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Abstract

Competitive challenges and regulatory uncertainty associated with the green transition should incentivize firms to innovate and to sway regulatory policy. We develop a novel method to identify "green" and "brown" environmental lobbying. We find that firms' lobbying is unrelated to innovation: green innovators are equally likely to lobby green or brown. Firms' environmental lobbying is explained by current business operations and predicts real actions, for example future emissions. In contrast, green innovation is better characterized as a real option, to be exercised only if necessary. Despite the informativeness of lobbying, neither environmental ratings nor UNPRI signatories' investments incorporate this signal.

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1. Introduction

Over the last few decades, increasing attention to climate change has led companies to invest in green innovation, developing new technologies that enable a transition to cleaner modes of production and consumption. Green innovation offers new growth opportunities and competitive advantages, which firms protect through patents. International agencies, academics, and the media all highlight the importance of innovation for the green transition.[1]

While the role of innovation is well-recognized, its impact may depend on firms' simultaneous efforts to protect their competitive advantage through other channels, in particular through lobbying. For example, Zingales (2017) states that "Most firms are actively engaged in protecting their source of competitive advantage through a mixture of innovation, lobbying, or both. As long as most of the effort is along the first dimension, there is little to worry about. (…) What is more problematic is when a lot of effort is put into lobbying."

Firms' lobbying efforts have implications for the speed of transition to greener modes of operation. On the one hand, firms may lobby to increase demand for the green technologies that they are developing. Such dynamics suggest that lobbying would expedite progress toward a greener future. We refer to this as the *Consistent lobbying hypothesis*. Alternatively, the *Misaligned lobbying hypothesis* posits that firms' lobbying activities do not align with their current innovation efforts, that is, firms' tendency to lobby in pro-green versus pro-brown directions would not be explained by their innovation efforts. Such dynamics might arise if green technologies and associated patents are held by firms with incentives to slow the transition to a greener future.

A failure to understand firms' lobbying efforts could result in distortionary economic effects. For example, if ratings agencies do not adequately factor in lobbying as well as innovation, then pro-green investment dollars may not get invested in the intended types of firms. If firms

[1] See, e.g., '*Innovation is an essential part of dealing with climate change*', The Economist October 31, 2020; '*Fighting climate change with innovation*', Finance & Development, The International Monetary Fund, September, 2021; An interview with Philippe Aghion: Is green growth possible?', July 19, 2023, https://cepr.org/multimedia/philippe-aghion-green-growth-possible.

engaging in green innovation simultaneously lobby in pro-brown directions, then policies that subsidize green innovation may have little effect in speeding the transition to a greener future.

To empirically examine these questions, we develop a unique approach to infer the direction of firms' environmental lobbying, that is, whether corporate lobbying expenditures are pro- or anti-environment. First, we characterize a firm's environmental lobbying activities. From lobbying reports filed with the Senate Office of Public Records (SOPR) and from OpenSecrets.org (OpenSecrets), we extract the timing, amount, and subjects ("issues") of lobbying. Using textual analysis and machine learning techniques, we identify the transactions that relate to environmental issues. Examples of environmental issues include energy, nuclear, fuel/gas/oil, clean air, water resources, waste, environmental protection, public lands, etc. These issues include those related to climate change, and also those related to broader environmental issues.

To overcome one of the biggest challenges towards understanding firms' lobbying behavior, the lack of data on the direction of firms' lobbying, we obtain the political contributions of each individual lobbyist. We use this to infer whether each lobbying transaction is pro-environment (which we refer to as "green") or anti-environment (which we refer to as "brown"). This identification strategy relies on the fact that, in the U.S., environmental issues are highly polarized along political lines; moreover, lobbyists tend to work with their political allies rather than with their adversaries, and they tend to make personal contributions to their preferred party. Finally, to characterize firms' innovation, we obtain all patents granted to U.S. firms, and we determine whether each patent relates to green technologies based on OECD classifications.[2]

In the first portion of the paper, we provide evidence on the extent of environmental lobbying, and the dispersion of this activity across different types of firms. Within our sample of U.S public companies, nearly 40% of firms that engage in lobbying devote attention to environmental issues. Among firm-years with environmental lobbying, an approximately equal

[2] In additional analyses, we employ the method of Dechezlepretre et al. (2020) to classify patents into clean versus dirty technologies.

percentage of dollars is allocated in green versus brown directions.

The industries with the highest brown lobbying expenditures also have the highest green lobbying expenditures, specifically *Utilities*, *Oil, gas, & coal extraction*, and *Chemicals*. Interestingly, many of these industries also have high rates of green patenting. However, there is considerable intra-industry variation along these dimensions.

Turning to our main analysis, we find no evidence that firms direct their lobbying efforts in the same direction as their innovation efforts. That is, our results support the *Misaligned lobbying hypothesis*. This is true irrespective of whether we consider a firm's propensity to lobby green vs brown, firms' expenditures on green and brown lobbying, or the fraction of environmental lobbying dollars directed toward green vs brown. Further, findings are robust to measuring innovation in terms of the number, the quality, the intensity, or the market value of green patents. To further address any remaining endogeneity concerns, we conduct a difference-in-differences analysis based on a USPTO green technology pilot program aimed at expediting green patent granting decisions. This analysis confirms that green innovation is unrelated to environmental lobbying.

