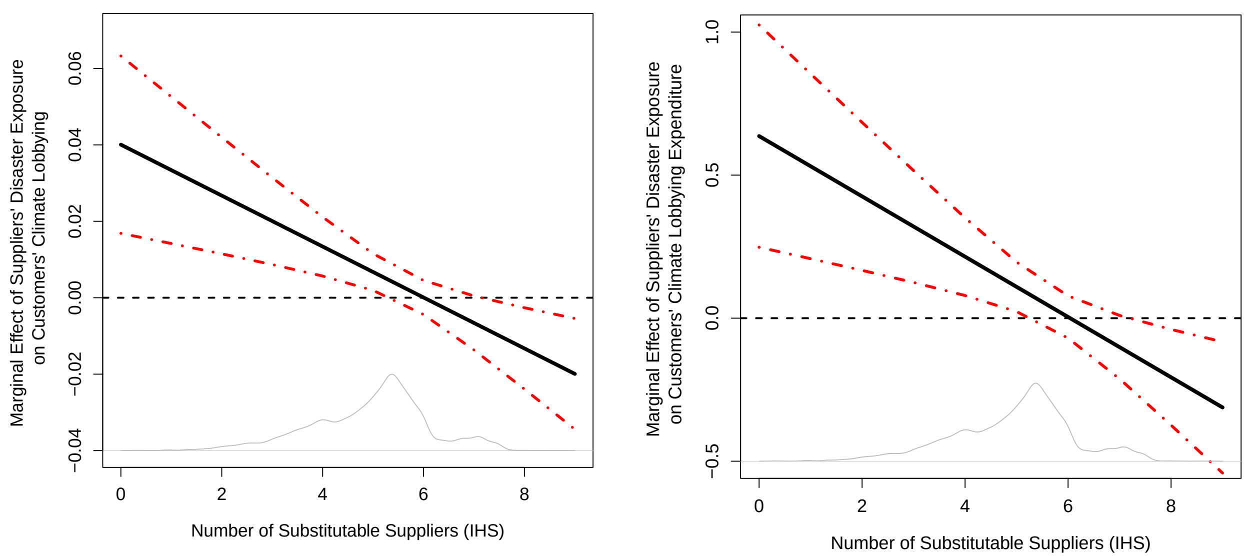

Figure 4: **Marginal Effect of Suppliers' Disaster Exposure on Self Lobbying and Self Lobbying Expenditure across Different Levels of Similar Supplier Substitutability.** This figure shows that the effect of the number of suppliers' disaster exposure on self lobbying and self lobbying expenditure is positive and significant only when supplier substitutability is low. When substitutability is high, the effect becomes more negative and insignificant.

Disaster Exposure and Direction of Lobbying

One key assumption of our theory is that firms exposed to disasters tend to lobby for *pro*-climate legislation. A well-recognized challenge, however, is that lobbying reports do not disclose the direction of lobbying by special interest groups. To address this, we draw on the first large-scale dataset that directly measures and predicts the positions of these groups across all legislative bills introduced from the 111th to the 117th Congresses (Kim et al., 2025). This dataset is constructed using a two-stage bill position annotation process. In the LLM Annotation stage, text information from lobbying reports and related bills is extracted, and positions are annotated with the aid of a large language model. When the text alone is insufficient to determine lobbying positions, lobbying and legislative network data are incorporated into the GNN Annotation pipeline, where a graph neural network refines the prediction. As Kim et al. (2025, p.4) argue, "if actors A and B consistently lobby in similar ways within comparable political networks and A's position toward a specific bill is known, we can reliably predict B's position on the bill, even if it hasn't been explicitly disclosed." For each relevant bill, we are therefore able to identify whether a firm supported, opposed, or engaged in activities such as amending or monitoring the legislation.

While we have measures of firms' positions on climate bills, these do not directly indicate whether a given firm supports or opposes climate legislation, since bills themselves may advance either pro- or anti-climate agendas. To address this, we develop two complementary approaches for classifying the orientation of thousands of climate-related bills. First, we employ the OpenAI ChatGPT API to annotate each bill's climate orientation using the official bill summary texts from LobbyView as input. Prompts were designed to elicit categorical judgments (pro-climate, anti-climate, or neutral). As a robustness check, we implement a keyword-based classification procedure that leverages dictionaries of pro- and anti-climate terms, combined with negation-handling phrases (see Appendix I). We then evaluate the reliability of the GPT annotations by manually comparing a random sample of bill classifications, confirming high accuracy for the first approach. Using this validated bill position data, we can infer firms' substantive positions on climate policy by linking their reported lobbying activities to the climate orientation of the underlying bills.

Combining the dataset by Kim et al. (2025) and our own approach of labeling bills' climate stances allows us to measure firms' climate positions. We then create two indicators. First, the "Ever Pro-Climate" dummy variable indicates whether a firm has participated in any pro-climate lobbying during a congressional session, regardless of the overall balance of its lobbying activities. Second, the "Overall Pro-Climate" dummy variable classifies a firm as pro-climate in a session if the total number of instances in which it supports pro-climate bills or opposes anti-climate bills exceeds the total number of instances in which it supports anti-climate bills or opposes pro-climate bills. We then re-estimate our baseline model using these alternative outcome measures. Because the dataset from Kim et al. (2025) is organized by two-year congressional sessions and mapped to annual data for our analysis, temporal dependence is mechanically induced. To account for this, we estimate firm- and year-fixed effects models without including a lagged dependent variable, while retaining the same set of controls. Figure 5 presents these results alongside our main findings in Table 1. Consistent with expectations, we find that firms become more pro-climate following their exposure to disasters.[25]

[25] Among firms with clearly identified climate positions, 27 (2%) engaged in lobbying in both pro- and anti-climate directions within the same congressional session. Excluding these firms does not affect our results. Substantively, such firms may hold conflictual climate policy preferences. For example, Coca-Cola may simultaneously seek to avoid regulatory costs while maintaining stable supply chains resilient to climate-related disruptions.

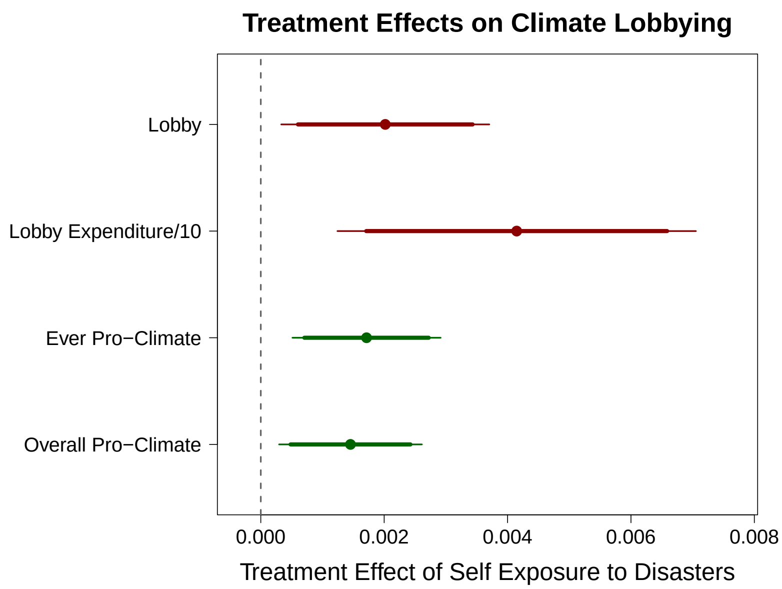

Figure 5: **Disaster Exposure and Climate Positions.** This figure illustrates the positive and statistically significant effect of disaster exposure on firm-level lobbying activity and pro-climate positions (using either the OpenAI-based or keyword-based bill classifications). For visualization purposes, the coefficient estimate for disaster exposure on lobbying expenditures is rescaled by a factor of 0.1.

Robustness Checks

Our first robustness check changes the outcome from climate lobbying to lobbying on various other issues that are unlikely to be related to disaster exposure, such as civil rights, education, pharmacy, science, and tobacco. This placebo test ensures that our main results are not driven by a general increase in lobbying activity following disasters. Indeed, we find that disaster exposure does not have a significant effect on lobbying for these unrelated issues.

