How Lobbyist CEOs Manage Climate Risks: Lobbying versus Innovation

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Abstract

This study examines the impact of lobbyist CEOs on firm-level climate change exposure, risk, and corporate innovation. Findings reveal a sharp industry divergence: in the high-tech sector, lobbyist CEOs leverage policy expertise to increase total patent filings by 34% and green patents by 18%, producing highly cited innovations with significantly greater economic value. Conversely, in non-high-tech industries, lobbyist CEOs prioritize regulatory management over R&D, resulting in fewer and lower-quality patents. While firms across both sectors achieve operational efficiency through lower COGS, these gains do not translate into higher sales growth. The results suggest that while lobbyist CEOs enhance cost efficiency, their ability to drive high-value climate innovation is contingent on the firm's technological intensity.

Keywords: Climate change risk, Lobbyist CEOs, Innovation, Green patents

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1 Introduction

Climate change has emerged as a central economic force, creating both risks and strategic opportunities for companies worldwide. The decade from 2011 to 2020 was the warmest on record, based on World Meteorological Organization [2021], increasing attention to how climate-related risks influence corporate decision-making and firm value. CEOs can manage these risks through a combination of regulatory engagement, technological innovation, and operational adjustments. They can lobby policymakers to shape environmental regulations favorably, secure government incentives, and implement internal compliance policies to reduce risks. Garloch [2024] demonstrates that climate-related lobbying can align with or oppose regulatory efforts. Peng, Fan, and Shen [2024] further show that climate policy uncertainty increases lobbying, boosting short-term financial outcomes while reducing green innovation and increasing environmental risks.

At the same time, companies can invest in green technologies, develop sustainable processes, and perform R&D to reduce emissions and resource consumption. Industry-level patterns reveal systematic heterogeneity in lobbying behavior, highlighting the role of lobbying in green innovation. Cohen, Gurun, and Nguyen [2020] show that oil, gas, and energy-producing firms, which often have lower ESG scores, play a central role in U.S. green innovation, filing a larger number of green patents and producing higher-quality innovations than other sectors.

The key question for this research is how the political background of CEOs shapes attention to climate change opportunities and risks and whether firms led by lobbyist CEOs respond by pursuing long-term innovation or short-term strategies. By focusing on lobbyist CEOs, I isolate the influence of managerial ideology on strategic climate decisions, firm-level climate risk exposures, corporate innovation, and operational efficiency. The political preferences of the CEO can determine how aggressively firms support or oppose climate regulations, allocate resources to innovation, and manage vulnerability to climate-related risks, highlighting the critical role of individual managers in translating political activity

into corporate climate strategies.

Corporate political activity, particularly lobbying, has emerged as a key channel through which companies navigate climate-related risks and opportunities. Lobbying allows firms to influence regulation, reduce uncertainty, and protect market positions, but it can also generate reputational and policy-reversal risks. Leippold, Sautner, and Yu [2024] show that anti-climate lobbying is concentrated in utilities and petroleum and natural gas, while pro-climate lobbying is more dispersed. Cen, Cohen, Wu, and Zhang [2023] show that government ties allow firms to hedge geopolitical disruptions, and Garloch [2024] demonstrates that climate-related lobbying can either align with or oppose regulatory efforts.

Figure 1 illustrates the trends in the number of registered lobbyists and total lobbying expenditures from 1998 to 2023, adjusted for inflation.

[Figure 1 here]

A parallel literature emphasizes that managerial characteristics strongly influence firm policies and risk exposure. Trabert [2023] shows that CEO backgrounds shape firm risk profiles, while Shen et al. [2022] document performance effects linked to managerial traits. Behavioral characteristics also matter. Malmendier, Tate, and Yan [2011] find that overconfident managers adopt more aggressive financial policies, including higher leverage and more frequent investment, whereas Islam and Zein [2020] show that inventor CEOs generate more highly cited patents and valuable innovative output. CEO political ideology further shapes corporate political activity. Unsal, Hassan, and Zirek [2016] find that Republican-leaning CEOs lobby more intensively, but their firms experience higher agency costs, lower Tobin's Q, and weaker long-run returns. Di Giuli and Kostovetsky [2014]Democratic-aligned CEOs, in contrast, invest more in CSR and social initiatives, though these actions are associated with lower future firm value.

I find that lobbyist CEOs reduce their firms' climate change exposure relative to other firms. As a result, these firms pay limited attention to opportunity-related exposures, particularly channels that could generate positive outcomes. Physical exposure, in contrast, is

largely unaffected by lobbying, highlighting the selective effectiveness of political strategies in managing climate risk.

To analyze how the political activities of CEOs impact the specific climate-related risks and opportunities faced by firms, I utilize the latest climate change metrics developed by Sautner, Van Lent, Vilkov, and Zhang [2023]. The measures provide a firm-level, time-varying indicator of climate change exposure, derived from textual analysis of corporate earnings call transcripts rather than relying on historical emissions data. The main measure, $CCExposure$, tracks the frequency of climate-related bigrams in earnings calls, while $CCRisk$ focuses on those co-occurring with terms like "risk" or "uncertainty." By capturing management discussions, the measure reflects forward-looking perceptions of climate risk and strategic considerations. Opportunity exposure refers to the potential for climate change to create new market opportunities or grow existing ones. Regulatory exposure occurs when climate change policies are likely to influence a company's costs. Physical exposure refers to the risk of being affected by the direct impacts of climate change.

Its key strengths include firm-level granularity and time-varying dynamics, allowing to observe how engagement with climate issues differs across firms and evolves over time. The measure also distinguishes between different types of climate exposure, such as opportunity-related, regulatory, and physical risk discussions. Because it relies on publicly available transcripts rather than voluntary ESG reports, it reduces biases from selective disclosure.

This approach addresses the limitations of earlier empirical methods, which either relied solely on historical emissions data or were vulnerable to greenwashing in CSR reports. Firms encounter a range of climate effects, such as threats to physical assets, regulatory changes, and technological opportunities. While previous research has largely concentrated on firms' responses to government regulations aimed at mitigating climate change, my study offers a broader perspective by integrating these new climate change measures.

Definition of these measures are in the Appendix 1 (based on the original paper). These measures capture the attention financial analysts and management devote to climate change

topics at a given point in time.

Recent evidence suggests that lobbying activities do not always align with technological needs. Kwon, Lowry, and Verardo [2023] propose the Misaligned Lobbying Hypothesis, showing that firms less reliant on green technologies engage more heavily in brown lobbying, while firms with greater market power often prefer lobbying over technological investment. A growing literature also highlights the role of lobbying in green innovation. Peng et al. [2024] further show that high climate policy uncertainty increases lobbying activity, boosting short-term financial performance but reducing green innovation and raising environmental risks, highlighting a trade-off between managing regulatory uncertainty and long-term sustainability.

I examine the innovative output of firms led by lobbyist CEOs to understand whether their focus on regulatory risks affects patenting activity. I find that in the high-tech[†] sector, which is highly R&D-intensive and characterized by rapid technological advancement, strong incentives exist for continuous innovation. In this environment, lobbyist CEOs can leverage their regulatory expertise and political networks to support rather than divert innovation. Their understanding of policy landscapes and connections with policymakers and research institutions allows them to secure favorable conditions for intellectual property protection, form strategic partnerships, and influence industry standards in ways that complement technological development. As a result, firms led by lobbyist CEOs in the high-tech industry file approximately 34% more patents overall and about 18% more green patents than their non-lobbyist counterparts. The sector's competitive and innovative nature ensures that political engagement enhances innovation, in contrast to the trade-offs observed in other industries.

In other industries, firms led by lobbyist CEOs file fewer patents and green patents compared to other firms. This pattern arises because these CEOs prioritize regulatory influence and short-term financial outcomes, diverting resources and attention from research and development. Managing regulatory risks and shaping policy often overshadows investment in

[†]I define a firm as high-tech if its primary SIC code falls within the following ranges: 3570–3579, 3660–3692, 3694–3699, 3810–3829, and 7370–7379.

innovation, leading to lower patent activity overall.

To identify green patents, I use the OECD classification, which labels patents as "green" if they involve at least one environment-related technology (ENV-TECH). These patents cover areas such as environmental management, water-related adaptation technologies, and climate change mitigation technologies associated with energy generation, transmission, and distribution.

Building on prior literature assessing innovative output, I examine not only the number of patents filed, which reflects overall firm-level inventive activity, but also citations per patent, which capture the influence and recognition of each patent within the scientific and technical community. A higher citation count indicates a more impactful innovation. I further consider the economic value of patents, which reflects their potential financial return or market impact.

Using the number of patents filed, citations per patent, and the economic value of patents measured for both total patents and green patents allows for an evaluation of not only the volume of innovative output but also its quality and economic significance. For firms led by lobbyist CEOs, patterns in these measures indicate whether a focus on climate regulatory risks corresponds to reduced innovation, lower-impact inventions, or diminished economic value. Examining green patents specifically provides insight into whether these CEOs support climate-related technological solutions or deprioritize environmentally significant innovation.

I find that in the high-tech sector, firms led by lobbyist CEOs file green patents that are more highly cited, as well as green and total patents that are more economically valuable. This suggests that in technology-intensive firms, lobbying can complement rather than replace innovation. The rapid pace of technological change and intense competitive pressures create strong incentives for continuous research and development, ensuring that firms must innovate to remain competitive. In this context, lobbying does not divert resources from innovation; instead, it enhances it by helping firms secure favorable policies, R&D incentives,

and influence over industry standards that support environmentally relevant technologies. Even if lobbyist CEOs do not explicitly emphasize climate change, their political activities may indirectly facilitate the development and dissemination of innovations addressing climate challenges.

In other industries, green patents filed by firms led by lobbyist CEOs are less cited and less economically valuable compared to those of other CEOs. This pattern aligns with evidence that lobbyist CEOs generally pay less attention to climate change topics, discuss fewer climate-related opportunities, and frame them less positively in earnings calls. Together, these results suggest that in most sectors, CEO lobbying activity does not translate into more environmentally focused or impactful innovation.