The finding that firms' lobbying efforts are not aligned with their innovation efforts is puzzling. It indicates that firms do not lobby to increase demand for their green innovations. Under the reasonable assumption that firms lobby to protect sources of current and future cash flows, this finding suggests that green innovation may not be a strong proxy for firms' expected future cash flows.

As a next step toward understanding firms' environmental lobbying, we examine the influence of current cash flows. We develop two within-industry proxies for the greenness of current cash flows, both of which are based on the 'green vocabulary' used within the business description section of firms' 10-K reports. The first measure uses ChatGPT to obtain this green vocabulary and the second uses green patents. Using either proxy, we find that firms' current operations are significantly related to their lobbying behavior. A one standard deviation increase

in firms' operational greenness is associated with an 8.5% reduction in brown lobbying expenditures (as a fraction of environmental lobbying expenditures).

Strikingly, even after accounting for the influence of current cash flows, we continue to find no evidence that green innovation explains firms' environmental lobbying behavior. Our results are consistent with a scenario in which innovation fails to proxy for firms' transition plans and their sources of expected future cash flows. Rather, innovation may represent a hedge or a real option to employ only if necessary – for example, to cope with future regulatory changes. As noted by Bloom and Van Reenen (2002), patents enable firms to delay investments, because they provide exclusive rights to new innovations; our analysis of lobbying behavior suggests that firms employ green patents to delay green investments somewhat indefinitely.

If firms employ lobbying to sway environmental regulatory policy but employ innovation as a real option to exercise only if necessary, then lobbying should be more informative than innovation regarding firms' real actions. In the next portion of the paper, we discuss this conjecture directly. We obtain data on each firm's releases of toxic chemicals from the Environmental Protection Agency (EPA)'s Toxic Release Inventory (TRI) dataset. Consistent with expectations, we find that a firm's lobbying behavior contains significant information regarding a firm's future emissions: a one standard deviation increase in brown lobbying is associated with 2.8 – 3.4% higher emissions per year, over the subsequent three years. In contrast, a firm's green innovation is unrelated to its future emissions (see also, Bolton et al. (2023)). These findings provide added evidence regarding the extent to which firms' innovation efforts represent an incomplete, and in some cases biased, representation of firms' true environmental stance.

In the final portion of the paper, we ask whether firms' lobbying efforts are recognized by markets, using two alternative approaches. First, we focus on the environmental ratings index of MSCI, the ESG rating provider with the most comprehensive coverage. We find that firms' lobbying efforts are not recognized by ratings agencies. These oversights are worrisome: among green innovators, the median firm spends more than 70% of its environmental lobbying dollars in

brown directions, and brown lobbying represents a significant negative signal of firm's environmental impact.

Our second approach toward measuring the market's awareness of lobbying focuses on the investment behavior of those institutions that have committed to integrating ESG factors into their decision-making. Specifically, we focus on UN PRI signatories. Strikingly, we find no evidence that these signatories consider firms' lobbying behavior when making their investment decisions.

We make several contributions to the literature. Our paper is the first to examine corporate pro- and anti-environmental lobbying. These lobbying activities shed light on firms' true stance regarding environmental issues. Substantial investment dollars and subsidies are directed toward green firms and firms that innovate in clean technologies, and both academics and regulators have highlighted green innovation as a critical tool toward mitigating climate change (Acemoglu et al., 2016); IMF, 2023); however, there remains a lack of clarity regarding which firms are actively transitioning toward green. Prior literature on environmental lobbying focuses narrowly on one bill (Meng and Rode, 2019) or measures firms' total expenditures without characterizing their direction (Brulle, 2018). Hassan et al. (2019) finds that firms facing higher environmental political risk tend to spend more on environmental lobbying. Recent work on lobbying and innovation studies these activities as tools for political risk mitigation (Rahman et al. 2022) or as responses to natural disasters by focusing on the automotive industry (Cutinelli Rendina et al. 2023). We are the first to develop a new approach to infer the direction of firms' lobbying efforts, across a broad set of environmental issues. Leippold et al. (2024) follows our identification strategy to define green and brown lobbying on climate-related issues and examines the association between these lobbying activities and firm returns.

Previous work on lobbying focuses mostly on potential misallocations of resources (Huneeus and Kim, 2020), the implications for firm value and risk premia (Borisov, Goldman, and Gupta, 2016; Grotteria, 2024), and the role of political connections (Blanes I Vidal, Draca, and

Fons-Rosen, 2012; Bertrand, Bombardini, and Trebbi, 2014).[3] Relative to this work, our analysis focuses on the distortionary effects of lobbying that can arise when firms patent green technologies but lobby to impede progress in pro-environmental directions. Such behavior can negatively impact the development of new technologies and economic growth. In an analysis of the energy sector, Kang (2016) concludes that lobbying influences legislative outcomes. Our examination of a broad set of firms and identification of the direction of their lobbying expenditures suggest that lobbying can slow the transition to cleaner modes of consumption and production. While the US and governments around the world are increasingly subsidizing green innovation as a way to expedite the green transition, our findings cast doubt on these strategies (World Bank, 2024).