Second, we redefine disaster exposure using different proximity thresholds. We find that the positive and significant effects we identified persist up to at least 18 kilometers, with the coefficient gradually decreasing as the distance increases. This provides additional evidence that firms are sensitive to the geographic scope of climate disasters.

Third, we examine another potential source of network effects—board member networks. Lerner and Osgood (2023) argue that board decisions to engage constructively on climate is-

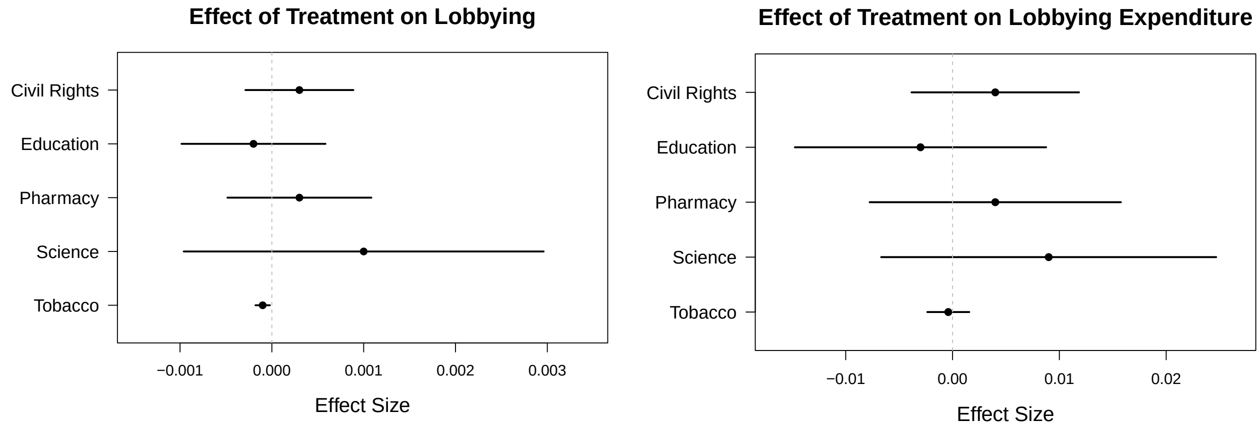

Figure 6: **Placebo Test with Lobbying on Unrelated Issues.** This figure shows that disaster exposure has no significant effect on firm-level lobbying for issues unrelated to climate disasters.

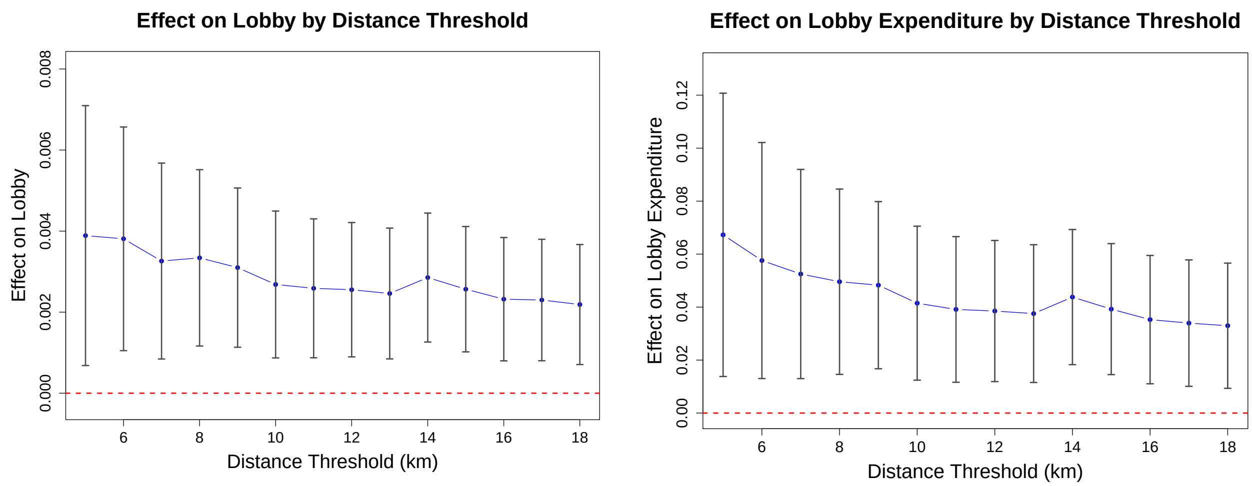

Figure 7: **Disaster Exposure with Different Proximity Thresholds.** This figure shows that disaster exposure has a significant but declining effect on firm-level lobbying as the proximity threshold increases.

sues are likely influenced by the choices and experiences of directors who serve on multiple boards. Therefore, we construct a network based on shared board membership across publicly traded firms based on Compustats and test whether disaster exposure affects climate lobbying through firms sharing the same board member. We find no significant effect in Table A6. In contrast, all of our main results remain robust. We posit that this may be because board member networks are often subsumed within subsidiary networks and primarily facilitate information sharing during ordinary times rather than in the wake of crises. Moreover, board members may act with more caution in high-stakes situations, and their influence may be diluted when direct operational or financial exposure through subsidiaries dominates the firm's risk calculus.

Finally, we include state fixed effects in all main regressions to absorb time-invariant differences across states that may jointly influence firms' exposure and lobbying behavior (see Table A7). Firms in different states operate within distinct policy regimes, political networks, and industrial environments that could affect the possibility of disaster exposure and shape their propensity to lobby. Moreover, state-specific factors—such as infrastructure, labor markets, or regulatory incentives—may influence where firms establish subsidiaries or form supplier networks, creating systematic geographic clustering in exposure. By comparing firms within the same state, we ensure that identification comes from variation in exposure rather than from structural differences in state-level natural, economic, or institutional environments.

4 Conclusion

This paper demonstrates that climate disasters and production networks mitigate the free-riding problem inherent in climate change and increase firms' willingness to take action on climate issues. We show that climate disasters help alleviate the free-riding problem by updating firms' perception of the expected future costs of climate disasters, their likelihood, and discount rate, but also by altering their perception of the broader societal costs caused by disasters. In this way, climate disasters make climate change legible in the present — that is, costs that usually accrue in the future and are difficult to estimate become visible and quantifiable today. This, in turn, reduces firms' tendency to avoid taking action in the present. Moreover, production networks further temper the free-riding problem: costs incurred at the subsidiary and supplier levels propagate to parent and customer firms. This makes the costs measurable, concentrated, and attributable to a smaller subset of firms, further reducing free-riding tendencies and increasing corporate climate lobbying more broadly.

Overall, this paper offers a productive framework for studying how climate change shapes corporate climate action. First, future research should examine firms' strategies to influence policy beyond lobbying. Doing so will help reveal whether disasters create new political cleavages along geographic lines and reshape traditional climate coalitions. Second, while our analysis focuses on domestic production networks, global disasters likely generate similar effects. Because climate shocks can disrupt subsidiaries and supply chains across borders, they may trigger spillovers in both economic and political behavior. Firms might respond by reconfiguring their supply chains toward climate - resilient countries or, more optimistically, by lobbying for climate policies across their entire global footprint, including in countries less directly affected by disasters. Understanding how global firms react to climate shocks remains an important avenue for future research. Third, future work should investigate heterogeneity across ownership and governance structures. Investor composition, managerial ideologies, and institutional ownership may condition how firms interpret and respond to climate shocks. For example, firms with higher ESG-oriented investors or stronger stakeholder-oriented governance might be more likely to translate disaster exposure into constructive climate action rather than defensive resistance. Identifying which types of firms convert climate risk into proactive policy engagement would deepen our understanding of when and why disasters lead to meaningful change.

Finally, as climate disasters intensify, our framework predicts that climate action will rise with their severity. Understanding how such traumatic events update firms' beliefs and preferences is crucial for anticipating not only the evolution of interest-group politics, but also the broader salience of climate policy in the decades ahead.

References

Addoum, Jawad M., David T. Ng and Ariel Ortiz-Bobea. 2023. "Temperature shocks and industry earnings news." *Journal of Financial Economics* 150(1):1–45.

Ard, Kerry, Nick Garcia and Paige Kelly. 2017. "Another avenue of action: an examination of climate change countermovement industries' use of PAC donations and their relationship to Congressional voting over time." *Environmental Politics* 26(6):1107–1131.