I then examine how having a lobbyist CEO influences firm value through two specific channels: cost of goods sold (COGS) and sales growth. The first channel, COGS, reflects the firm's efficiency in managing production and operational costs. The analysis shows that firms led by lobbyist CEOs tend to have lower COGS, suggesting that these CEOs may leverage their experience, connections, or strategic insights from lobbying to reduce operational expenses. The second channel, sales growth, represents the firm's ability to expand revenue over time. The findings indicate that there is no significant difference in sales growth between firms run by lobbyist CEOs and those led by non-lobbyist CEOs. This suggests that while lobbyist CEOs may improve efficiency and cost management, their presence does not necessarily translate into faster revenue expansion. Overall, the results highlight that lobbyist CEOs can enhance firm value primarily through cost reduction rather than by boosting sales growth.

This paper makes several contributions to the literature on climate change opportunities and risks, CEO political activity, and innovation. First, I show that lobbyist CEOs actively shape climate-related policies in ways that reduce their firms' overall exposure to climate change. Firms led by lobbyist CEOs exhibit lower climate exposure primarily through reduced attention to climate-related opportunities, particularly positive opportunity channels,

reflecting a strategic emphasis on regulatory risk management rather than proactive adaptation. These findings highlight an important trade-off between mitigating regulatory risk and pursuing longer-term climate-related opportunities.

Second, I clarify the mechanisms through which managerial political expertise affects climate exposure by showing that lobbying is more strongly associated with regulatory and opportunity-related risks than with physical climate risks. Because physical risks materialize over longer horizons and are subject to greater uncertainty, they are less responsive to CEO political activity, underscoring the limits of lobbying as a tool for managing climate-related shocks.

Third, I contribute to the literature on innovation by demonstrating that lobbying and innovation act as substitutes in most industries but as complements in high-tech, R&D-intensive sectors. Outside of high tech, firms led by lobbyist CEOs file fewer total and green patents, receive fewer patent citations, and produce patents of lower economic value, consistent with an emphasis on regulatory influence and short-term financial objectives that crowd out long-term innovative investment. In contrast, in the high-tech sector, lobbyist CEOs are associated with more total and green patents. This reflects the role of policy expertise, networks, and regulatory influence in facilitating innovation, intellectual property protection, and standard setting in technologically dynamic environments.

Finally, I examine how these strategic choices translate into firms' operating performance. Firms led by lobbyist CEOs display systematically lower costs of goods sold (COGS), yet their sales growth is not significantly different from that of other firms. This pattern indicates that the benefits of lobbying primarily materialize through cost efficiency and regulatory positioning rather than through enhanced market demand or expansion. Consistent with the innovation findings, the relatively weak green innovation activity observed in non_high-tech industries suggests that lobbying efforts tend to prioritize internal efficiencies and policy related advantages over the development of environmentally oriented products or technologies. In contrast, in technology intensive sectors, lobbying appears to reinforce innovative activity

by supporting patenting including green innovation as a source of competitive advantage, although these effects remain highly dependent on industry context.

2 Hypotheses

H1(a): As lobbyist CEOs actively shape and influence climate policies to their advantage, firms run by lobbyist CEOs pay less attention to climate change exposure, especially positive climate change exposure, compared to other firms.

Lobbyist CEOs can mitigate or offset climate related impacts through political influence, so they have weaker incentives to emphasize or disclose climate change exposure, particularly positive exposure, compared with firms without such political advantages.

H1(b): Lobbyist CEOs pay less attention to opportunity exposure or positive opportunity exposure.

Lobbying is a key strategy for companies to mitigate immediate risks and align with short-term goals. They often view new opportunities as uncertain or difficult to pursue, choosing to rely on familiar strategies rather than invest in opportunities that may not deliver immediate returns.

H1(c): Lobbyist CEOs will pay less attention to physical climate risks compared to other CEOs..

The effects of policies related to physical shocks unfold over a longer period and are more uncertain compared to those related to opportunities or regulations.

H2(a): Firms led by lobbyist CEOs exhibit greater innovative output in high-technology industries, as reflected in higher total patents and citations. In contrast, in non-high-technology industries, firms run by lobbyist CEOs produce less innovation, as resources are diverted away from long-term research and development toward short-term or political objectives.

The effect of lobbyist CEOs on innovation depends on whether political engagement complements or substitutes for technological investment. In high-technology industries, where innovation is central to firm value and policy uncertainty is high, lobbying can reduce regulatory risk, secure subsidies, and shape standards, thereby increasing the returns to R&D and encouraging innovation. In contrast, in non-high-technology industries, innovation is less central and more incremental; lobbying mainly serves as an alternative channel to protect rents or delay regulation, diverting managerial attention and resources away from long-term R&D and toward short-term political strategies.

H2(b): Firms led by lobbyist CEOs file more green patents and receive more green patent citations in high-technology industries. In contrast, in non-high-technology industries, firms run by lobbyist CEOs produce fewer green patents and citations, as resources are diverted away from long-term research and development toward short-term or political objectives.

In high-technology industries, firms led by lobbyist CEOs exhibit higher levels of green innovation, as measured by green patent counts and citations. In these industries, political engagement complements long-term R&D investment by reducing regulatory uncertainty and increasing the expected returns to environmental innovation. In contrast, in non-high-technology industries, firms run by lobbyist CEOs exhibit lower green innovation, as lobbying activities substitute for sustainability-oriented R&D and managerial attention and financial resources are reallocated toward short-term objectives that prioritize immediate financial returns over long-term environmental investments.

H3: Firms managed by lobbyist CEOs file patents of greater importance in high-technology industries, as reflected in higher citations per patent and greater economic value. In contrast, in non-high-technology industries, firms led by lobbyist CEOs file patents of lower importance, as measured by fewer citations per patent and lower economic value.

In high-technology industries, lobbyist CEOs can leverage political connections to reduce regulatory uncertainty, secure subsidies or government contracts, influence technical standards, and protect intellectual property rights. These advantages increase the expected returns to R&D and encourage investment in long-term, high-impact innovation, resulting in more valuable and highly cited patents. In non-high-technology industries, by contrast, lobbying often substitutes for innovation: managerial attention and financial resources are diverted toward short-term objectives, protecting existing business models, delaying regulation, or maintaining market rents. As a result, patents are less important, receive fewer citations, and contribute less economic value.

H4: Lobbyist CEOs reduce the cost of goods sold (COGS) across all industries, but their presence does not significantly affect the firm's sales growth.

Lobbyist CEOs primarily affect firm performance through the cost channel rather than the revenue channel. By leveraging their regulatory knowledge, political connections, and strategic influence, these CEOs focus on reducing production and compliance costs, leading to lower costs of goods sold (COGS) across industries. In contrast, lobbying activities are less effective in directly expanding market demand or generating new products, and therefore do not significantly affect sales growth. This pattern is consistent with a strategic emphasis on operational efficiency and rent preservation rather than innovation-driven expansion, as reflected in the lower reliance on high-impact innovation as a source of revenue growth.

3 Data and descriptive statistics

3.1 Climate Exposure

For measuring the climate risk, I have used the data provided by Sautner et al. [2023] which is publicly available on https://osf.io/fd6jq/. I used the Annually (not quarterly) reports for this research. They have applied transcripts of earnings conference calls to develop

measures that capture call participants' views about firms' exposures to different dimensions of climate change in the different parts of the world. This data is annually reported for the period of 2001-2022. Figure 2 shows these variables.

[Figure 2 here]

3.2 Lobbying Activity

Lobbyist data is from Lobbyview, Kim [2018], which is available publicly. This data gives first, middle, and last names of lobbyists. Names of CEOs have different patterns in these two data sets. As a result, in the first step, I found 5 nearest full names to each name in Compustat and then if it was exactly the same as the full name in lobbyist data, I matched those two data and considered them as one person. As there is not any firm-related information available in lobbyist data set, I could not use gvkeys or other characteristics of the firms for matching name of lobbyists and CEOs.

3.3 CEO characteristics

I used Execucomp data in the period between 2000-2021 for obtaining full names of the CEOs and companies which they worked in. It also provides information about when they became CEO, when they left as CEO, and when they left the firm. If a CEO has left the company as a CEO in the first 6 months of the year, I considered the new CEO of the firm for that year. Otherwise, if a CEO has left its position in the firm in the second 6 months of the year, I considered this calendar year for the CEO of the firms.

3.4 Patent data

I used updated KPSS data for identifying patents granted to public firms constructed by Kogan, Papanikolaou, Seru, and Stoffman [2017]. This dataset has patents granted to public firms between 1926 to 2020. For classifying green and none-green patents, I have used

the IPC (International Patent Classification) code from https://patentsview.org/ . This publicly available data has all patent numbers and their IPC codes (Section, class, subclass, main group, and subgroup). I used OECD classification for identifying green patents. Green patents have at least one of the environment-related technologies (ENV-TECH) based on OECD classification. The green patents are related to subjects such as environmental management, water-related adaptation technologies, climate change mitigation technologies related to energy generation, transmission of distribution.

3.5 Identification strategy

This data is related to the identification strategy for this research. Gentry, Harrison, Quigley, and Boivie [2021] have constructed a database of CEO turnover and dismissal in S&P 1500 firms in the period of 2000-2018 and is available publicly. There are some reasons for dismissing CEOs regarding this dataset. Some of them are dismissed because of poor job performance, personal issues, or retirement. I have used data of CEOs who had involuntary death or illness which are 95 CEOs in total.

4 Matching names

I matched the CEO names in Compustat with those in Data on lobbying activities were obtained from Lobbyview. To obtain names of lobbyist CEOs. The matching procedure is as follows, First, I divide the first and last names into two-letter and three-letter segments, vectorize them, count the occurrences, and store them in an array that contains the union of all character sets. Then, I calculate the cosine similarity between the vectors corresponding to each name. In the next step, I compare each name with the most similar one, which has the smallest cosine distance, and if the first and last names of the individuals do not match, I remove that name. Finally, if the individual has a middle name, the found name must include it; otherwise, it is removed.

You can find the number of lobbyist CEOs, non-lobbyist CEOs, and the ratio of lobbyist CEOs to all CEOs in each year from 2001 to 2022 in Figure 3. What I observe is that the ratio of lobbyist CEOs has decreased in recent years. It can be due to growing public and regulatory scrutiny, which has increased the focus on corporate governance and ethical leadership. Companies are now prioritizing leaders with strong operational, technological, or industry-specific expertise to navigate challenges like sustainability and digital transformation. Additionally, concerns about public perception and the importance of corporate social responsibility have made firms more cautious about appointing CEOs with strong lobbying backgrounds. Stricter lobbying regulations and disclosure requirements have also made it less attractive for companies to have lobbyist CEOs, contributing to this decline.