Finally, our paper contributes to the growing literature on green innovation. Recent studies focus on the technical changes and the optimal policies that can enable the transition from dirty technologies to clean technologies (Acemoglu et al., 2016; Aghion et al., 2016). Our finding that green innovators are equally likely as other firms within the same industry to lobby brown builds upon Cohen et al (2023). Given that green innovators are concentrated within traditionally brown industries such as oil and energy, our findings cast doubt on the possibility that some firms within these industries are actively transitioning to green. Moreover, our finding that green innovation is not an informative signal about firms' commitment to the green transition builds upon Bolton et al. (2023), who show that firms' green innovation efforts do not translate into lower future emissions. We contribute to this body of work by studying how firms that are involved in the green transition lobby to shape the regulatory agenda. Our findings also relate to prior work showing that patents can be used by firms to delay their investments (Bloom and Van Reenen, 2002).

[3] Related to lobbying, but distinct from it, is the literature on political connections (for example, Fisman (2001), Faccio (2006), Cohen et al. (2013)) and on political donations. In particular, donations through political action committees (PACs) are payments to individual politicians aimed at obtaining political influence, but not at affecting a specific issues or legislative outcome. A recent paper by Fich and Xu (2023) relates these political donations to firms' environmental scores.

2. Data

We construct a dataset that includes firm financial information, firms' lobbying transactions, individual lobbyists' political contributions, and patent data. We define each data source below.

2.1. Sample of firms

Our initial sample consists of all publicly traded firms with CRSP and Compustat data from 1999 to 2020, where the starting year of 1999 is dictated by publicly available machine-readable lobbying reports. In regressions, we measure firm size as the natural log of one plus total assets, and we exclude firms with less than $10 million in assets and firms with non-positive sales. We winsorize financial ratios (leverage, ROA, Cash/Assets) at the 1% and 99% levels annually.

We measure the environmental impact for each firm-year using the Environmental Protection Agency (EPA) Toxic Release Inventory (TRI) dataset (see, e.g., Naaraayanan et al., 2021; Kim et al., 2019, Lyu et al., 2022). We focus on onsite emissions, which include emissions into the air, surface water, and ground. These data are self-reported at the plant level, and we aggregate these data up to the firm-year level.

To capture market perceptions of each firm's ESG profile, we use the MSCI environmental ratings. MSCI's ratings are more comprehensive than other data providers, and less noisy (Eccles and Stroehle, 2020; Berg et al., 2021). MSCI ranks each firm-year on a range of factors relative to other firms in its industry, and it gives each firm-year a score between zero and ten. We additionally obtain data on each investor who signed the UN PRI, including their first year of signing.

2.2. Patent data

We identify patents granted to public firms using the extended KPSS data, which covers patents granted between 1926 and 2020, and PatentsView.[4] Using the CPC (Cooperative Patent

[4] PatentsView is a patent data visualization and analysis platform supported by the Office of the Chief Economists in the USPTO. Following prior literature, we focus on utility patents (thus excluding design patents and plant patents).

Classification) and IPC (International Patent Classification) codes, we employ two approaches to identify patents with an environmental focus.[5] First, we identify patents that pertain to green technology (i.e., *green* patents) using the OECD classifications.[6] Green patents include issues such as environmental management, water-related adaptation technologies, and climate change mitigation technologies. Second, we identify *clean* patents and *dirty* patents, following Dechezlepretre et al. (2020).[7] Patents that are classified as both clean and dirty (this may occur when a patent includes multiple technology classes) are classified as neither clean nor dirty.

Panel A of Figure 1 shows the total number of patents granted each year, 1999-2020, as well as the number of green, clean, and dirty patents. The numbers of green and clean patents have grown much faster than either dirty patents or even total patents. This pattern is more evident in Panel B, which shows the cumulative number of patents within each of these categories, defined over the prior 20 years, within each category. The cumulative number of dirty patents has remained relatively constant throughout the sample period (compound annual growth rate of 0.8%), indicating that a newly granted patent on average replaces an obsolete patent (defined here as a patent granted over 20 years ago). In contrast, the cumulative numbers of green and clean patents have grown by an average of 4.95% and 6.87% per year, respectively, over this period.