Bare, Fiona, Christian J. Baehr and Vincent Heddesheimer. 2023. "Climate Exposure Drives Firm Political Behavior: Evidence from Earnings Calls and Lobbying Data." Preprint available on OSF and ResearchGate.
URL: *https://osf.io/preprints/socarxiv/yq27d*

Baumgartner, Frank R, Jeffrey M Berry, Marie Hojnacki, Beth L Leech and David C Kimball. 2009. *Lobbying and policy change: Who wins, who loses, and why*. University of Chicago Press.

Broda, Christian and David E. Weinstein. 2006. "Globalization and the Gains from Variety." *Quarterly Journal of Economics* 121(2):541–585.

Brulle, Robert and Christian Downie. 2022. "Following the money: trade associations, political activity and climate change." *Climatic Change* 175(3):11.

Brulle, Robert J. 2018. "The climate lobby: a sectoral analysis of lobbying spending on climate change in the USA, 2000 to 2016." *Climatic change* 149(3):289–303.

Brulle, Robert J. 2019. "Networks of opposition: A structural analysis of US climate change countermovement coalitions 1989–2015." *Sociological Inquiry* 91(3):603–624.

Callaway, Brantly and Pedro H. C. Sant'Anna. 2021. "Difference-in-Differences with Multiple Time Periods." *Journal of Econometrics* 225(2):200–230.

Chen, Ted Hsuan Yun, Christopher J Fariss, Hwayong Shin and Xu Xu. 2024. "Disaster experience mitigates the partisan divide on climate change: Evidence from Texas." *Global Environmental Change* 89:102918.

Colgan, Jeff D, Jessica F Green and Thomas N Hale. 2021. "Asset revaluation and the existential politics of climate change." *International organization* 75(2):586–610.

Cory, Jared, Michael Lerner and Iain Osgood. 2021. "Supply chain linkages and the extended carbon coalition." *American Journal of Political Science* 65(1):69–87.

Davenport, Frances V, Marshall Burke and Noah S Diffenbaugh. 2021. "Contribution of historical precipitation change to US flood damages." *Proceedings of the National Academy of Sciences* 118(4):e2017524118.

Delmas, Magali, Jinghui Lim and Nicholas Nairn-Birch. 2016. "Corporate environmental performance and lobbying." *Academy of Management Discoveries* 2(2):175–197.

Gazmararian, Alexander F. and Helen V. Milner. 2024. *Climate Fault Lines: The Political Economy of a Warming World*. Princeton: Princeton University Press.

Genovese, Federica. 2019. "Sectors, pollution, and trade: How industrial interests shape domestic positions on global climate agreements." *International Studies Quarterly* 63(4):819–836.

Genovese, Federica and Endre Tvinnereim. 2019. "Who opposes climate regulation? Business preferences for the European emission trading scheme." *The Review of International Organizations* 14(3):511–542.

Hong, Harrison, Frank Weikai Li and Jiangmin Xu. 2019. "Climate risks and market efficiency." *Journal of econometrics* 208(1):265–281.

Howe, Peter D. 2021. "Extreme weather experience and climate change opinion." *Current Opinion in Behavioral Sciences* 42:127–131.

Howe, Peter D, Jennifer R Marlon, Matto Mildenberger and Brittany S Shield. 2019. "How will climate change shape climate opinion?" *Environmental Research Letters* 14(11):113001.

Kennard, Amanda. 2020. "The enemy of my enemy: When firms support climate change regulation." *International Organization* 74(2):187–221.

Kim, In Song. 2017. "Political cleavages within industry: Firm-level lobbying for trade liberalization." *American Political Science Review* 111(1):1–20.

Kim, In Song. 2018. "LobbyView: Firm-level Lobbying and Congressional Bills Database." Working Paper available from `http://web.mit.edu/insong/www/pdf/lobbyview.pdf`.

Kim, Jiseon, Dongkwan Kim, Joohye Jeong, Alice Oh and In Song Kim. 2025. "Measuring Interest Group Positions on Legislation: An AI-Driven Analysis of Lobbying Reports.".
URL: *https://arxiv.org/abs/2504.15333*

Kolcava, Dennis, Quynh Nguyen and Thomas Bernauer. 2019. "Does trade liberalization lead to environmental burden shifting in the global economy?" *Ecological Economics* 163:98–112.

Kruttli, Mathias S., Brigitte Roth Tran and Sumudu W. Watugala. 2023. "Pricing Poseidon: Extreme Weather Uncertainty and Firm Return Dynamics." *The Journal of Finance* 80(2):783–832.

Lerner, Michael and Iain Osgood. 2023. "Across the boards: Explaining firm support for climate policy." *British Journal of Political Science* 53(3):934–957.

Levy, David L and Ans Kolk. 2002. "Strategic responses to global climate change: Conflicting pressures on multinationals in the oil industry." *Business and Politics* 4(3):275–300.

Martin, Nigel and John Rice. 2010. "Analysing emission intensive firms as regulatory stakeholders: a role for adaptable business strategy." *Business Strategy and the Environment* 19(1):64–75.

Nissen, Katie. 2025. "Policymaker environmental communication in the wake of natural disasters." *Environmental Politics* pp. 1–29.

Olson, Mancur. 1971. *The Logic of Collective Action: Public Goods and the Theory of Groups, with a new preface and appendix.* Vol. 124 harvard university press.

Oreskes, Naomi and Erik M Conway. 2011. *Merchants of doubt: How a handful of scientists obscured the truth on issues from tobacco smoke to global warming.* Bloomsbury Publishing USA.

Pankratz, Nora MC and Christoph M Schiller. 2024. "Climate change and adaptation in global supply-chain networks." *The Review of Financial Studies* 37(6):1729–1777.

Parks, Sean A and John T Abatzoglou. 2020. "Warmer and drier fire seasons contribute to increases in area burned at high severity in western US forests from 1985 to 2017." *Geophysical Research Letters* 47(22):e2020GL089858.

Phillips, Anna. 2025. "Texas was once affordable. After hail and hurricanes, not anymore.". Accessed: 2025-09-16.
URL: *https://css.washingtonpost.com/climate-environment/2025/04/21/home-insurance-texas-costs-rising/*

Sautner, Zacharias, Laurence Van Lent, Grigory Vilkov and Ruishen Zhang. 2023. "Firm-level climate change exposure." *The Journal of Finance* 78(3):1449–1498.

Schmeisser, Bjoern. 2013. "A systematic review of literature on offshoring of value chain activities." *Journal of International Management* 19(4):390–406.

Sloggy, Matthew R, Jordan F Suter, Mani Rouhi Rad, Dale T Manning and Chris Goemans. 2021. "Changing opinions on a changing climate: the effects of natural disasters on public perceptions of climate change." *Climatic Change* 168(3):25.

Svendsen, Gert Tinggaard. 2011. "Evaluating and regulating the impacts of lobbying in the EU? The case study of green industries." *Environmental Policy and Governance* 21(2):131–142.

You, Hye Young. 2017. "Ex post lobbying." *The Journal of Politics* 79(4):1162–1176.

Zhang, Hao. 2025. "Commerce, Coalitions, and Global Value Chains: Coordinated and Collective Lobbying on Trade." *American Journal of Political Science* Forthcoming.