[Figure 3 here]

You can see the distribution of firm-year observations with lobbyist and non-lobbyist CEOs across Fama-French 12 industry groups, ranked from the highest to the lowest ratio of lobbyist CEOs in figure 4. Utilities industry has the highest ratio of Lobbyist CEOs which is consistent with prior findings of Leippold et al. [2024]. They show utilities spend the largest amount of lobbying on both pro- and anti-climate lobbying activities.

[Figure 4 here]

I also report percentage of firm-year observations with lobbyist CEOs to all the firm year observations in my dataset in each industry. The results are reported in table 1. The utility Sector has the highest ratio of lobbyist CEOs which is 10.18%. after that healthcare and business equipmen sectors have the highest ratio of lobbyist CEOs during the period of 2001 to 2022. It is consistent with the previous literature regarding patterns of lobbying in different industries. Leippold et al. [2024] have found that Anti-climate lobbying is highly concentrated. Firms in utilities and petroleum and natural gas spending the largest total amounts. Pro-lobbying is relatively more dispersed across sectors. Interestingly, utility sector

also spends the largest total amount. It is followed by machinery, automobiles and trucks, and electronic equipment. Firms that primarily use coal and gas as a fuel have significantly more anti-climate lobbying.

[Table 1 here]

5 Lobbyist CEOs and firms' exposure to climate change measures

Table 2 reports the summary statistics for the exposure measures (for clarity, the measures are multiplied by 10^3). Lobbyist CEOs are on average older and more tenured, and their firms are larger.

[Table 2 here]

To examine the correlation between lobbyist CEOs and a firms' exposure to climate change measures, I estimate the following ordinary least squares (OLS) regression:

$$\text{Climate Change measure}_{i,t+1} = \alpha + \beta \text{ Lobbyist CEO}_{i,t} + \gamma Z_{i,t} + \text{Industry}_i + \text{year}_t + \varepsilon_{i,t} \quad (1)$$

Climate Change measure$_{i,t+1}$ is one of the variables constructed by Sautner et al. (2023) in their publicly available file for firm i at time t+1. $Industry_i$ is industry fixed effect. Industries are defined based on Fama-French 12 industry group and $year_t$ is year fixed effect. I have also used control variables ($Z_{i,t}$) which are firm controls and CEO controls. Firm controls are log of total assets (firm size), capital expenditure/assets, firm age and CEO controls are CEO age, length (in years) of a CEO's tenure.

[Table 3 here]

I run the regression both with and without control variables. The results of the first regression are reported in table 3 and the results of the regression with considering control variables are reported in table 4 panel A to D.

[Table 4 here]

Table 4 panel A shows the results for the regression for climate change exposure measures. climate change exposure, climate change positive sentiment and climate change overall sentiment are negative. it shows lobbyist CEOs pay less attention to climate change topics and talk less about them in the transcripts of earnings conference calls. They also do not talk about climate change in a positive way as much as other CEOs do. Lastly, lobbyist CEOs do not consider climate change topics as much as other CEOs in the conference calls. Climate change risk measure is not different between lobbyist CEOs and the rest of the CEOs which means that these two groups of CEOs pay the same attention to the risks related to climate change.

Panel B shows the result for the regression for climate change opportunity exposure measures. Climate change opportunity exposure, climate change opportunity positive sentiment and climate change opportunity overall sentiment are negative. It shows that lobbyist CEOs talk less about opportunities regarding climate change, and they do not consider opportunities that climate change can have for the firm with positive sentiment in comparison to other CEOs. They also do not talk about climate change opportunities (positive and negative) as much as other CEOs do. Instead, talking about climate change opportunities with negative tone is not different between lobbyist CEOs and non-lobbyist CEOs as climate change opportunity negative is not different with zero in panel B. Furthermore, paying attention to risks related to climate change opportunities is not different in transcripts of earnings conference calls for firms run by lobbyist CEOs and other firms.

Panel C of table 4 examines the relation between lobbyist CEOs and climate change regulatory exposure measures. The result of this part shows that lobbyist CEOs talk less about climate change regulatory in the overall and in a positive way. But they consider

climate change regulatory risks as much as other CEOs. They also talk about climate change regulatory with negative tone just as much as other CEOs. In short, it seems lobbyist CEOs do not consider climate change exposures as positive as other CEOs consider it.

Lastly, panel D shows the results of the equation for the climate change physical exposure. In contrast to the other three panels, paying attention to climate change physical risk is not the same between lobbyist CEOs and non-lobbyist CEOs, instead, lobbyist CEOs pay less attention to climate change risks compared to other CEOs. Results for all other dependent variables here are not different between lobbyist CEOs and non-lobbyist CEOs.

6 Identification strategy

To establish a causal relationship between lobbyist CEOs and exposure of firms to climate change measures, I used an exogenous shock which is dismissal of the CEO from the firm because of involuntary death or illness. There are 95 observations for dismissal of the CEO due to involuntary death or illness. There are 9 lobbyist CEO between these 95 people. Among these exogenous CEO turnovers, a set of Treated turnovers is defined as cases where a lobbyist CEO is replaced with a non-lobbyist CEO. To obtain a sample of Non treated turnovers, I consider turnovers from a non-lobbyist CEO to another non- lobbyist CEO. I have employed a difference-in-difference methodology to analyze differences in post-turnover cc-exposure outcomes between Treated and Nontreated firms.

While I examine a comprehensive suite of climate related metrics including physical and regulatory risks, my primary identification strategy focuses on total climate change exposure (cc_expo) and opportunity exposure (op_expo) for two fundamental reasons. First, these metrics demonstrate the highest degree of statistical sensitivity to the presence of a Lobbyist CEO, with coefficients significant at the 1% level across our primary specifications. Second, from a model-fit perspective, these variables yield the highest explanatory power within my sample. Specifically, the regression for cc_expo achieves an R^2 of 0.411, nearly double the

explanatory power found in other categories like regulatory exposure (0.187) or physical exposure (0.015). This suggests that the intersection of executive lobbying expertise and firm level climate strategy is most clearly manifested in the firm's overall climate discourse and its proactive identification of climate-related opportunities.

Table 5 reports the results for this section. The positive coefficients for both cc-expo and op-expo indicate that when a lobbyist CEO is replaced by a non-lobbyist CEO, the firm's attention to climate change exposure and climate change opportunity exposure increases more than when a non-lobbyist CEO is replaced by another non-lobbyist CEO. This pattern suggests that the previous findings reflect a causal relationship rather than being driven by endogeneity concerns.

[Table 5 here]

7 Lobbyist CEOs and (green) innovation

Romer [1990] has found that Innovation is a fundamental source of competitive advantage. Mkrtchyan, Bai, Dai, and Wan [2025] showed that R&D of the firm is the innovation input, and patents are the innovative output of the firm. Hutton et al. [2014] also show that the personal political preferences of corporate managers influence corporate policies. Specifically, Republican managers, who are likely to have conservative personal ideologies, adopt and maintain more conservative corporate policies. Those firms tend to have lower capital and research and development (R&D) expenditures

This raises the question of what happens when a firm hires a lobbyist CEO? Does it have any effect on the firm's innovative output? I follow the previous literature and use two measures of innovation output in the firms. These include all patents filed each year that are eventually granted and the total citations of the patents in that year.

To examine the correlation between lobbyist CEOs and a firms' total patents, estimate

the following ordinary least squares (OLS) regressions:

$$\text{Number of total patents}_{i,t+k} = \alpha + \beta \text{ Lobbyist CEO}_{i,t} + \gamma Z_{i,t} + \text{Industry}_i + \text{Year}_t + \varepsilon_{i,t} \quad (2)$$

In this specification, $k \in \{1, 2, 3\}$ denotes the lead periods for the dependent variable, allowing for the observation of innovation outcomes over a three-year horizon. To account for time-invariant industry characteristics and common macroeconomic shocks, I include industry fixed effects (Industry_i), defined by the Fama-French 12-industry classification, and year fixed effects (Year_t).

The number of total $\text{patents}_{i,t+k}$ is measured as the natural logarithm of the number of patents plus one. Control variables ($Z_{i,t}$) include firm size (log of total assets), cash/assets, leverage, and return on assets (ROA). I also run the following regression for the citation counts:

$$\text{Number of total citations}_{i,t+k} = \alpha + \beta \text{ Lobbyist CEO}_{i,t} + \gamma Z_{i,t} + \text{Industry}_i + \text{Year}_t + \varepsilon_{i,t} \quad (3)$$

Table 6 Panel A reports the results for total patents, while Panel B presents the results for the total number of citations. In the high-tech sector, firms led by lobbyist CEOs file significantly more patents, and these patents receive more citations. Notably, this positive impact is not a temporary shock; the coefficients for lobbyist CEOs in high-tech firms grow in both magnitude and statistical significance from $t+1$ to $t+3$, indicating that the benefits of political engagement for innovation accumulate and intensify over time. This is because lobbying in technology-intensive industries is closely linked to shaping industry standards, securing R&D incentives, and protecting intellectual property, which provides a sustained foundation for innovative activity.

There are three primary reasons for the increased and persistent innovation by lobbyist CEOs in the high-tech sector. First, innovation is the primary competitive margin, where firms compete through technological advancement rather than cost leadership. Second, lob-

byist CEOs in this sector do not substitute lobbying for R&D; instead, lobbying is used to protect and commercialize innovation, ensuring R&D investments yield high-quality results over a multi-year horizon. Third, high-tech firms possess the organizational capacity and absorptive ability to strategically integrate political engagement into existing innovation processes.

In contrast, for non-high-tech industries, firms led by lobbyist CEOs file fewer patents and receive fewer citations. This negative relationship also persists and slightly intensifies through $t + 3$. This suggests that in these sectors, lobbyist CEOs prioritize regulatory influence and rent-seeking over innovation. By focusing on lobbying, these CEOs allocate fewer resources and less attention to R&D, leading to a long-term decline in innovative output as political connections are used to maintain competitive advantage rather than investing in uncertain technological development.

[Table 6 here]

Hall, Jaffe, and Trajtenberg [2000] suggest that patent counts alone provide an incomplete measure of innovative output, given that patents vary widely in their economic importance. To examine the relationship between lobbyist CEOs and innovation quality, I use two other measures of corporate innovation importance: the number of citations per patent which is used by Gao and Zhang [2017] and the patent's economic value as estimated by Kogan et al. [2017].