2.3. Lobbying transactions

We identify firms' lobbying activities from the lobbying reports filed with the Senate Office of Public Records (SOPR). Under the Lobbying Disclosure Act of 1995, every lobbyist and every corporation with in-house lobbying is required to disclose their lobbying activity. As discussed by Huneeus and Kim (2020), lobbyists who fail to comply with these requirements face

[5] The CPC-IPC concordance table is available at https://www.cooperativepatentclassification.org/cpcConcordances
[6] https://www.oecd.org/environment/consumption-innovation/ENV-tech%20search%20strategies,%20version%20for%20OECDstat%20(2016).pdf
[7] Examples of clean patents include energy generation from renewable and non-fossil sources, combustion technologies with mitigation potential, and other technologies with potential contribution to emissions mitigation. Examples of dirty patents include steam engine plants, gas turbine plants, and combustion engines.

potential monetary fines and imprisonment.[8] First, lobbyists file an LD-1 form for each of their clients, which contains the names and addresses of the client, as well as the starting date of the lobbying-client relationship. Second, an LD-2 form is filed for each lobbying transaction, containing: the date, the amount lobbied, the issue and where applicable the bill number to which the transaction relates, the lobbyist name, and whether a lobbying transaction concerns the Senate, the House of Representatives or any other US government branch. We parse and extract information from these forms (which represent the primary data source) and from OpenSecrets. Internet Appendix A shows an LD-2 form, covering lobbying by ExxonMobil for the second half of 2007.

We match client names in lobbying reports with firm names in CRSP-Compustat. We use a search engine-based matching algorithm proposed by Autor et al. (2020) to verify whether these pairs share the same URLs, and we manually verify the matching quality. We remove duplicate filings and keep the latest report when there are multiple amendments to the same filing.

Figure 2 shows the time series of lobbying transactions across publicly traded US firms. The solid white bars show the number of lobbying transactions each year, and the solid lines show lobbying dollars spent each year. Lobbying increased through approximately 2008 and has leveled off since then. The number of LD-2s exhibits a similar pattern, but also has a discrete jump between 2007 and 2008. The approximate doubling in the number of LD2s in 2008 is driven by the 2007 Honest Leadership and Open Government Act, which switched the filing requirement of LD-2s from semi-annually to quarterly.[9]

[8] See https://www.gao.gov/products/GAO-20-449. In 2014 the Carmen Group paid $125,000 in fines to the federal government for not disclosing its political contributions (https://www.washingtonpost.com/local/crime/carmen-group-to-pay-125000-to-resolve-lobbying-disclosure-violations/2015/08/28/2d46c1b2-4d9d-11e5-84df-923b3ef1a64b_story.html).

[9] In addition to instituting a quarterly filing requirement, the 2007 Act and associated policies put in place by President Obama instituted other changes that likely contributed to a leveling out of expenditures. For example, these policies made it more difficult for registered lobbyists to get jobs working for the administration, increased reporting requirements, and restricted people from lobbying the body they used to serve for a designated period of time. OpenSecrets shows a similar time-series pattern: https://www.opensecrets.org/federal-lobbying.

2.4. Environmental lobbying

Our empirical tests focus on lobbying transactions that relate to environmental issues (which we refer to as e-lobbying). To identify these transactions, we rely on information found on lines 15 and 16 of each LD-2. Some LD-2s contain multiple lobbying transactions; in such cases, each transaction lists the relevant subject (on line 15) and supplemental description (line 16). For example, the Exxon-Mobil LD-2 shown in Internet Appendix A contains five transactions. We define a transaction within an LD-2 to be e-related if one or more of the following criteria is satisfied.

Our first criterion relies on the standardized codes in LD-2 line 15, which reflect the general category to which the lobbying transaction belongs. Amongst the 79 unique codes, we define the transaction to be e-related if one or more of the following five categories is listed: *Energy/Nuclear (ENG), Environment/Superfund (ENV), Fuel/Gas/Oil (FUE), Clean air and water (CAW), and Waste (hazardous/solid/interstate/nuclear) (WAS).* Thus, three of the five transactions on the sample LD-2 of ExxonMobil in Internet Appendix A are classified as e-related based on this criterion.

Our second criterion relies on Congressional bill numbers. On LD-2 line 16, filers must list the precise lobbying issues, including specific bills before Congress. Where relevant, filers must provide information on the bill number and title. In our sample, 34.7% of LD-2s contain specific bill numbers. We define the transaction to be e-related if at least one of the listed bills is categorized by Congress.Gov (the online database of the United Congress) as belonging to one of the four categories of environment-related issues: *Energy, Environmental protection, Public lands and natural resources,* and *Water resources development*. Looking again at the sample LD-2 of Exxon Mobil, we can infer that the transaction with line 15 code TAX also relates to environmental lobbying, based on the listing of bill numbers such as '*H.R. 6, Clean Energy Act of 2007'* and *'H.R. 2776 Renewable Energy and Energy Conservation Tax Act of 2007*'.