Supplementary Appendix

A Climate Lobbying Trend

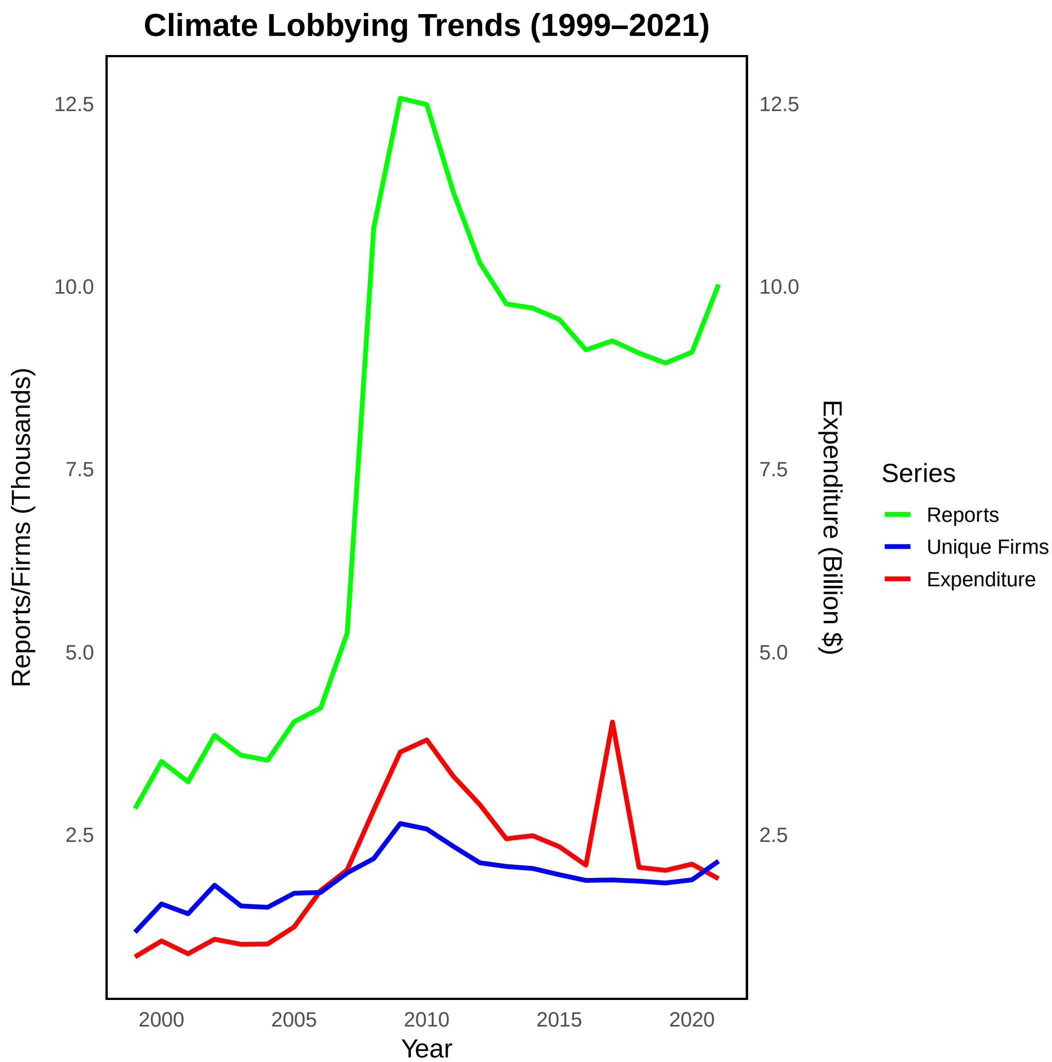

Figure A1: **Climate Lobbying Trend.** This figure shows the increasing trend of climate lobbying since 1999. The number of lobbying reports, unique firms, and total lobbying expenditure have all been steadily rising.

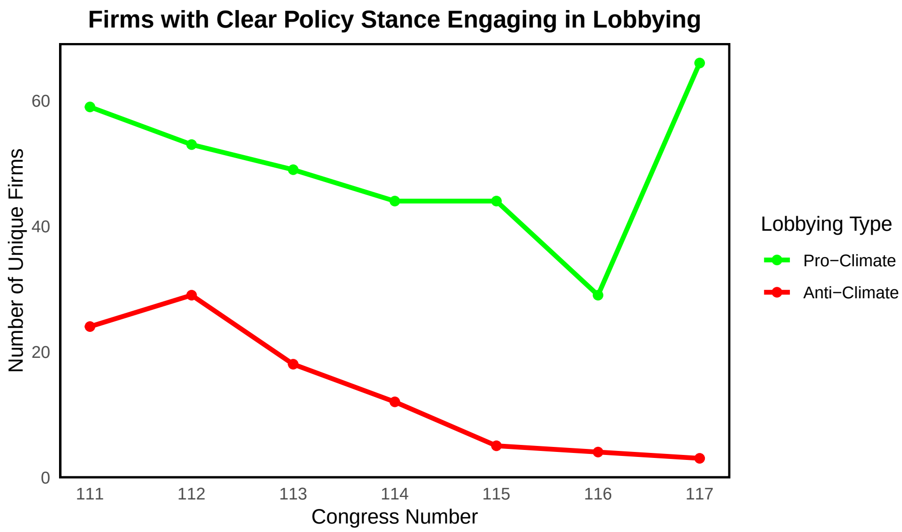

Figure A2: **Climate Lobbying Trend by Policy Stance.** This figure shows the increasing number of unique firms supporting pro-climate policies, in contrast with the declining number opposing climate policies, based on their lobbying activities. The data combine Kim et al. (2025)'s new dataset on the policy stances of special interest groups with AI-classified positions of all climate bills (see the robustness check section for details). We classify pro-climate firms as those lobbying for pro-climate bills or against anti-climate bills, and anti-climate firms as those lobbying against pro-climate bills or for anti-climate bills. Because not all lobbying reports specify the bills lobbied and some firms do not display a clear policy stance (e.g., monitoring or engaging without a clear position), the sample size decreases accordingly. Also note that the number of unique lobbying firms is affected by the legislation available in each Congress—the 116th congress had relatively fewer new climate-related bills introduced or passed compared with previous sessions. Despite these limitations, the overall trend is clear: more firms engage in pro-climate lobbying than in anti-climate lobbying.

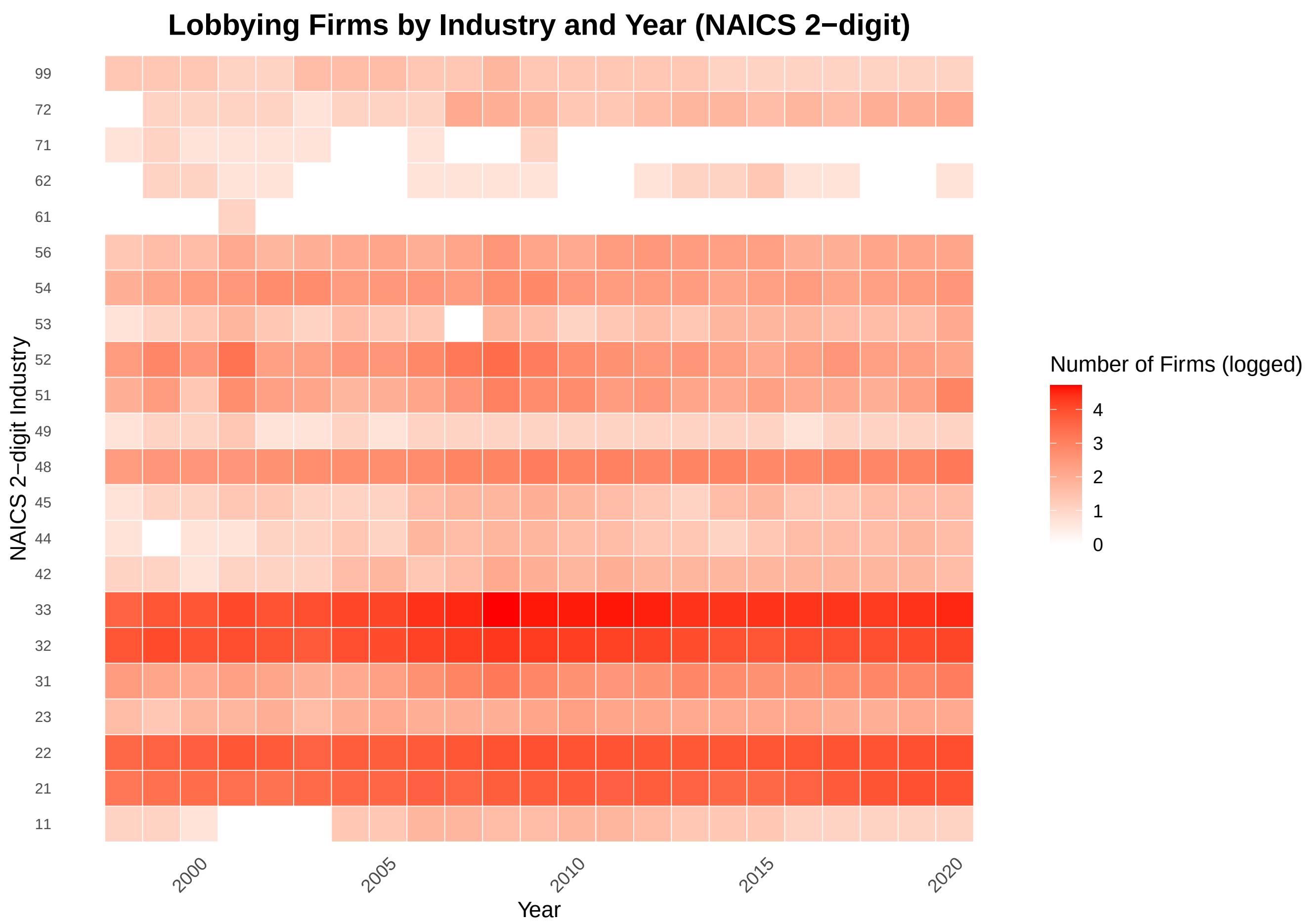

Figure A3: **Industry Distribution of Lobbying Firms over Time.** This figure shows the distribution of climate-related lobbying firms across industries over time. Industries are defined at the 2-digit NAICS level. As shown in this figure, lobbying firms span nearly all NAICS industries, extending well beyond the manufacturing sectors (31–33).