Table 7 Panel A reports the results for citations per patent, while Panel B presents the findings for patent economic value. In the high-tech sector, firms led by lobbyist CEOs demonstrate a significant and growing advantage in innovation quality. For these firms, the positive impact on patent economic value is statistically significant at $t + 1$ and continues to intensify through $t + 3$, where the coefficient reaches its peak. Furthermore, while the impact on citations per patent is not immediate, it becomes statistically significant by $t + 3$, suggesting that the influential nature of high-tech innovation facilitated by lobbyist CEOs takes time to be fully recognized by the industry. This trend reflects how lobbying

in technology-intensive sectors is strategically used to secure R&D incentives and protect intellectual property, which directly enhances the commercial and influential value of the firm's output over a multi-year horizon.

In contrast, for firms in non-high-tech industries, the presence of a lobbyist CEO is associated with a decrease in both the economic value and the citation impact of their patents. In these sectors, the negative effect on economic value persists and slightly worsens over time. This indicates that for most other industries, lobbyist CEOs may be prioritizing short-term regulatory gains and rent-seeking behavior, which tends to crowd out the resources and attention necessary for high-impact innovation. Consequently, while lobbying supports the "moat" of a high-tech firm, it appears to act as a substitute for genuine technological progress in more traditional sectors.

[Table 7 here]

But what happens regarding CEOs actions about climate change? Do they have more green innovation or less? To examine the correlation between lobbyist CEOs and a firms' green patents, estimate the following ordinary least squares (OLS) regressions:

$$\text{Number of green patents }_{i,t+k} = \alpha + \beta \text{ Lobbyist CEO}_{i,t} + \gamma Z_{i,t} + \text{Industry}_i + \text{Year}_t + \varepsilon_{i,t} \quad (4)$$

In this specification, $k \in \{1, 2, 3\}$ denotes the lead periods for the dependent variable, allowing for the observation of innovation outcomes over a three-year horizon. I include industry fixed effects (Industry_i), defined by the Fama-French 12-industry classification, to control for time-invariant industry characteristics, and year fixed effects (Year_t) to account for common macroeconomic shocks.

The Number of green patents$_{i,t+k}$ is measured as the natural logarithm of the number of green patents plus one. Control variables ($Z_{i,t}$) include firm size (log of total assets), cash-to-assets ratio, leverage, and return on assets (ROA).

[Table 8 here]

I repeat regression (4), this time using green citations, citations per green patent, and economic value of green patents as the dependent variables. The results are presented in Tables 8 and 9. The results across Tables 8 and 9 reveal a stark divergence in how lobbyist CEOs influence green innovation depending on the industry context. For the high-tech sector, the presence of a lobbyist CEO is associated with a significant and growing increase in both the quantity and quality of green innovation. Specifically, the positive impact on the number of green patents grows from 0.14 at $t+1$ to 0.18 by $t+3$ (Table 8, panel A), while the economic value of these patents increases from 0.23 to 0.29 over the same period (Table 9, panel B).

This suggests that in technology-intensive industries, political engagement acts as a strategic complement to green innovation. Lobbying likely allows these CEOs to secure critical R&D incentives and shape industry standards that favor their environmentally relevant technologies. While these CEOs may not emphasize climate change in public communications, their political activities effectively provide the regulatory "moat" and financial resources necessary to facilitate high-impact green development over a multi-year horizon.

In contrast, for non-high-tech industries, lobbyist CEOs appear to detract from green innovation. In these sectors, firms lead by lobbyist CEOs file fewer green patents, and those patents are consistently less impactful and valuable. This negative effect is persistent; for instance, the number of green patents remains significantly lower through $t+3$ (Table 8, panel A), and the citation impact of these patents remains negative or negligible (Table 9, panel B).

These findings align with the results in Table 4, which indicated that lobbyist CEOs in traditional industries pay less attention to climate-related opportunities. Together, the evidence suggests a substitution effect in non-high-tech sectors: CEOs prioritize rent-seeking and regulatory influence to maintain existing "brown" business models rather than investing in the uncertain and resource-intensive process of green technological development. Consequently, in most industries, the focus on political influence directly crowds out the firm's

capacity for environmentally impactful innovation.

[Table 9 here]

8 Firm value

In the last part of this study, I examine how lobbyist CEOs affect firms through two channels of operating efficiency: cost of goods sold (COGS) and sales growth. Table 9 presents these results, with Panel A showing the impact on COGS and Panel B on sales growth. The findings indicate that firms led by lobbyist CEOs have lower COGS, suggesting that these CEOs use their lobbying experience, regulatory knowledge, and strategic connections to improve operational efficiency and reduce production costs. However, sales growth does not differ significantly between firms led by lobbyist CEOs and those led by non-lobbyist CEOs, implying that while these CEOs enhance cost management, they do not necessarily drive higher revenue growth. This pattern suggests that lobbyist CEOs create value primarily through efficiency improvements rather than market expansion.

[Table 10 here]

9 Conclusion

Lobbyist CEOs actively engage in shaping climate policies, which can reduce their firms' exposure to climate change relative to others. Their presence and influence, however, vary considerably across industries, reflecting differences in climate-related risks and opportunities. By prioritizing regulatory management over technological innovation, lobbyist CEOs can alter the rules in their favor, often more efficiently than by directly transforming firm operations. This strategic focus explains why these firms tend to be less attentive to climate-related opportunities, particularly positive opportunity channels, highlighting a trade-off between managing regulatory risk and pursuing proactive innovation.

Firms led by lobbyist CEOs tend to have lower overall climate change exposure compared to other firms. Lobbyist CEOs pay less attention to opportunity exposure, particularly opportunities with positive potential. Lobbying serves as a key strategy to mitigate immediate risks and align with short-term objectives. These firms often perceive new opportunities as uncertain or difficult to pursue and therefore rely on familiar regulatory strategies rather than

Physical exposure, by contrast, tends to be less strongly associated with lobbying. The effects of policies or shocks related to physical risks unfold over a longer horizon and are more uncertain than those associated with opportunities or regulatory pressures, making them less responsive to CEO political activity.

My analysis reveals a sharp contrast in how lobbyist CEOs influence corporate innovation, contingent on industry R&D intensity. Consistent with the rent seeking hypothesis, I find that in non-high-tech sectors, firms led by lobbyist CEOs file significantly fewer patents, both general and green. This decline reflects a substitution effect: these executives prioritize short term regulatory management and political influence over long term research and development. In traditional industries, the focus on navigating existing regulatory frameworks appears to crowd out the resources and managerial attention necessary for technological adaptation.

However, the high-tech sector presents a robust exception. In this R&D intensive environment, I document that firms managed by lobbyist CEOs file approximately 34% more total patents and 18% more green patents than their non lobbyist counterparts. I attribute this to the complementary nature of political capital and innovation at the technological frontier. Lobbyist CEOs in this sector leverage their regulatory expertise and networks not to bypass competition, but to secure intellectual property rights, influence industry standards, and facilitate public private research partnerships.

Crucially, this increase in quantity does not come at the expense of quality. My results show that patents filed by lobbyist CEOs in the high-tech sector, including green patents,

garner significantly higher forward citation counts and possess greater economic value. This indicates that political connections in the technology sector are instrumental in enhancing the commercial viability and impact of innovation. Ultimately, my findings suggest that while lobbyist CEOs generally act as a drag on innovation in regulated traditional industries, they act as catalysts for high value technological advancement in the knowledge economy.

These patterns are also reflected in operational outcomes. Firms led by lobbyist CEOs exhibit lower cost of goods sold (COGS) across all sectors, but they do not experience higher or lower sales growth. This suggests that while lobbyist CEOs may achieve efficiency gains or cost reductions, such improvements do not necessarily translate into stronger market growth. Similarly, the limited green innovation in most industries indicates that lobbying tends to focus on internal efficiency or strategic regulatory advantages rather than on creating environmentally focused value. In technology-intensive sectors , however, lobbying can complement innovation, helping align patenting activity, including green innovation, with competitiveness and strategic advantage, though such effects remain highly industry-specific.

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Figure 1: Distribution of registered individual lobbyists and total lobbying expenditures over time

This graph shows Total number of lobbyists (The number of unique, registered lobbyists who have actively lobbied) and total lobbying spending from 1998 to 2023. All dollar values are adjusted for inflation.
This data is available at OpenSecrets.org [OpenSecrets, 2024].

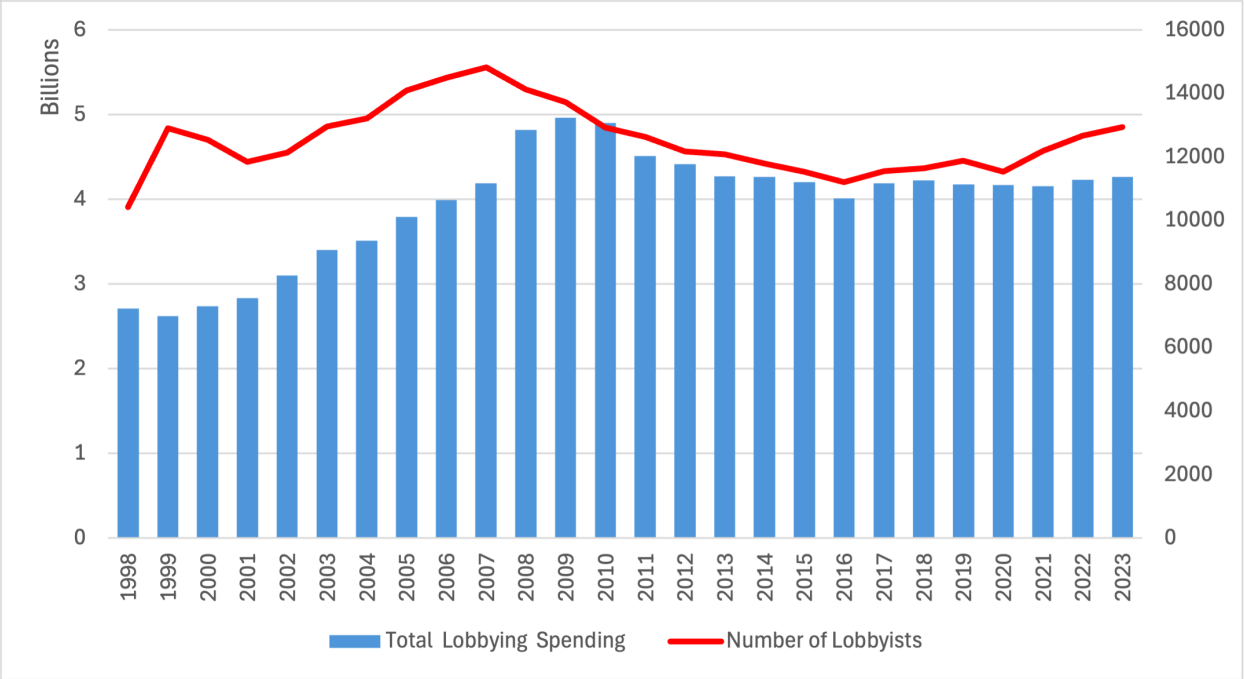


Figure 2: Climate change measures

The graph displays the 20 climate change measures provided in the dataset from Sautner et al. [2023]. In the graph, abbreviations are used as follows: 'Expo' represents 'exposure,' 'pose' denotes 'positive,' 'neg' stands for 'negative,' and 'sent' indicates 'sentiment.' For instance, 'cc_pose' reflects the measure for bigrams related to climate change mentioned in a positive context.