Our third criterion strives to capture transactions that are missed by the prior two filters,

for example because a specific bill was not mentioned or the line 15 category is more tangentially related to the environment (e.g., *Chemicals/Chemical Industry*). Following Engle et al. (2020), we develop an environment-related vocabulary. In our setting, this vocabulary comes from the textual description of the lobbying transaction provided in line 16, across those LD-2s identified in steps one and two as representing e-lobbying. Figure 3 depicts this vocabulary in the form of a word cloud. Across each LD-2 lobbying transaction, we first apply the Term Frequency-Inverse Document Frequency (*tf-idf*) algorithm to identify meaningful words contained in line 16 text (i.e., tokenization).[10] Then, we calculate the cosine similarity between the tokenized line 16 text and the environment-related vocabulary. We define an LD-2 lobbying transaction as e-related (among those not previously identified in steps one and two) if the cosine similarity is greater than the average cosine similarity of e-related LD-2 transactions identified using the prior two criteria.[11] The remaining transaction in Exxon-Mobil's LD-2, which has line 15 code *Budget (BUD)*, includes 'energy policy' in the line 16 text, and this text leads it to be classified as environmental.

We identify any LD-2 with at least one environmental transaction as e-related. When calculating e-related lobbying expenditures, we assume that total LD-2 expenditures are equally allocated to each transaction within the LD-2.[12] In the Exxon-Mobil LD-2 example, all five lobbying issues are e-related, hence we allocate the total LD-2 expenditures to e-related lobbying expenditures. Across e-related LD-2s in our sample, 38.8% include only e-related transactions.

Internet Appendix Figure A2 shows the overlap among our classification methods—approximately 82% of e-related LD-2s are identified by line 15 code, and the remaining 18% are further identified through line 16 bill numbers and the textual analysis. Figure 2 shows that the trends in e-lobbying generally mirror those in total lobbying: expenditures increased through 2008,

[10] Term frequency-inverse document frequency (*tf-idf*) algorithm assigns more weight to words that appear 1) frequently in a given document but 2) infrequently across all lobbying transactions.
[11] The mean cosine similarity between the Line 16 text and the environmental vocabulary is 0.20 (0.08) for lobbying transactions that are classified as being environmental-related (not environmental-related) in steps 1 and 2. See Internet Appendix Figure A1 for the distribution of cosine similarities.
[12] Within LD-2s, expenditures are not separately attributed to each transaction.

and they have leveled off and decreased slightly since then.

3. Identifying the direction of lobbying on environmental issues

One of the biggest challenges towards understanding firms' lobbying behavior is the lack of data on the direction of firms' lobbying efforts: firms do not provide information on whether they are lobbying for or against a particular issue. Our paper is the first to develop a unique approach towards overcoming this challenge, across a broad set of environmental-related issues.

Our approach toward identifying green and brown lobbying is based on the following premises. First, in the U.S., environmental issues are highly polarized along political lines, with Democrats being more pro-environmental than Republicans. For example, a 2020 Pew Research Study finds that while 85% of Democrats would agree with the statement "The environment should be a top priority for President and Congress", only 39% of Republicans agree with this same statement.[13] Second, when a firm lobbies on a particular issue, it hires not only a lobbying firm but specific individual lobbyists within that firm (Hirsch et al., 2023). Third, as shown in the political science literature (Koger and Viktor, 2009), lobbyists tend to make personal contributions to their preferred party, that is, they do not donate to the opposite party for strategic reasons. Moreover, in many cases lobbyists have prior experience working for their preferred party, as a congressperson or a staff member (Blanes I Vidal et al, 2012).[14] Fourth, a wide body of political science literature shows that lobbyists focus their lobbying efforts on their allies and avoid their political adversaries (see, e,g., Hojnacki and Kimball, 1998, 1999; Hirsch et al., 2023). In fact, lobbyists are often involved in shaping the content of proposals and bills during the committee stage. Thus, a company

[13] In a similar vein, 78% of Democrats agree with the statement "Climate change should be a top priority for President Trump and Congress, compared to only 21% of Republicans. In contrast, there is substantially less disagreement on issues such as crime and social security, where the analogous percentages democrats and republican agreement with the respective issue are 53% vs 57% and 59% vs 65%. https://www.pewresearch.org/politics/2020/02/13/as-economic-concerns-recede-environmental-protection-rises-on-the-publics-policy-agenda/

[14] Bertrand et al. (2014) argue that lobbyists, on average, tend to be connected to a given politician; they show that lobbyists switch the issues they work on in a predictable way as the legislators they are connected to through campaign donations switch committee assignments.

looking to lobby for pro-environmental policies would tend to hire a Democratic lobbyist, as this person would tend to have connections to Democratic senators and representatives.

Given these four factors, our proxy for the direction of each firm-year's e-lobbying is based on the political stance of each lobbyist hired by the firm, as measured by these lobbyists' individual political contributions. House and Senate committees report contributions received from individuals to the Federal Election Commission (FEC), which are itemized on Schedule A of FEC Form 3 when the amount exceeds $200.[15] OpenSecrets processes these data and provides information on contributor name, contribution date, contribution amount, and details regarding the recipient.[16] We name-match contributor names with lobbyist names in lobbying reports.

Among 2,951,544 individual contributions made by 29,171 unique lobbyists between 1990-2020, we restrict our focus to 1,256,534 individual contributions associated with 10,658 lobbyists who lobbied for public firms. For these lobbyists, we calculate the sum of lifetime individual contributions to Democrats (D), Republicans (R), and other (O). Panel A of Figure 4 shows the distribution of lobbyist-level political contributions, which is defined by R/(R+D).[17] Approximately 78 percent of lobbyists make over 75% of their contributions to a single party, and the largest mass lies near the extreme cases of 0 or 100%. This distribution provides support for using this measure as a proxy for political leanings.