B Climate-Related Bills

We apply OpenAI tools to summarize the content of all climate-related bills, and they reveal three main legislative pathways through which Congress engages with climate change: (1) Administrative & Public Programs, (2) Energy & Tax Incentives, and (3) Environmental Protection & Natural Resources. Together, they illustrate how federal policy blends systemic planning with targeted industrial measures to address mitigation and adaptation challenges.

Administrative & Public Programs bills establish national strategies or coordinate agencies to address climate risks and community resilience. For example, H.R. 4722-111 (Active Community Transportation Act of 2010) promotes non-motorized transportation infrastructure such as walking and cycling networks. Though indirectly climate-oriented, it supports emissions reduction and urban resilience through public infrastructure investment. This category represents broad policy because it affects local governments, planners, and transportation systems nationwide rather than any single industry.

Energy & Tax Incentives bills target the energy sector directly, using fiscal tools to accelerate clean technology adoption and reduce fossil fuel dependence. H.R. 5019-111 (Home Star Energy Retrofit Act of 2010), for instance, provides rebates for homeowners and contractors implementing energy-efficient retrofits. This type of policy is narrower in scope — it specifically targets building and construction sectors — but it contributes significantly to climate mitigation through efficiency gains and private-sector mobilization.

Environmental Protection & Natural Resources bills link climate action with ecosystem management and pollution control. A good example is H.R. 2030-112 (Green Infrastructure for Clean Water Act of 2009), which encourages green infrastructure to manage stormwater and enhance ecosystem resilience. While rooted in environmental protection, the bill has strong climate adaptation implications, addressing extreme weather and flood risks. Its policy scope is moderately broad, influencing municipalities, infrastructure developers, and environmental agencies alike.

Across these categories, climate-related legislation demonstrates a layered policy architecture: broad federal coordination and planning, targeted fiscal incentives for decarbonization, and ecosystem-based adaptation measures — all essential components of a comprehensive climate strategy. Yet even within this stratified structure, no policy operates in isolation. Broader federal mandates shape market expectations in ways that benefit non-participating firms or jurisdictions, while narrowly targeted subsidies often allow adjacent actors to capture gains without bearing proportional costs. In this sense, every bill generates externalities that invite some degree of free riding. Focusing on these climate bills arguably provides a hard test of our theory about disaster and corporate mobilization.

C Formal Proof about PV and Lobbying

We formalize the central mechanism behind our theoretical argument and empirical implication: firms' incentives to lobby on climate policy depend on the present value of future climate losses. We model lobbying as a voluntary contribution to a public good, which naturally gives rise to free-riding unless the perceived benefits are sufficiently large. We then show that higher PV increases firms' willingness to lobby, making previously unprofitable lobbying privately optimal.

This appendix proceeds in three steps. First, we present a simple deterministic lobbying model with symmetric firms. Second, we use the model to illustrate the classic gap between private and social incentives to lobby. Third, we extend the model to a probabilistic setting that allows for interior lobbying rates, showing that lobbying increases as PV rises. In short, the resulting equilibrium mirrors the familiar logic that firms with higher policy stakes contribute more, even in the presence of free-riding by others.

C.1 Setup

Let us first assume a simple setup where there are N identical firms indexed by $i = 1, \ldots, N$. Each firm chooses a lobbying action

$$a_i \in \{0, 1\}, \quad a_i = 1 \text{ if the firm lobbies}, \quad a_i = 0 \text{ otherwise.}$$

Note that lobbying costs are normalized to 1 per firm. Let $m = \sum_{j=1}^{N} a_j$ denote the total number of lobbying firms.

Successful lobbying generates a policy that delivers a common benefit $B(PV)$, where PV denotes present valuation of future climate losses. $B()$ is an increasing function, as higher PV leads to greater benefits from climate lobbying. Following standard public good formulations, we assume that when m firms lobby, each firm receives benefit, $\frac{m}{N} B(PV)$.

The payoff of a firm i is therefore

$$u_i(a_i, m) = -a_i + \frac{m}{N} B(PV). \tag{A1}$$

C.2 Best Response and Free-Rider Gap

Let $m_{-i} = \sum_{j \neq i} a_j$ denote lobbying by others. If firm i contributes, total lobbying becomes $m_{-i} + 1$, so

$$u_i(1, m_{-i} + 1) - u_i(0, m_{-i}) = -1 + \frac{m_{-i} + 1}{N} B(PV) - \frac{m_{-i}}{N} B(PV) \tag{A2}$$

$$= -1 + \frac{B(PV)}{N}. \tag{A3}$$

Thus firm i lobbies if and only if

$$B(PV) > N. \tag{A4}$$

A social planner maximizing total welfare selects m to maximize

$$W(m) = -m + N \cdot \frac{m}{N} B(PV) = m\big(B(PV) - 1\big), \tag{A5}$$

so the socially optimal choice is $m^* = N$ if $B(PV) > 1$ and $m^* = 0$ otherwise.

Therefore, there is a **free-rider gap** between:

- **Social threshold:** $B(PV) > 1$ (policy is socially desirable), and
- **Private threshold:** $B(PV) > N$ (individual firm has incentive to lobby).

Whenever $1 < B(PV) \leq N$, lobbying is socially efficient but no individual firm contributes—a classic free-rider outcome.

C.3 Probabilistic Extension

Suppose perceived policy benefit is uncertain. Each firm observes a signal $B(PV_i)$, where $B(PV_i)$ has cumulative distribution $F(\cdot \mid PV_i)$ and $\mathbb{E}[B \mid PV_i]$ increases in PV_i. This relaxes the earlier assumption of symmetric firms, as signals may now differ across firms. For ease of notation, we now drop the subscript i, but continue to assume that PV varies across firms.

A firm lobbies if $B(PV) > N$, so the probability of lobbying is

$$\Pr(B > N \mid PV) = 1 - F(N \mid PV). \tag{A6}$$

If higher PV shifts the distribution of perceived benefits rightward, then

$$\frac{\Pr(B > N \mid PV)}{\partial PV} = -\frac{\partial F(N \mid PV)}{\partial PV} > 0. \tag{A7}$$

Hence, **the probability a firm lobbies increases with present valuation of future climate losses (PV)**.

D AT&T's Supplier Disaster Map

Figure A4: **AT&T's Supplier Disaster Map.** This figure shows AT&T suppliers' exposure to disasters in three years as an example. There is considerable variation in the suppliers, their affected status, and their geographical distribution. A few suppliers outside the U.S. are also plotted, although they are not included in our empirical analysis.