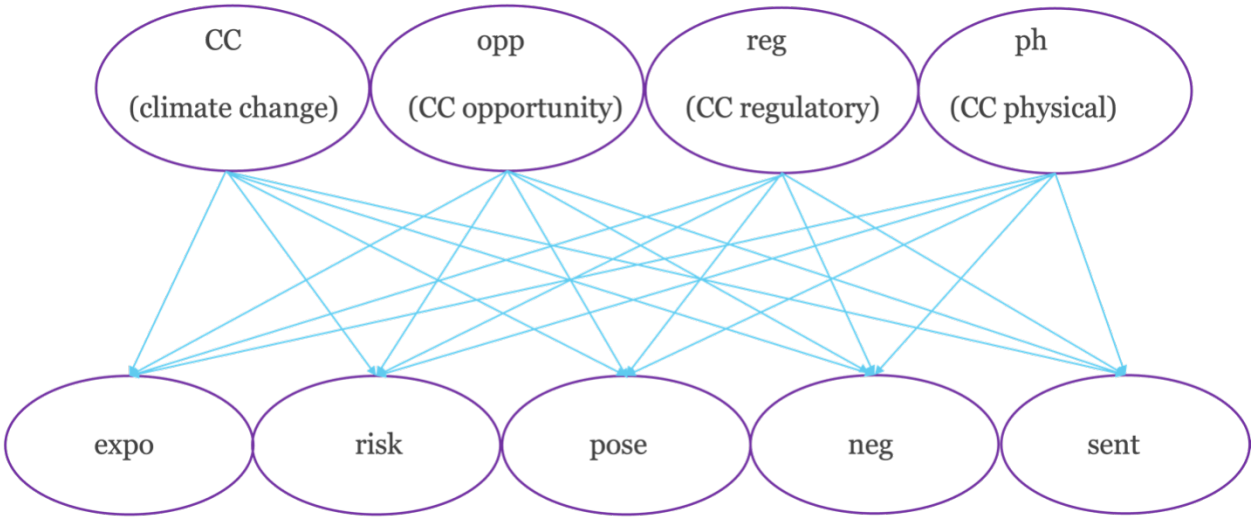


Figure 3: Sample distribution of lobbyist CEOs by year

This figure presents the annual distribution of lobbyist CEOs versus non-lobbyist CEOs from 2001 to 2022. The red line indicates the percentage of lobbyist CEOs each year.

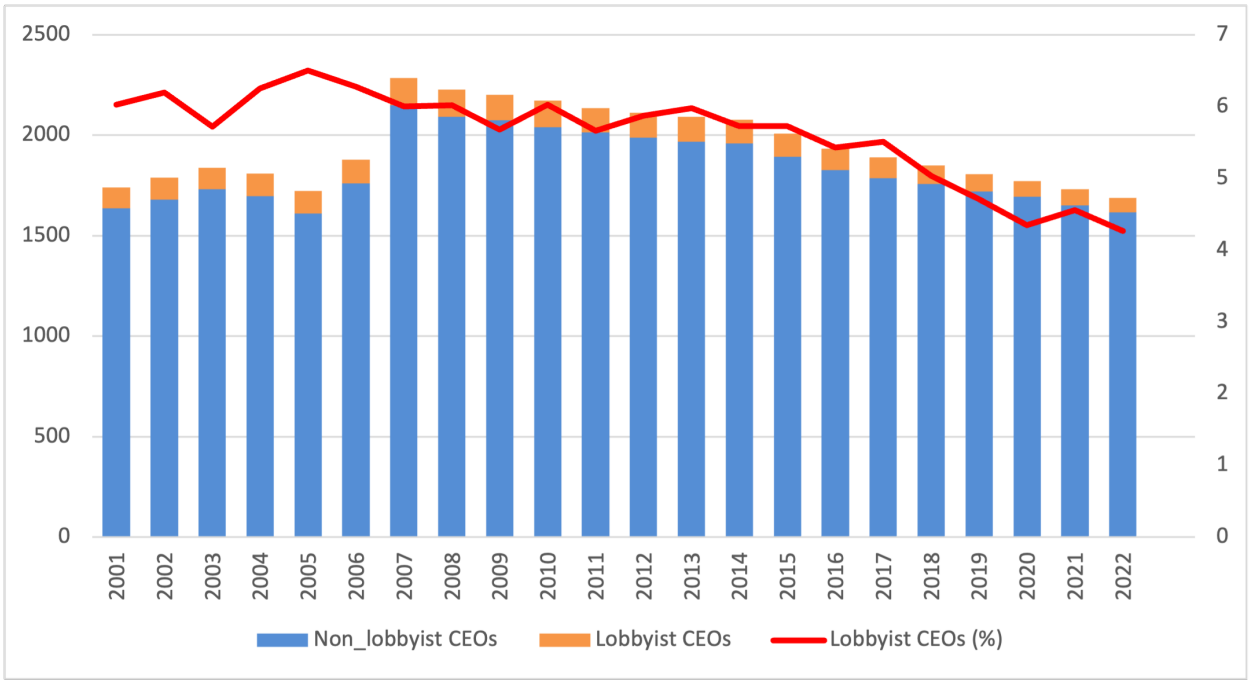


Figure 4: Distribution of firm-year observations with lobbyist & non-lobbyist CEOs across industries

The graph shows the distribution of firm-year observations with lobbyist and non-lobbyist CEOs across Fama-French 12 industry groups, ranked from the highest to the lowest ratio of lobbyist CEOs. Utilities industry has the highest ratio of Lobbyist CEOs which is consistent with prior findings of Leippold et al. (2024). They show utilities spend the largest amount of lobbying on both pro- and anti-climate lobbying activities.

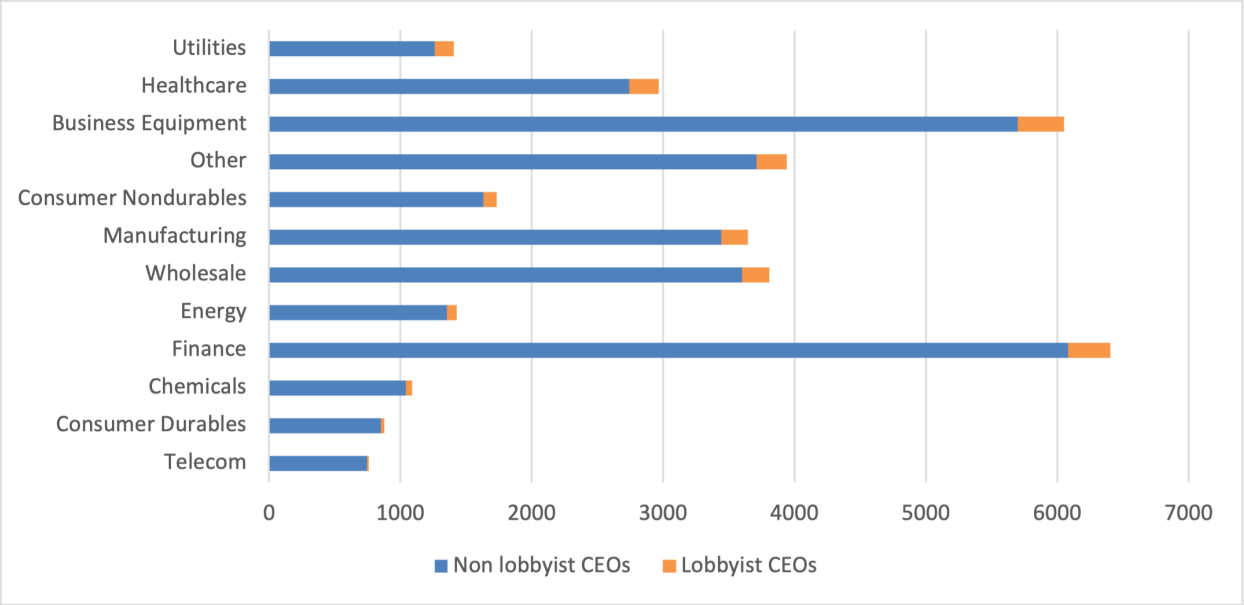


Table 1: Ratio of lobbyist CEOs to all CEOs in different industries

This table reports the percentage of lobbyist CEOs relative to all CEOs in each industry based on firm-year observations. The utilities sector has the highest ratio of firm-year observations with lobbyist CEOs among all sectors, followed by Healthcare and Business Equipment, with 7.64% and 5.96%, respectively.

Division	Lobbyist CEOs (%)
Utilities	10.18
Healthcare, medical equipment, and drugs	7.64
Computer, Software, and electronic equipment	5.96
Oil, gas, coal extraction and products	5.8
Mines, construction, building materials, transportation, and entertainment	5.66
Food, tobacco, textile, apparel, leather, and toys	5.49
Machinery, trucks, planes, paper, and commercial printing	5.45
Wholesale, retail, and some services	5.44
Financials	5.06
Chemicals and applied products	4.36
Cars, TV's, furniture, and household appliances	2.98
Telephone and television transmission	1.82

Table 2: Summary statistics

This table presents the mean and standard deviation of all climate change measures, alongside the fixed effects applied in this section of the analysis. These statistics provide a clear understanding of the central tendency and variability of the climate change metrics, as well as the other factors controlled for in the model, offering a comprehensive overview of the data used in this study.