We define a lobbyist to be Democratic (Republican) leaning if more than 75% of the lobbyist's contributions to these parties is allocated to the Democratic (Republican) party.[18] As shown in Panel B of Figure 4, under this scheme, 41.6% (36.4%) of lobbyists are defined to be Democratic (Republican) party-leaning. The remaining 22.0% of lobbyists are classified as neutral. We find that lobbyists' political orientations are very sticky: as shown in Internet

[15] https://www.fec.gov/help-candidates-and-committees/filing-reports/individual-contributions/

[16] These data are provided for each two-year federal election cycle. We thank OpenSecrets (https://www.opensecrets.org/) for providing research access.

[17] We exclude contributions to the other parties since we cannot infer the direction of the lobbying.

[18] Our classification is similar in spirit to Di Giuli and Kostovetsky (2014), who use campaign contributions to define the political affiliations of CEOs, directors, and founders of the firms.

Appendix Table A1, when we classify lobbyists' political orientation annually, the probability of being classified as a Democratic (Republican) party-leaning in year t+1 conditional on being classified as a Democratic (Republican) party-leaning in year t is 96.8%-97.1% (96.0%-96.6%).

Our final step is to classify each e-related LD-2 as green or brown. As noted above, we argue that Democratic-leaning lobbyists are more likely to lobby in support of green-related legislation, whereas Republican-leaning lobbyists are more likely to lobby against such actions. We classify an LD-2 as green if at least one of the following conditions hold: (1) more than 75% of lobbyists listed on the LD-2 are Democratic-leaning; (2) more than 50% of lobbyists listed on the LD-2 can be classified as having a political orientation (either Democratic- or Republican) AND more than 75% of classified lobbyists are Democratic-leaning. An analogous procedure is employed to identify LD-2s as brown. Panel A of Figure 5 shows that among the 37,171 e-related LD-2s in our sample, 17.4% are Green, 23.3% are Brown, and 59.3% are unclassified.[19] Our relatively stringent approach toward classifying the direction of lobbying transactions increases confidence in the assigned direction of each transaction.

For empirical tests, we aggregate these LD-2 level statistics up to the firm-year level. While we use multiple measures within regressions, for descriptive purposes Panel B of Figure 5 shows brown lobbying as a percent of total brown and green lobbying. Similar to statistics at the lobbyist level, firm-years tend to focus their environmental lobbying efforts in one direction or the other.[20] However, a strength of our approach is that we can measure not only the extensive margin of brown versus green lobbying, but also the intensive margin. By quantifying the direction of firms' environmental lobbying using the political affiliations of each individual lobbyist in each individual transaction, we capture the fact that some firms opportunistically lobby brown on some

[19] Unclassified LD-2s reflect instances in which (1) we lack data on a lobbyist's political contributions, for example because the lobbyist made no political contributions or because we cannot perfectly match names due to variations/typos, or (2) the political leaning of lobbyists within an LD-2 did not meet the above criteria.
[20] The distribution is similar among firm-years with two or more e-lobbying transactions and also among firm-years with five or more e-lobbying transactions.

issues and green on other issues, within the same year.[21] As shown in Internet Appendix Figure A3, among the 25 firm-years that spend the most dollars lobbying brown (green), many also spend money lobbying green (brown).

4. Distribution of Innovation and Lobbying

Environmental issues are increasingly viewed as a major source of risk, and firms must choose how to handle this risk. In this section, we describe firms' lobbying activities, including the ways in which these activities vary across firms with different innovation focuses. In Table 1, we tabulate both firms' propensity to lobby and firms' dollars spent lobbying, across all types of lobbying and limited to e-lobbying. We provide evidence across all firm-years (top portion of table), across firm-years with lobbying (middle portion of table), and across firm-years with green or brown lobbying (bottom portion of table).

Across the full sample of firm-years (shown in column 1), 21.8% engage in lobbying. As shown by Borisov et al. (2016), lobbying tends to be concentrated among larger firms. Limiting to firm-years with positive lobbying expenditures, 10.7% engage in green lobbying and 13.0% in brown lobbying. While average expenditures are relatively low, the distribution is quite skewed, with some firms spending large amounts. Finally, both green and brown lobbying represent approximately 3% of total lobbying dollars, across all firms in our sample. On average, brown lobbying as a fraction of environmental (brown + green) lobbying is 56.4%.