E US Disaster Map

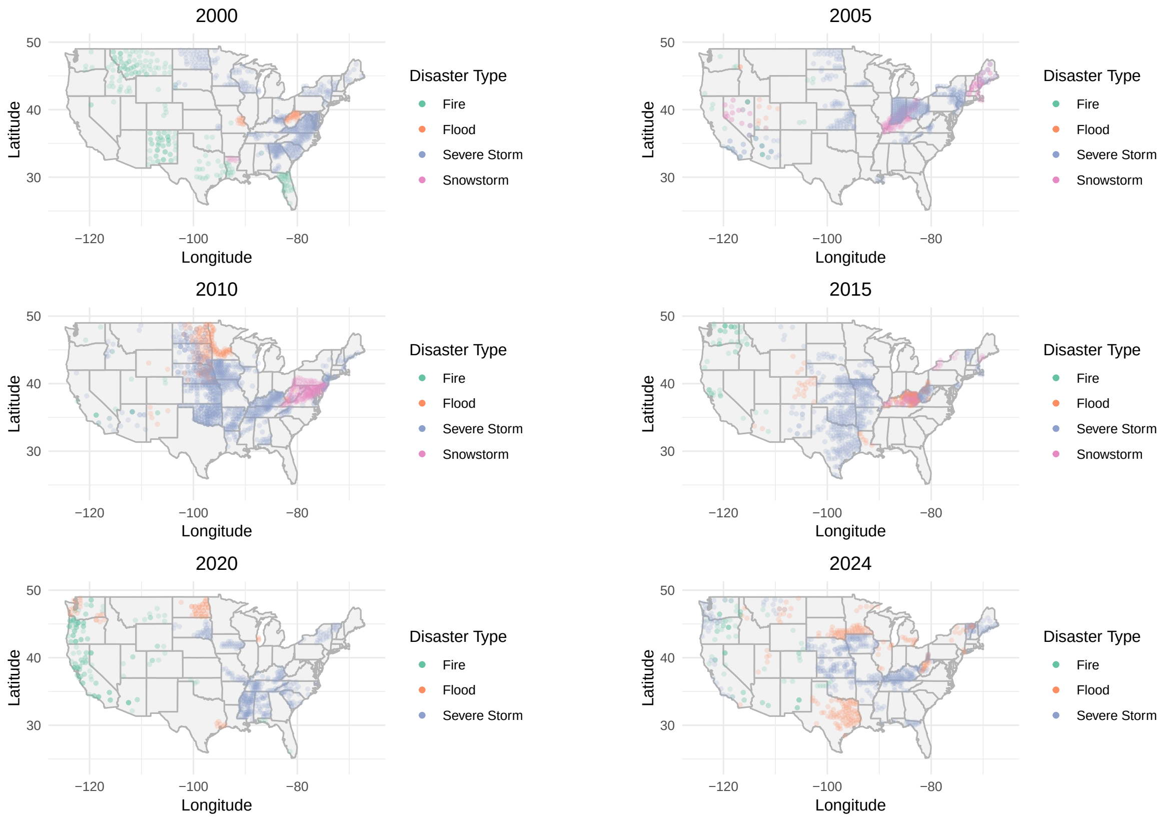

Figure A5: **US Disaster Map.** This figure shows geographical distribution of major climate disasters in the United States from 2000 to 2024 based on the FEMA data.

F Summary Statistics

Table A1: Summary Statistics for Key Variables

Statistic	N	Mean	St. Dev.	Min	Max
Lobby	193,751	0.023	0.149	0	1
Expenditure (IHS)	193,751	0.262	1.913	0.000	22.110
Headquarter Exposure	193,751	0.250	0.433	0	1
Subsidiary Exposure (IHS)	144,784	0.043	0.192	0.000	2.095
Supplier Exposure (IHS)	193,751	0.049	0.248	0.000	3.402
Supplier Substitutability (IHS)	34,357	5.294	1.104	0.881	8.842
Productivity	120,363	3.158	2.659	−17.388	9.782
Total Assets (IHS)	145,786	6.150	2.885	0.000	15.969
Capital Expenditure (IHS)	143,896	2.517	2.427	−8.782	11.754
Cost of Goods Sold (IHS)	144,939	4.570	3.011	−9.682	13.716
Employment (IHS)	120,812	1.111	1.384	0.000	8.434
Market Value (IHS)	125,545	5.940	2.551	0.000	15.352
PPE (Value, IHS)	89,848	1.997	2.711	−0.011	12.261

G Full Regression Results

G.1 Table 1

Table A2: The effect of headquarter exposure on climate lobbying

	Dependent variable:			
	Lobby	Expenditure	Lobby	Expenditure
	(1)	(2)	(3)	(4)
Disaster Exposure	0.003***	0.047***	0.003***	0.041***
	(0.001)	(0.015)	(0.001)	(0.015)
Lobby (lagged)	0.817***		0.827***	
	(0.007)		(0.007)	
Lobbying Expenditure (lagged)		0.756***		0.765***
		(0.009)		(0.009)
Productivity	−0.001**	−0.008***	−0.001**	−0.008***
	(0.0002)	(0.003)	(0.0002)	(0.003)
Total Assets	−0.0001	−0.002	−0.0001	−0.004
	(0.0003)	(0.004)	(0.0003)	(0.005)
Capital Expenditure	0.002***	0.034***	0.002***	0.033***
	(0.0003)	(0.005)	(0.0003)	(0.005)
Cost of Goods Sold	0.0001	−0.00001	0.00004	−0.0002
	(0.0002)	(0.004)	(0.0002)	(0.004)
Employment	0.006***	0.106***	0.006***	0.105***
	(0.001)	(0.013)	(0.001)	(0.013)
Market Value	0.0002	0.002	0.0003	0.003
	(0.0003)	(0.004)	(0.0003)	(0.004)
PPE (Missing Dummy)	−0.001***	−0.016***	−0.001***	−0.017***
	(0.0003)	(0.006)	(0.0003)	(0.006)
PPE (Value)	−0.001	−0.023	−0.001	−0.022
	(0.001)	(0.015)	(0.001)	(0.015)
Observations	116,950	116,950	116,973	116,973
Industry FE	✓	✓		
Year FE	✓	✓		
Industry-year FE			✓	✓

Note: Clustered standard errors at firm level. *p<0.1; **p<0.05; ***p<0.01

G.2 Table 2

Table A3: The effect of headquarter exposure on climate risk perception

	Dependent variable:	
	Climate Risk Perception	
	(1)	(2)
Disaster Exposure	0.052**	0.050**
	(0.022)	(0.023)
Productivity	−0.013***	−0.015***
	(0.003)	(0.003)
Total Assets	−0.0002	0.004
	(0.008)	(0.009)
Capital Expenditure	0.015***	0.012**
	(0.005)	(0.005)
Cost of Goods Sold	−0.016**	−0.015*
	(0.007)	(0.008)
Employment	−0.039***	−0.037***
	(0.012)	(0.013)
Market Value	0.016***	0.013**
	(0.005)	(0.006)
PPE (Missing Dummy)	0.003	0.003
	(0.004)	(0.004)
PPE (Value)	0.054**	0.050**
	(0.024)	(0.024)
Observations	67,222	67,225
Industry FE	✓	
Year FE	✓	
Industry-year FE		✓

Note: Cluster standard errors at firm level.
*p<0.1; **p<0.05; ***p<0.01

G.3 Table 3

Table A4: The effect of disaster exposure on climate lobbying through subsidiaries

	Dependent variable:					
	Lobby	Expenditure	Lobby	Expenditure	Lobby	Expenditure
	(1) Standalone	(2) Standalone	(3) All	(4) All	(5) All	(6) All
Headquarter Exposure	0.002**	0.024*	0.001	0.018	0.001	0.018
	(0.001)	(0.013)	(0.001)	(0.016)	(0.001)	(0.016)
Subsidiary Exposure (Binary)			0.008***	0.116***		
			(0.003)	(0.040)		
Subsidiary Exposure (Continuous)					0.008***	0.113***
					(0.003)	(0.041)
Lobbying (lagged)	0.863***		0.852***		0.852***	
	(0.013)		(0.008)		(0.008)	
Lobbying Expenditure (lagged)		0.808***		0.795***		0.795***
		(0.017)		(0.010)		(0.010)
Productivity	−0.0003*	−0.004	−0.001***	−0.008**	−0.001***	−0.008**
	(0.0002)	(0.003)	(0.0002)	(0.003)	(0.0002)	(0.003)
Total Assets	−0.0005*	−0.006	−0.0004	−0.007	−0.0004	−0.007
	(0.0003)	(0.004)	(0.0004)	(0.005)	(0.0004)	(0.005)
Capital Expenditure	0.001***	0.008*	0.002***	0.032***	0.002***	0.032***
	(0.0003)	(0.005)	(0.0004)	(0.006)	(0.0004)	(0.006)
Cost of Goods Sold	0.0003	0.002	−0.0002	−0.003	−0.0002	−0.003
	(0.0002)	(0.004)	(0.0003)	(0.004)	(0.0003)	(0.004)
Employment	0.003***	0.043***	0.006***	0.105***	0.006***	0.104***
	(0.001)	(0.012)	(0.001)	(0.014)	(0.001)	(0.014)
Market Value	0.001**	0.009**	0.001*	0.007	0.001*	0.007
	(0.0003)	(0.004)	(0.0003)	(0.005)	(0.0003)	(0.005)
PPE (Missing Dummy)	−0.0001	0.004	−0.001**	−0.014**	−0.001**	−0.014**
	(0.0004)	(0.005)	(0.0004)	(0.006)	(0.0004)	(0.006)
PPE (Value)	0.002*	0.021	−0.0002	−0.012	−0.0002	−0.012
	(0.001)	(0.014)	(0.001)	(0.018)	(0.001)	(0.018)
Observations	51,670	51,670	75,713	75,713	75,713	75,713
Industry-year FE	✓	✓	✓	✓	✓	✓