	Non-lobbyist CEOs			Lobbyist CEOs		
	N	Mean	Std	N	Mean	Std
Dependent variables						
cc_expo	37419	89.537	228.181	2197	99.036	228.003
cc_risk	37419	3.110	14.442	2197	3.789	14.518
cc_pos	37419	37.868	108.102	2197	39.395	96.930
cc_neg	37419	-17.039	45.567	2197	-20.360	48.653
cc_sent	37419	20.829	86.302	2197	19.035	71.313
op_expo	37419	26.043	104.412	2197	27.782	92.741
op_risk	37419	0.877	7.756	2197	0.956	5.870
op_pos	37419	11.202	51.698	2197	11.609	45.604
op_neg	37419	-4.039	18.503	2197	-4.615	19.464
op_sent	37419	7.163	42.217	2197	6.994	35.128
rg_expo	37419	4.253	18.909	2197	5.053	21.572
rg_risk	37419	0.143	1.766	2197	0.220	2.380
rg_pos	37419	1.826	10.640	2197	1.890	9.253
rg_neg	37419	-0.851	7.113	2197	-1.054	6.673
rg_sent	37419	0.975	10.666	2197	0.837	8.866
ph_expo	37419	1.180	6.896	2197	1.116	8.023
ph_risk	37419	0.044	0.769	2197	0.014	0.327
ph_pos	37419	0.364	3.774	2197	0.294	2.577
ph_neg	37419	-0.384	3.223	2197	-0.396	3.622
ph_sent	37419	-0.020	3.963	2197	-0.102	3.866
Other Variables						
CEO tenure	37419	7.048	7.235	2197	7.332	7.200
CEO age	37363	55.104	7.339	2197	55.928	6.592
Firm age	37419	2.990	0.801	2197	3.075	0.779
Firm size	37419	8.072	1.860	2197	8.166	1.791
Capex/asset	31822	0.041	0.051	1927	0.040	0.046

Table 3: Climate change measures without controls

Panel A: Results of the OLS regression for Climate Change exposure, Climate Change risk, Climate Change positive sentiment, Climate Change negative sentiment, Climate Change overall sentiment (Climate Change positive sentiment + Climate Change negative sentiment). The regression includes industry and year fixed effects.

	cc_expo	cc_risk	cc_pos	cc_neg	cc_sent
Const	80.79***	2.35***	40.19***	-12.79***	27.4***
	(42.59)	(15.67)	(37.6)	(-33.33)	(30.91)
Lobbyist CEO	-13.98***	-0.07	-6.13***	0.64	-5.49***
	(-3.87)	(-0.22)	(-3.25)	(0.72)	(-3.41)
Number of observations	35129	35129	35129	35129	35129
R^2	0.408	0.116	0.248	0.292	0.118

Panel B: Results of the OLS regression for Climate Change opportunity exposure, Climate Change opportunity risk, Climate Change opportunity positive sentiment, Climate Change opportunity negative sentiment, Climate Change opportunity overall sentiment. The regression includes industry and year fixed effects.

	op_expo	op_risk	op_pos	op_neg	op_sent
Const	27.87***	0.83***	12.94***	-3.62***	9.32***
	(27.63)	(8.88)	(24.42)	(-20.26)	(20.9)
Lobbyist CEO	-6.11***	-0.19	-2.5**	0.44	-2.07**
	(-3.34)	(-1.34)	(-2.49)	(1.04)	(-2.49)
Number of observations	35129	35129	35129	35129	35129
R^2	0.245	0.055	0.165	0.156	0.105

Panel C: Results of the OLS regression for Climate Change regulatory exposure, Climate Change regulatory risk, Climate Change regulatory positive sentiment, Climate Change regulatory negative sentiment, Climate Change regulatory overall sentiment (Climate Change regulatory positive sentiment + Climate Change regulatory negative sentiment). The regression includes industry and year fixed effects.

	rg_expo	rg_risk	rg_pos	rg_neg	rg_sent
Const	1.92***	0.04***	1.17***	-0.4***	0.78***
	(18.49)	(3.6)	(13.08)	(-9.98)	(9.06)
Lobbyist CEO	-0.37	0.05	-0.38*	-0.0	-0.38*
	(-0.86)	(0.98)	(-1.85)	(-0.02)	(-1.77)
Number of observations	35129	35129	35129	35129	35129
R^2	0.182	0.021	0.084	0.047	0.025

Panel D: Results of the OLS regression for Climate Change physical exposure, Climate Change physical risk, Climate Change physical positive sentiment, Climate Change physical negative sentiment, Climate Change physical overall sentiment (Climate Change physical positive sentiment + Climate Change physical negative sentiment). The regression includes industry and year fixed effects.

	ph_expo	ph_risk	ph_pos	ph_neg	ph_sent
Const	0.64***	0.03***	0.3***	-0.18***	0.12***
	(9.92)	(3.37)	(7.58)	(-6.85)	(3.12)
Lobbyist CEO	-0.12	-0.03***	-0.08	-0.02	-0.09
	(-0.64)	(-3.33)	(-1.15)	(-0.18)	(-0.99)
Number of observations	35129	35129	35129	35129	35129
R^2	0.014	0.002	0.006	0.005	0.002

Table 4: Climate change measures with controls

Panel A: Results of the OLS regression for Climate Change exposure, Climate Change risk, Climate Change positive sentiment, Climate Change negative sentiment, Climate Change overall sentiment (Climate Change positive sentiment + Climate Change negative sentiment). The regression includes industry and year fixed effects. Control variables are included as well.

	cc_expo	cc_risk	cc_pos	cc_neg	cc_sent
Const	45.66***	1.71***	28.61***	-6.89***	21.72***
	(5.89)	(3.1)	(7.39)	(-3.78)	(6.81)
Lobbyist CEO	-15.61***	-0.08	-6.73***	0.71	-6.02***
	(-4.17)	(-0.24)	(-3.46)	(0.78)	(-3.63)
Firm size	2.19***	0.09*	1.3***	-0.29*	1.01***
	(3.33)	(1.79)	(3.96)	(-1.91)	(3.72)
Capex	42.44*	-1.1	4.08	2.12	6.21
	(1.66)	(-0.73)	(0.33)	(0.38)	(0.63)
Firm age	1.62	0.09	0.59	-0.49*	0.1
	(1.24)	(0.85)	(0.84)	(-1.73)	(0.16)
CEO age	0.26*	-0.01	0.02	-0.05	-0.03
	(1.85)	(-0.71)	(0.24)	(-1.4)	(-0.53)
CEO tenure	-0.05	0.02*	-0.05	-0.0	-0.05
	(-0.37)	(1.71)	(-0.82)	(-0.04)	(-0.97)
Number of observations	32619	32619	32619	32619	32619
R^2	0.411	0.119	0.249	0.296	0.118

Panel B: Results of the OLS regression for Climate Change opportunity exposure, Climate Change opportunity risk, Climate Change opportunity positive sentiment, Climate Change opportunity negative sentiment, Climate Change opportunity overall sentiment (Climate Change opportunity positive sentiment + Climate Change opportunity negative sentiment). The regression includes industry and year fixed effects. Control variables are included as well.

	op_expo	op_risk	op_pos	op_neg	op_sent
Const	22.23***	1.35***	10.32***	-3.04***	7.28***
	(5.77)	(4.34)	(5.48)	(-3.58)	(4.72)
Lobbyist CEO	-6.46***	-0.17	-2.65**	0.43	-2.22***
	(-3.43)	(-1.21)	(-2.55)	(1.0)	(-2.6)
Firm size	0.96***	-0.04	0.46***	-0.0	0.45***
	(2.87)	(-1.41)	(2.84)	(-0.01)	(3.52)
Capex	52.61***	1.46*	14.74***	-4.73**	10.01**
	(4.4)	(1.86)	(2.66)	(-2.02)	(2.17)
Firm age	0.32	0.12**	0.37	-0.32***	0.05
	(0.51)	(2.33)	(1.16)	(-2.78)	(0.17)
CEO age	-0.07	-0.01**	-0.04	0.01	-0.03
	(-0.96)	(-2.48)	(-1.2)	(0.46)	(-1.26)
CEO tenure	-0.02	0.02*	0.01	0.02	0.03
	(-0.25)	(1.87)	(0.32)	(1.33)	(0.99)
Number of observations	32619	32619	32619	32619	32619
R^2	0.248	0.056	0.168	0.158	0.107

Panel C: Results of the OLS regression for Climate Change regulatory exposure, Climate Change regulatory risk, Climate Change regulatory positive sentiment, Climate Change regulatory negative sentiment, Climate Change regulatory overall sentiment (Climate Change regulatory positive sentiment + Climate Change regulatory negative sentiment). The regression includes industry and year fixed effects. Control variables are included as well.

	rg_expo	rg_risk	rg_pos	rg_neg	rg_sent
Const	-3.6***	-0.21**	-1.17***	0.65**	-0.52
	(-4.68)	(-2.52)	(-2.71)	(2.09)	(-1.18)
Lobbyist CEO	-0.58	0.04	-0.49**	0.02	-0.48**
	(-1.31)	(0.73)	(-2.37)	(0.12)	(-2.17)
Firm size	0.64***	0.04***	0.3***	-0.11***	0.19***
	(10.22)	(5.79)	(8.21)	(-4.74)	(5.07)
Capex	-9.11***	-0.5**	-3.19**	2.25***	-0.94
	(-4.12)	(-2.33)	(-2.55)	(3.05)	(-0.79)
Firm age	-0.37***	-0.03**	-0.1	0.08*	-0.02
	(-2.74)	(-2.35)	(-1.2)	(1.65)	(-0.19)
CEO age	0.05***	0.0	0.01	-0.01	0.0
	(3.19)	(1.18)	(1.37)	(-1.61)	(0.24)
CEO tenure	-0.04***	-0.0	-0.02**	-0.0	-0.02*
	(-3.37)	(-0.62)	(-2.09)	(-0.28)	(-1.93)
Number of observations	32619	32619	32619	32619	32619
R^2	0.187	0.022	0.088	0.048	0.027

Panel D: Results of the OLS regression for Climate Change physical exposure, Climate Change physical risk, Climate Change physical positive sentiment, Climate Change physical negative sentiment, Climate Change physical overall sentiment (Climate Change physical positive sentiment + Climate Change physical negative sentiment). The regression includes industry and year fixed effects. Control variables are included as well.