Next, we partition the sample according to whether the firm-year has at least one green patent (column 2), whether it has at least one patent but no green patents (column 3), and whether it has no patents (column 4). Firms with green patents are more likely to lobby; however, conditional on lobbying, they are nearly equally likely to lobby in green (20.5% of lobbying firms) or brown (22.8%) directions. In fact, the portion of environmental lobbying directed in brown

[21] An alternative approach of identifying firms' lobbying using the political affiliations of firms' executives, as employed by Leippold et al. (2024) has less power to identify such variation.

directions is close to 50% for each of these subsamples. Even more surprising, among green innovators, average lobbying expenditures are greater for brown lobbying than green lobbying. Figure 6 provides an illustration of these patterns of environmental lobbying. Panel A shows that green innovators are equally likely to lobby in green and in brown directions; non-green innovators exhibit a smaller, but also similar, propensity to lobby both green and brown. Panel B illustrates the fraction of total lobbying expenditures devoted to green and brown lobbying; again, companies devote a similar fraction of their lobbying expenditures to green and brown issues, irrespective of their green innovation efforts. Columns 5 and 6 of Table 1, which focus on firm-years with clean and dirty patents, respectively, yield similar conclusions. Firms with clean (dirty) patents spend 51.5% and 53.2%, respectively, of their environmental lobbying in brown directions. In sum, the univariate statistics presented in this table provide preliminary support for the *Misaligned lobbying hypothesis*. Firms engaging in green innovation, on average, are no more likely to engage in green lobbying than brown lobbying.

Table 2 describes the distribution of lobbying and innovation across industries. We limit our sample to firm-years with at least one lobbying transaction. Columns 2 and 3 show the percent of firm-years, within each Fama-French 12 industry, that engages in green and brown lobbying, respectively. Results are striking: both green and brown lobbying are concentrated within the same industries. The top three industries in brown lobbying also represent the top three in green lobbying: *Utilities*; *Oil, gas, & coal extraction and products*; and *Chemicals and allied products*. To provide one example, in 2018, ten firms in the Oil, gas, and coal industry spent a total of $1,152,700 on green lobbying, with Peabody Energy being the top spender ($315,000). However, other firms within the same industry concentrate their efforts on brown lobbying.[22]

Within some of these high-lobbying industries, the frequency of green innovation is also high. For example, as shown in column 5, 46.4% of firms in *Chemicals and allied products* have

[22] In 2018, 22 firms in the oil/gas/coal industries spent a total of $6,214,083 on brown lobbying, with Anadarko Petroleum being the top spender ($1,163,000).

at least one green patent. In addition, 45.6 % of firms in *Consumer durables* have one or more green patent, and 38.2% of firms in *Manufacturing*.[23] Conclusions are similar if we focus on the percent of firm-years with clean versus dirty patents, as shown in columns 6 and 7. In sum, the distribution of green patenting across industries highlights the extent to which some industries that are typically considered as not environmentally friendly are engaging in substantial innovation. Figure 7 illustrates the degree of overlap between green innovation and environmental lobbying (both green and brown) across industries.

5. Innovation and the direction of lobbying

To robustly test our two hypotheses, the *Consistent Lobbying hypothesis* versus the *Misaligned Lobbying hypothesis*, we now turn to regression analyses.

5.1 Main Results

In Table 3, we examine firms' choice to lobby. We estimate firm-year panel regressions in which the dependent variable is an indicator variable of whether a firm engages in lobbying, The independent variable of interest is a measure of environmental innovation, and we control for firm characteristics such as size, profitability, and other firm financials. We also include industry fixed effects, meaning we are examining within-industry variation.

In Panel A, we measure innovation based on the stock of patents, measured as the log of one plus the number of patents granted over the past 5 years (years t-5 through t-1). This captures the quantity of environment-related innovation. In Panel B we focus on the quality of innovation, measured as the citations of each patent grant. For each firm year, across all patents granted over the past 5 years, we calculate the average forward citations up to early 2022, and we adjust citations by technology class-year.[24] Panel C focuses on the composition of patents, specifically the number of green patents (or clean or dirty patents) granted over the past five years as a fraction of all

[23] Relatedly, Cohen et al. (2023) find a high incidence of green innovation in the Oil and gas industry.
[24] The number of forward citations of each patent is scaled by the average number of forward citations received in the same year-technology class to address the truncation bias in patent data (Hall et al. 2001).

patents granted over this period. Thus, in panel C, the sample is restricted to firm-years with at least one patent in the past five years. Finally, in panel D, we measure green innovation using the market value of a firm's portfolio of patents, as an average of the value of all patents granted over the previous five years. We use the measure computed by Kogan et al (2017), which is based on the market reaction to news about patents.

Looking first at Panel A, results in column 1 show that a one standard deviation increase in the stock of patents accumulated over the past five years is associated with a 25% increase in the probability of lobbying.[25] Both innovation and efforts to influence the regulatory environment represent competitive strategies, and firms tend to use these tools jointly, even after controlling for characteristics such as size and profitability.

In subsequent columns, we test more directly the relation between types of innovation and types of lobbying. Columns 2 and 4 (3 and 5) focus on the incidence of green (brown) lobbying. Similar to column 1, our independent variable of interest is the stock of patents granted over the past five years, but we focus on green patents (columns 2 and 3) or on clean and dirty patents (columns 4 and 5). To ensure that our measures of patent type do not capture overall innovation intensity, we control for the number of all other patents (i.e., patents not classified as green in columns 2 and 3, and patents not classified as clean or dirty in columns 4 and 5).