Note: Clustered standard errors at firm level. *p<0.1; **p<0.05; ***p<0.01

G.4 Table 4

Table A5: The effect of disaster exposure on climate lobbying through suppliers

	Dependent variable:			
	Lobby	Expenditure	Lobby	Expenditure
	(1)	(2)	(3)	(4)
Headquarter Exposure	−0.003	−0.056	−0.003	−0.056
	(0.002)	(0.042)	(0.002)	(0.042)
Subsidiary Exposure	0.011**	0.187**	0.011**	0.185**
	(0.004)	(0.080)	(0.004)	(0.080)
Supplier Exposure	0.004*	0.061	0.040***	0.636***
	(0.002)	(0.038)	(0.012)	(0.198)
Supplier Substitutability	0.001	0.011	0.001	0.026*
	(0.001)	(0.015)	(0.001)	(0.015)
Supplier Exposure × Substitutability			−0.007***	−0.105***
			(0.002)	(0.034)
Lobbying (lagged)	0.822***		0.822***	
	(0.010)		(0.010)	
Lobbying Expenditure (lagged)		0.742***		0.741***
		(0.014)		(0.014)
Productivity	−0.001*	−0.015*	−0.001*	−0.014
	(0.001)	(0.009)	(0.001)	(0.009)
Total Assets	0.0005	0.014	0.001	0.014
	(0.001)	(0.022)	(0.001)	(0.022)
Capital Expenditure	0.004***	0.065***	0.004***	0.064***
	(0.001)	(0.013)	(0.001)	(0.013)
Cost of Goods Sold	−0.001*	−0.014	−0.001*	−0.014
	(0.001)	(0.013)	(0.001)	(0.013)
Employment	0.005***	0.116***	0.005***	0.115***
	(0.002)	(0.028)	(0.002)	(0.028)
Market Value	0.001	0.009	0.001	0.010
	(0.001)	(0.016)	(0.001)	(0.016)
PPE (Missing Dummy)	−0.003	−0.078	−0.003	−0.074
	(0.003)	(0.054)	(0.003)	(0.054)
PPE (Value)	−0.001*	−0.025**	−0.001	−0.024**
	(0.001)	(0.012)	(0.001)	(0.012)
Observations	30,638	30,638	30,638	30,638
Headquarter & Subsidiary Exposure	✓	✓	✓	✓
Industry-year FE	✓	✓	✓	✓

Note: Clustered standard errors at firm level. *p<0.1; **p<0.05; ***p<0.01

H DID Estimates

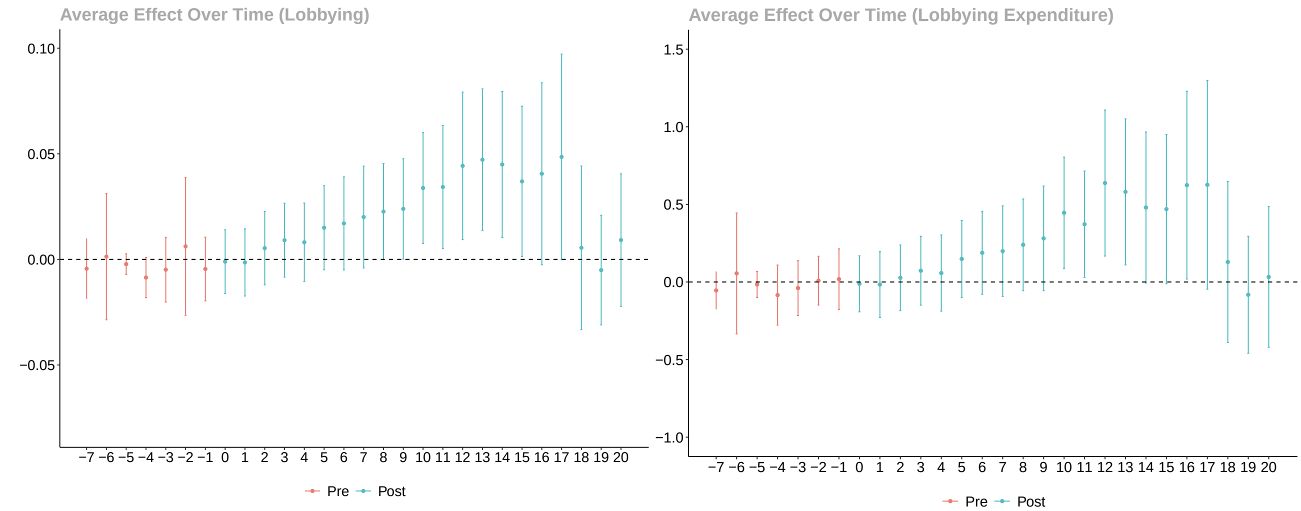

Figure A6: **Estimated Treatment Effect based on the Difference-in-Differences Estimator.** This figure illustrates the estimated treatment effect of disaster exposure on firms' climate lobbying and lobbying expenditures based on the DID estimator (Callaway and Sant'Anna, 2021). The overall effect is positive and statistically significant, with a particularly notable effect beginning in the eighth year after exposure.

I Dictionary for Climate Bill Classification

This section presents the dictionary of keywords used to classify all climate bills into three categories: “pro-climate,” “anti-climate,” and “neutral/unclear.” We use a set of words corresponding to pro- or anti-climate positions and incorporate a list of negation/weakening phrases to reverse the direction when necessary. These phrases were provided by OpenAI and manually verified using a random sample of bill summaries. Note that this classification was generated to validate the AI-assisted results, which we find to have higher accuracy. Therefore, we rely on the AI-assisted classification for our empirical analysis.

pro-climate keywords:

- Climate and emissions: “climate change”, “global warming”, “greenhouse gas”, “ghg emissions”, “carbon dioxide”, “methane emissions”, “carbon tax”, “carbon pricing”, “cap and trade”, “emissions reduction”, “net zero”, “decarbonization”, “carbon neutrality”
- Renewable and clean energy: “renewable energy”, “solar”, “wind”, “geothermal”, “hydropower”, “biomass”, “clean energy”, “energy efficiency”, “energy storage”, “smart grid”
- Transportation: “electric vehicles”, “ev charging”, “zero-emission vehicles”, “public transit”
- Environment and conservation: “epa authority”, “clean air act”, “clean water act”, “endangered species”, “climate resilience”, “climate adaptation”, “climate mitigation”, “sustainable agriculture”, “biodiversity”, “land conservation”, “reforestation”, “afforestation”, “carbon sequestration”, “coastal restoration”, “pollution reduction”, “air quality standards”, “water quality”
- Economy and policy: “green jobs”, “green economy”, “sustainable infrastructure”, “climate finance”, “environmental justice”, “disadvantaged communities”, “climate action”, “climate science”, “science-based targets”, “department of energy”, “climate risk disclosure”, “environmental review”, “clean technology”

Anti-climate keywords:

- Fossil fuels and extraction: “fossil fuel”, “coal”, “oil”, “oil and gas”, “natural gas”, “fracking”, “pipeline”, “offshore drilling”, “arctic drilling”, “keystone pipeline”, “liquefied natural gas”, “drill baby drill”, “domestic energy production”, “energy independence”, “fossil fuel export”, “shale oil”, “tar sands”
- Regulatory rollback/opposition: “deregulat”, “rollback regulations”, “limit epa”, “weaken environmental standards”, “reduce oversight”, “suspend environmental rules”, “defund epa”, “rescind climate rule”, “nullify climate rule”, “repeal emission standards”, “repeal climate policy”, “repeal carbon tax”, “clean power plan repeal”, “stop green new deal”, “oppose climate science”, “anti-climate agenda”
- Denial and misinformation: “climate hoax”, “climate alarmism”, “war on coal”, “unnecessary environmental oversight”, “carbon regulation burden”, “regulatory burden”, “opposition to climate policy”

Negation phrases:

- “ban”, “stop”, “halt”, “oppose”, “end”, “restrict”, “prohibit”, “prohibits”, “prohibited”, “prohibition”, “phase out”, “block”, “prevent”, “cancel”, “repeal”, “limit”, “eliminate”, “reduce”, “remove”, “terminate”, “abolish”, “close”, “weaken”, “curtail”, “defer”, “nullify”, “minimize”, “roll back”, “automatic approval”

Weakening phrases:

- “minimize the discretion of the epa”, “reduce the discretion of the epa”, “defer to the state”, “substantial deference to the state”, “considered approved if epa does not”, “automatic approval if epa does not”, “limit the authority of epa”, “restrict the authority of epa”, “waive the requirements of”, “exempt from compliance with”

J Board Network Exposure

Table A6: The effect of disaster exposure on climate lobbying (board network)

	Dependent variable:	
	(1) Lobby	(2) Expenditure
Disaster Exposure	−0.003	−0.065
	(0.003)	(0.045)
Subsidiary Exposure	0.012**	0.201**
	(0.005)	(0.087)
Supplier Exposure	0.042***	0.666***
	(0.012)	(0.205)
Supplier Substitutabiliy	0.002	0.027*
	(0.001)	(0.017)
Supplier Exposure × Supplier Substitutabiliy	−0.007***	−0.112***
	(0.002)	(0.035)
Board Network Exposure	0.0001	0.110
	(0.004)	(0.117)
Observations	28,656	28,656
Firm Characteristics	✓	✓
Industry-year FE	✓	✓

Note: Cluster standard errors at firm level.
*p<0.1; **p<0.05; ***p<0.01

K State Fixed Effects

Table A7: The effect of headquarter exposure on climate lobbying

	Dependent variable:			
	Lobby	Expenditure	Lobby	Expenditure
	(1)	(2)	(3)	(4)
Disaster Exposure	0.002**	0.039**	0.002*	0.034**
	(0.001)	(0.017)	(0.001)	(0.017)
Lobby (lagged)	0.814***		0.824***	
	(0.007)		(0.007)	
Lobbying Expenditure (lagged)		0.753***		0.762***
		(0.009)		(0.009)
Observations	116,950	116,950	116,973	116,973
Firm Characteristics	✓	✓	✓	✓
Industry FE	✓	✓		
Year FE	✓	✓		
State FE	✓	✓	✓	✓
Industry-year FE			✓	✓

Note: Clustered standard errors at firm level. *p<0.1; **p<0.05; ***p<0.01

Table A8: The effect of disaster exposure on climate lobbying through subsidiaries

	Dependent variable:			
	Lobby	Expenditure	Lobby	Expenditure
	(1)	(2)	(3)	(4)
Headquarter Exposure	0.0004	0.008	0.0004	0.008
	(0.001)	(0.019)	(0.001)	(0.019)
Subsidiary Exposure (Binary)	0.007***	0.106***		
	(0.003)	(0.040)		
Subsidiary Exposure (Continuous)			0.008***	0.104***
			(0.003)	(0.040)
Observations	75,713	75,713	75,713	75,713
Firm Characteristics	✓	✓	✓	✓
Lagged Dependent Variable	✓	✓	✓	✓
State FE	✓	✓	✓	✓
Industry-year FE	✓	✓	✓	✓

Note: Clustered standard errors at firm level. *p<0.1; **p<0.05; ***p<0.01

Table A9: The effect of disaster exposure on climate lobbying through suppliers

	Dependent variable:			
	Lobby	Expenditure	Lobby	Expenditure
	(1)	(2)	(3)	(4)
Supplier Exposure	0.004*	0.063*	0.040***	0.627***
	(0.002)	(0.038)	(0.012)	(0.197)
Supplier Substitutability	0.001	0.012	0.002	0.026*
	(0.001)	(0.015)	(0.001)	(0.015)
Supplier Exposure × Substitutability			−0.007***	−0.103***
			(0.002)	(0.034)
Observations	30,638	30,638	30,638	30,638
Headquarter & Subsidiary Exposure	✓	✓	✓	✓
Lagged Dependent Variable	✓	✓	✓	✓
Firm Characteristics	✓	✓	✓	✓
State FE	✓	✓	✓	✓
Industry-year FE	✓	✓	✓	✓

Note: Clustered standard errors at firm level. *p<0.1; **p<0.05; ***p<0.01

L Additional Analysis about Subsidiaries

L.1 All Subsidiaries

Table A10: The effect of disaster exposure on climate lobbying through all subsidiaries

	Dependent variable:			
	Lobby	Expenditure	Lobby	Expenditure
	(1)	(2)	(3)	(4)
Subsidiary Exposure (Binary)	0.009***	0.123***		
	(0.002)	(0.024)		
Subsidiary Exposure (Continuous)			0.004***	0.056***
			(0.001)	(0.008)
Observations	75,713	75,713	75,713	75,713
Firm Characteristics	✓	✓	✓	✓
Lagged Dependent Variable	✓	✓	✓	✓
Industry-Year Fixed Effect	✓	✓	✓	✓

Note: Cluster robust standard errors at firm level. *p<0.1; **p<0.05; ***p<0.01

L.2 Subsidiaries with Different Thresholds

Table A11: The effect of disaster exposure on climate lobbying through subsidiaries (15km)

	Dependent variable:			
	Lobby	Expenditure	Lobby	Expenditure
	(1)	(2)	(3)	(4)
Subsidiary Exposure (Binary)	0.007***	0.079**		
	(0.002)	(0.032)		
Subsidiary Exposure (Continuous)			0.007***	0.083**
			(0.002)	(0.032)
Observations	75,713	75,713	75,713	75,713
Firm Characteristics	✓	✓	✓	✓
Lagged Dependent Variable	✓	✓	✓	✓
Industry-Year Fixed Effect	✓	✓	✓	✓

Note: Cluster robust standard errors at firm level. *p<0.1; **p<0.05; ***p<0.01

Table A12: The effect of disaster exposure on climate lobbying through subsidiaries (20km)

	Dependent variable:			
	Lobby	Expenditure	Lobby	Expenditure
	(1)	(2)	(3)	(4)
Subsidiary Exposure (Binary)	0.005***	0.060**		
	(0.002)	(0.028)		
Subsidiary Exposure (Continuous)			0.006***	0.064**
			(0.002)	(0.028)
Observations	75,713	75,713	75,713	75,713
Firm Characteristics	✓	✓	✓	✓
Lagged Dependent Variable	✓	✓	✓	✓
Industry-Year Fixed Effect	✓	✓	✓	✓

Note: Cluster robust standard errors at firm level. *p<0.1; **p<0.05; ***p<0.01

M Additional Analysis of Supplier Exposure

Table A13: The effect of disaster exposure on climate lobbying through suppliers

	Dependent variable:			
	Lobby	Expenditure	Lobby	Expenditure
	(1)	(2)	(3)	(4)
Supplier Exposure (Binary)	0.002	0.031	0.029^{**}	0.472^{**}
	(0.002)	(0.043)	(0.014)	(0.225)
Supplier Substitutability	0.001	0.012	0.001	0.022
	(0.001)	(0.015)	(0.001)	(0.015)
Supplier Exposure (Binary) × Substitutability			-0.005^{**}	-0.082^{**}
			(0.002)	(0.040)
Observations	30,638	30,638	30,638	30,638
Headquarter & Subsidiary Exposure	✓	✓	✓	✓
Lagged Dependent Variable	✓	✓	✓	✓
Firm Characteristics	✓	✓	✓	✓
Industry-year FE	✓	✓	✓	✓

Note: Clustered standard errors at firm level. *p<0.1; **p<0.05; ***p<0.01