	ph_expo	ph_risk	ph_pos	ph_neg	ph_sent
Const	0.08 (0.24)	-0.03 (-1.03)	0.16 (1.06)	0.05 (0.39)	0.22 (1.25)
Lobbyist CEO	-0.1 (-0.5)	-0.03*** (-3.15)	-0.07 (-1.04)	-0.01 (-0.15)	-0.08 (-0.89)
Firm size	-0.01 (-0.46)	0.0* (1.88)	-0.01 (-0.34)	0.0 (0.2)	-0.0 (-0.19)
Capex	0.22 (0.28)	0.04 (0.45)	-0.13 (-0.31)	-0.03 (-0.08)	-0.16 (-0.35)
Firm age	0.09 (1.54)	-0.0 (-0.53)	0.11*** (3.48)	-0.03 (-1.09)	0.08** (2.54)
CEO age	0.01 (1.63)	0.0 (0.97)	-0.0 (-0.91)	-0.0 (-1.16)	-0.01* (-1.72)
CEO tenure	-0.0 (-0.95)	-0.0 (-0.82)	0.0 (0.27)	-0.0 (-0.66)	-0.0 (-0.37)
Number of observations	32619	32619	32619	32619	32619
R^2	0.015	0.002	0.006	0.006	0.002

Table 5: Identification strategy

This table presents the results of a difference-in-differences analysis examining the causal effect of lobbyist CEOs on firms' exposure to climate change measures. The exogenous shock is defined as CEO turnover due to involuntary death or illness. Treated firms are those where a lobbyist CEO is replaced by a non-lobbyist CEO, while Non-treated firms experience a turnover from one non-lobbyist CEO to another.

	cc_expo	op_expo
Const	-1.22	-0.33
	(-0.95)	(-0.58)
Treated*Turnover	2.92***	1.24***
	(3.46)	(3.37)
Firm size	-0.08	-0.02
	(-0.62)	(-0.4)
Capex	4.19	1.56
	(1.37)	(1.17)
Firm Age	0.72**	0.19
	(2.24)	(1.33)
Number of observations	88	88
R^2	0.214	0.169

Table 6: Innovation outputs

Panel A: This Table presents results from ordinary least squares regression for number of all patents filed in a given year. Columns (1)-(3) report the results for non-high-tech sector and columns (4)-(6) report the results for high-tech sector.

	Patents					
	Non High Tech			High Tech		
	t+1	t+2	t+3	t+1	t+2	t+3
	(1)	(2)	(3)	(4)	(5)	(6)
Lobbyist CEO	-0.07***	-0.08***	-0.08***	0.25***	0.3***	0.33***
	(-3.5)	(-3.88)	(-4.2)	(3.19)	(3.81)	(4.05)
Firm size	0.26***	0.25***	0.23***	0.75***	0.71***	0.67***
	(53.03)	(50.56)	(48.12)	(47.34)	(44.11)	(40.85)
Cash/Assets	1.07***	1.01***	0.96***	1.63***	1.59***	1.51***
	(12.75)	(12.56)	(12.77)	(14.94)	(14.6)	(13.87)
Leverage	-0.18***	-0.18***	-0.17***	-0.25**	-0.2*	-0.19*
	(-7.69)	(-7.81)	(-7.62)	(-2.17)	(-1.79)	(-1.74)
ROA	0.09	0.08	0.07	0.41***	0.41***	0.41***
	(1.54)	(1.55)	(1.55)	(3.05)	(3.22)	(3.29)
R&D/Assets	1.66***	1.58***	1.43***	7.01***	6.33***	5.69***
	(3.05)	(3.07)	(3.07)	(16.45)	(16.03)	(15.5)
Number of observations	40617	40617	40617	7079	7079	7079
R^2	0.3	0.279	0.256	0.386	0.357	0.327

Panel B: This Table presents results from ordinary least squares regression for total number of citations for all patents filed in a given year. Columns (1)-(3) report the results for non-high-tech sector and columns (4)-(6) report the results for high-tech sector.

	Citations					
	Non High Tech			High Tech		
	t+1	t+2	t+3	t+1	t+2	t+3
	(1)	(2)	(3)	(4)	(5)	(6)
Lobbyist CEO	-0.08**	-0.09***	-0.09***	0.35***	0.43***	0.46***
	(-2.52)	(-2.77)	(-2.84)	(3.13)	(3.81)	(4.11)
Firm size	0.34***	0.32***	0.3***	0.93***	0.87***	0.81***
	(49.64)	(47.32)	(45.01)	(45.61)	(42.74)	(39.53)
Cash/Assets	1.54***	1.41***	1.3***	2.42***	2.29***	2.07***
	(12.15)	(11.8)	(11.79)	(14.97)	(14.51)	(13.38)
Leverage	-0.28***	-0.27***	-0.25***	-0.24	-0.22	-0.21
	(-8.04)	(-8.09)	(-7.93)	(-1.42)	(-1.32)	(-1.31)
ROA	0.12	0.11	0.1	0.57***	0.5***	0.55***
	(1.46)	(1.46)	(1.47)	(3.17)	(3.12)	(3.33)
R&D/Assets	2.36***	2.21***	1.98***	8.58***	7.49***	6.67***
	(2.93)	(2.95)	(2.95)	(15.94)	(15.36)	(14.74)
Number of observations	40617	40617	40617	7079	7079	7079
R^2	0.271	0.249	0.227	0.321	0.297	0.273

Table 7: Technological and economic value of innovation

Panel A: This Table presents results from ordinary least squares regression for number of citaitions per patent. Columns (1)-(3) report the results for non-high-tech sector and columns (4)-(6) report the results for high-tech sector.

	Citation/patent					
	Non High Tech			High Tech		
	t+1	t+2	t+3	t+1	t+2	t+3
	(1)	(2)	(3)	(4)	(5)	(6)
Lobbyist CEO	-0.0	-0.0	0.0	0.03	0.06	0.08*
	(-0.12)	(-0.05)	(0.15)	(0.6)	(1.27)	(1.71)
Firm size	0.11***	0.1***	0.09***	0.2***	0.19***	0.17***
	(37.63)	(36.16)	(34.77)	(26.36)	(25.84)	(24.64)
Cash/Assets	0.66***	0.58***	0.53***	0.86***	0.78***	0.65***
	(11.62)	(10.87)	(10.91)	(10.93)	(10.59)	(9.48)
Leverage	-0.13***	-0.12***	-0.11***	0.05	0.03	0.02
	(-8.15)	(-8.16)	(-8.0)	(0.67)	(0.35)	(0.31)
ROA	0.04	0.04	0.03	0.21***	0.13*	0.19***
	(1.27)	(1.25)	(1.26)	(2.88)	(1.8)	(2.77)
R&D/Assets	0.91***	0.86***	0.75***	2.21***	1.76***	1.56***
	(2.74)	(2.77)	(2.76)	(11.24)	(9.7)	(9.42)
Number of observations	40617	40617	40617	7079	7079	7079
R^2	0.206	0.187	0.169	0.109	0.099	0.092

Panel B: This Table presents results from ordinary least squares regression for economic value of all patents filed in a given year. Columns (1)-(3) report the results for non-high-tech sector and columns (4)-(6) report the results for high-tech sector.

	Patent economic value					
	Non High Tech			High Tech		
	t+1	t+2	t+3	t+1	t+2	t+3
	(1)	(2)	(3)	(4)	(5)	(6)
Lobbyist CEO	-0.09**	-0.1***	-0.1***	0.23**	0.3***	0.34***
	(-2.45)	(-2.77)	(-2.66)	(2.08)	(2.7)	(3.02)
Firm size	0.57***	0.54***	0.5***	1.14***	1.08***	1.0***
	(64.89)	(61.5)	(58.08)	(53.68)	(49.54)	(45.37)
Cash/Assets	2.08***	1.96***	1.83***	2.58***	2.44***	2.26***
	(15.05)	(14.64)	(14.4)	(16.24)	(15.31)	(13.97)
Leverage	-0.27***	-0.26***	-0.26***	-0.35**	-0.24	-0.21
	(-6.15)	(-6.25)	(-6.27)	(-2.05)	(-1.46)	(-1.28)
ROA	0.16*	0.15*	0.13*	0.68***	0.66***	0.66***
	(1.68)	(1.68)	(1.67)	(3.18)	(3.24)	(3.25)
R&D/Assets	2.75***	2.65***	2.46***	9.21***	8.42***	7.7***
	(3.11)	(3.12)	(3.11)	(16.42)	(15.82)	(15.16)
Number of observations	40617	40617	40617	7079	7079	7079
R^2	0.319	0.296	0.272	0.409	0.375	0.34

Table 8: Green innovation outputs

Panel A: This Table presents results from ordinary least squares regression for number of all green patents filed in a given year. Columns (1)-(3) report the results for non-high-tech sector and columns (4)-(6) report the results for high-tech sector.

	Green patents					
	Non High Tech			High Tech		
	t+1	t+2	t+3	t+1	t+2	t+3
	(1)	(2)	(3)	(4)	(5)	(6)
Lobbyist CEO	-0.02*	-0.02*	-0.02*	0.14***	0.16***	0.18***
	(-1.67)	(-1.85)	(-1.78)	(2.92)	(3.32)	(3.64)
Firm size	0.09***	0.08***	0.08***	0.32***	0.3***	0.29***
	(30.62)	(29.47)	(28.21)	(30.54)	(29.17)	(27.7)
Cash/Assets	0.23***	0.22***	0.2***	0.53***	0.52***	0.49***
	(8.79)	(8.62)	(8.37)	(10.42)	(10.17)	(9.64)
Leverage	-0.03***	-0.03***	-0.03***	-0.11*	-0.11*	-0.12**
	(-4.51)	(-4.11)	(-4.07)	(-1.75)	(-1.71)	(-2.1)
ROA	0.02	0.02*	0.02	0.07	0.06	0.08*
	(1.64)	(1.65)	(1.63)	(1.6)	(1.46)	(1.9)
R&D/Assets	0.46***	0.44***	0.41***	2.44***	2.27***	2.13***
	(3.27)	(3.27)	(3.25)	(14.8)	(14.32)	(13.87)
Number of observations	40617	40617	40617	7079	7079	7079
R^2	0.164	0.155	0.145	0.276	0.261	0.246

Panel B: This Table presents results from ordinary least squares regression for total number of all citations for green patents filed in a given year. Columns (1)-(3) report the results for non-high-tech sector and columns (4)-(6) report the results for high-tech sector.

	Green citations					
	Non High Tech			High Tech		
	t+1	t+2	t+3	t+1	t+2	t+3
	(1)	(2)	(3)	(4)	(5)	(6)
Lobbyist CEO	-0.03*	-0.03	-0.02	0.25***	0.29***	0.33***
	(-1.71)	(-1.56)	(-1.02)	(3.2)	(3.7)	(4.26)
Firm size	0.13***	0.12***	0.11***	0.46***	0.42***	0.39***
	(30.14)	(28.98)	(27.5)	(30.51)	(28.94)	(27.33)
Cash/Assets	0.31***	0.29***	0.27***	0.83***	0.79***	0.72***
	(7.27)	(7.07)	(6.7)	(9.13)	(8.82)	(8.33)
Leverage	-0.07***	-0.06***	-0.05***	-0.14	-0.17	-0.16*
	(-5.42)	(-4.8)	(-4.81)	(-1.28)	(-1.54)	(-1.69)
ROA	0.03	0.03	0.03	0.14*	0.1	0.16**
	(1.55)	(1.54)	(1.54)	(1.93)	(1.57)	(2.36)
R&D/Assets	0.73***	0.69***	0.63***	3.44***	3.08***	2.85***
	(3.19)	(3.16)	(3.14)	(13.75)	(13.29)	(13.08)
Number of observations	40617	40617	40617	7079	7079	7079
R^2	0.14	0.132	0.122	0.228	0.215	0.204

Table 9: Technological and economic value of green innovation

Panel A: This Table presents results from ordinary least squares regression for number of citation per patent. Columns (1)-(3) report the results for non-high-tech sector and columns (4)-(6) report the results for high-tech sector.

	Green citation/patent					
	Non High Tech			High Tech		
	t+1	t+2	t+3	t+1	t+2	t+3
	(1)	(2)	(3)	(4)	(5)	(6)
Lobbyist CEO	-0.02*	-0.01	-0.0	0.11**	0.12***	0.14***
	(-1.81)	(-1.27)	(-0.45)	(2.57)	(2.88)	(3.4)
Firm size	0.06***	0.05***	0.05***	0.19***	0.17***	0.15***
	(28.66)	(27.69)	(26.25)	(26.94)	(25.46)	(24.02)
Cash/Assets	0.14***	0.13***	0.11***	0.44***	0.4***	0.34***
	(5.61)	(5.3)	(4.72)	(7.39)	(7.15)	(6.68)
Leverage	-0.05***	-0.04***	-0.04***	-0.02	-0.04	-0.02
	(-6.39)	(-5.41)	(-5.81)	(-0.31)	(-0.66)	(-0.3)
ROA	0.02	0.02	0.02	0.13***	0.09**	0.12***
	(1.43)	(1.39)	(1.42)	(2.81)	(2.08)	(3.02)
R&D/Assets	0.38***	0.36***	0.32***	1.67***	1.44***	1.32***
	(3.11)	(3.05)	(3.04)	(11.91)	(11.34)	(11.16)
Number of observations	40617	40617	40617	7079	7079	7079
R^2	0.107	0.1	0.092	0.128	0.119	0.113

Panel B: This Table presents results from ordinary least squares regression for economic value of green patents filed in a given year. Columns (1)-(3) report the results for non-high-tech sector and columns (4)-(6) report the results for high-tech sector.

	Green patent economic value					
	Non High Tech			High Tech		
	t+1	t+2	t+3	t+1	t+2	t+3
	(1)	(2)	(3)	(4)	(5)	(6)
Lobbyist CEO	-0.04	-0.03	-0.03	0.23***	0.27***	0.29***
	(-1.59)	(-1.39)	(-1.14)	(2.97)	(3.37)	(3.59)
Firm size	0.21***	0.2***	0.19***	0.58***	0.55***	0.52***
	(38.75)	(37.27)	(35.72)	(36.15)	(34.16)	(32.19)
Cash/Assets	0.51***	0.48***	0.45***	1.22***	1.19***	1.1***
	(9.72)	(9.57)	(8.97)	(12.2)	(11.85)	(11.03)
Leverage	-0.09***	-0.08***	-0.08***	-0.22**	-0.16	-0.17*
	(-5.28)	(-4.69)	(-5.06)	(-2.09)	(-1.58)	(-1.77)
ROA	0.05*	0.05*	0.04*	0.2**	0.16**	0.19**
	(1.74)	(1.73)	(1.72)	(2.36)	(2.1)	(2.38)
R&D/Assets	0.99***	0.92***	0.89***	4.19***	3.91***	3.7***
	(3.33)	(3.33)	(3.3)	(15.02)	(14.29)	(13.81)
Number of observations	40617	40617	40617	7079	7079	7079
R^2	0.18	0.17	0.158	0.298	0.279	0.26

Table 10: Firm performance channels

Panel A: This Table presents results from ordinary least squares regression for Cost of goods sold in a given year. Columns (1)-(3) report the results for non-high-tech sector and columns (4)-(6) report the results for high-tech sector.

	COGS					
	Non High Tech			High Tech		
	t+1	t+2	t+3	t+1	t+2	t+3
	(1)	(2)	(3)	(4)	(5)	(6)
Lobbyist CEO	-0.14***	-0.16***	-0.17***	-0.12***	-0.12**	-0.12**
	(-4.99)	(-5.26)	(-5.46)	(-2.7)	(-2.42)	(-2.37)
Firm size	0.83***	0.81***	0.8***	0.86***	0.85***	0.85***
	(222.14)	(204.81)	(189.62)	(122.56)	(113.97)	(104.97)
Cash/Assets	0.1	0.12	0.15*	-1.55***	-1.43***	-1.37***
	(1.46)	(1.59)	(1.96)	(-25.06)	(-21.97)	(-19.63)
Leverage	0.02	0.0	-0.02	-0.02	-0.01	-0.07
	(0.7)	(0.04)	(-0.62)	(-0.36)	(-0.14)	(-0.85)
ROA	0.22***	0.31***	0.32***	0.09*	0.16***	0.2***
	(5.22)	(4.79)	(4.38)	(1.74)	(3.93)	(4.93)
R&D/Assets	-0.16	-0.09	-0.13	-0.73***	-0.87***	-0.94***
	(-0.72)	(-0.37)	(-0.49)	(-4.8)	(-5.49)	(-5.16)
Number of observations	37522	34499	31560	6515	5948	5403
R^2	0.654	0.64	0.625	0.774	0.765	0.757

Panel B: This Table presents results from ordinary least squares regression for sales growth in a given year. Columns (1)-(3) report the results for non-high-tech sector and columns (4)-(6) report the results for high-tech sector.

	Sales growth					
	Non High Tech			High Tech		
	t+1	t+2	t+3	t+1	t+2	t+3
	(1)	(2)	(3)	(4)	(5)	(6)
Lobbyist CEO	-0.01	-0.01	-0.01	0.01	0.02	0.01
	(-1.42)	(-1.17)	(-1.24)	(1.17)	(1.64)	(1.29)
Firm size	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***
	(-13.61)	(-14.43)	(-12.73)	(-4.44)	(-4.81)	(-4.06)
Cash/Assets	0.05*	0.1***	0.08**	0.06***	0.11***	0.08***
	(1.7)	(3.61)	(2.23)	(2.66)	(5.68)	(3.99)
Leverage	-0.03**	-0.02**	-0.02**	0.03	0.02	0.01
	(-2.11)	(-2.4)	(-2.25)	(1.25)	(1.13)	(0.68)
ROA	0.0	-0.0	0.01	0.07**	0.04*	0.05**
	(0.05)	(-0.05)	(0.49)	(2.46)	(1.94)	(2.43)
R&D/Assets	0.14	0.04	0.05	-0.08	-0.07	0.02
	(1.12)	(0.34)	(0.27)	(-1.5)	(-1.15)	(0.29)
Number of observations	37422	34404	31459	6509	5939	5395
R^2	0.019	0.019	0.016	0.01	0.018	0.014

Appendix 1: Climate change variable definitions from Sautner et al. [2023]

Variable	Definition
	Climate change variables
$CCExposure$	Relative frequency with which bigrams related to climate change occur in the transcripts of earnings conference calls.
$CCExposure^{Opp}$	Relative frequency with which bigrams that capture opportunities related to climate change occur in the transcripts of earnings conference calls.
$CCExposure^{Reg}$	Relative frequency with which bigrams that capture regulatory shocks related to climate change occur in the transcripts of earnings conference calls.
$CCExposure^{Phy}$	Relative frequency with which bigrams that capture physical shocks related to climate change occur in the transcripts of earnings conference calls.
$CCSentiment^{pos}$	Relative frequency with which bigrams related to climate change are mentioned together with positive tone words that are summarized by Loughran and McDonald [2011] in one sentence in the transcripts of earnings conference calls..
$CCSentiment^{Neg}$	Relative frequency with which bigrams related to climate change are mentioned together with the negative tone words that are summarized by Loughran and McDonald [2011] in one sentence in the transcripts of earnings conference calls.
$CCRisk$	Relative frequency with which bigrams related to climate change are mentioned together with the words "risk" or "uncertainty" (or synonyms thereof) in one sentence in the transcripts of earnings conference calls.

Appendix 2: Variable definitions

Variable	Definition
Panel A: Dependent variables (Innovation and efficiency)	
Patents	Natural logarithm of one plus the total number of patent applications filed by the firm in a given year.
Citations	Natural logarithm of one plus the total number of citations received by the firm's patents in a given year.
Citation/patent	Natural logarithm of one plus firm's average number of citations received on the firm's patents in a given year.
Patent economic value	Patent value metric as measured by Kogan et al. [2017]
Green patents	Natural logarithm of one plus the total number of green patent applications filed by the firm in a given year.
Green citations	Natural logarithm of one plus the total number of citations received by the firm's green patents in a given year.
Green citation/patent	Natural logarithm of one plus firm's average number of citations received on the firm's green patents in a given year.
Green patent economic value	Patent value metric as measured by Kogan et al. [2017] for green patents
COGS	Cost of goods sold.
Sales growth	Growth in sales from one year from the previous year .
Panel B: Firm characteristics	
Firm size	Book value of total assets.
Firm age	Number of years since the firm's first appearance in Compustat.
Capex	Capital expenditures, scaled by total assets.
Cash/Assets	Cash, scaled by total assets.
Leverage	Book value of debt divided by total assets.
ROA	Net income divided by total assets.
R&D/Assets	Research and development expense, scaled by total assets.
CEO age	CEO age.
CEO tenure	Number of years a person was a CEO.