Echoing descriptive statistics provided in Table 1, results are consistent with the *Misaligned lobbying hypothesis*. Firms engaging in more green innovation, on average, are more likely to engage in both green lobbying and brown lobbying. Moreover, the economic significance of both effects is similar; a one standard deviation increase in the stock of green patents accumulated over the past five years is associated with a 95% (89%) increase in the probability of

[25] The standard deviation of *#All patents* (i.e., ln(granted patents in the last five years + 1)) is 1.7, and 0.034*1.7 = 0.058. Compared to the unconditional probability of lobbying (0.229), this is equivalent to 25% in terms of the magnitude.

green (brown) lobbying.[26] Conclusions are similar when we focus on clean and dirty patents.

Looking at the remaining panels of Table 3, conclusions are also robust to alternative measures of green innovation.[27] In sum, results support the Misaligned lobbying hypothesis. On average across all firms, green innovation contains no information regarding whether firms are striving to influence the regulatory agenda in more green directions or in more brown directions.

In Table 4, we focus on dollars spent on lobbying, rather than just the incidence of lobbying. Looking first at column 1, consistent with inferences from Table 3, we again find a large overlap between lobbying and innovation. A one standard deviation increase in green patenting is associated with a 72% increase in lobbying expenditures. The finding that firms engaging in green innovation are significantly more likely to simultaneously strive to influence the regulatory agenda through lobbying motivates our examination of the direction of these lobbying activities.

In subsequent columns, we focus on the direction of lobbying. In columns 2 and 3, the dependent variable is the fraction of lobbying dollars spent in green and brown directions, respectively. In columns 4 – 7, we restrict the sample to firm-years with positive expenditures on environmental lobbying, either green or brown, and the dependent variable equals the fraction of these dollars (green plus brown) spent on brown lobbying. This enables us to capture more precisely the direction in which the firm is striving to influence environmental regulation.

Ex ante, one might expect that firms with a greater stock of green patents would spend more money on pro-environmental lobbying and less on anti-environmental lobbying. However, results indicate that this is not the case. Consistent with the *Misaligned lobbying hypothesis*, firms with more green innovation do not strive to influence the government toward adopting a more pro-environmental stance. This conclusion holds irrespective of whether we measure green innovation as the quantity of green patents, the quality of green patents, green patenting intensity, or the

[26] The standard deviation of # *Green patents* is 0.72. Compared to the unconditional probability of green and brown lobbying (2.5% and 3%, respectively), the relative magnitudes are 95% (0.033*0.72/0.025) and 89% (0.037*0.72/0.03), respectively.

[27] Results in Panel C are similar if we limit the sample to the 13,687 firm-years with at least ten patents in the past five years.

market value of green patents.

In additional analyses, we examine if companies that sign onto the science-based target initiative (SBTi), which pushes for net-zero targets, are less likely to lobby brown. However, as shown in Internet Appendix Table A2, we find that these signatories also behave no differently than other companies, with regards to their lobbying.

5.2 Endogeneity

In our setting, perhaps the biggest endogeneity concern is measurement error. If we fail to measure green innovation or green lobbying sufficiently precisely, then we may fail to find a relation, even if such a relation does exist. This measurement error concern is mitigated by the robustness of conclusions across many measures of both innovation and lobbying. In this section we conduct several additional analyses, to further mitigate endogeneity concerns.

First, we estimate dynamics around an exogenous shock that decreased the cost of applying for green patents, the USPTO Green Technology Pilot Program. As discussed by Gao and Li (2021), this program was in effect from December 2009 – March 2012, and it decreased firms' time costs to get green patents approved. Firms could simultaneously file a patent and a petition describing the patent's positive environmental impact. Petitions that were granted were evaluated on a fast track. Thus, among firms that already had infrastructure in place to conduct green innovation, this program should increase the extent of green innovation.

We conduct a difference-in-differences analysis of the relation between green innovation and environmental lobbying in a quasi-experiment setting around the implementation of the Green Technology Pilot Program. Table 5 shows the results from this test. We define *treated* equal to one for firms that had a green innovation program in place, based on the premise that these firms were positioned to take advantage of this program. Specifically, *treated* equals one for firms that applied for at least one green patent in the three years leading up to the program, January 1, 2006 through November 30, 2009, zero otherwise. We define *post* equal to one for the years 2010 – 2012. The sample period is 2007 – 2012.

We define the sample as including all firm-years (column 1), firm-years with lobbying (columns 2 – 4), or firm-years with green or brown lobbying (columns 5 – 6). In all cases, we find that the number of green patents is significantly higher for treated firms during the Pilot program, as indicated by the coefficient on *treated* × *post*. However, consistent with results from OLS regressions, we find no evidence that environmental lobbying is affected. This shock to green innovation increased the number of green patents, but it did not cause firms to engage in more green lobbying or less brown lobbying.

For robustness, we perform two additional tests. First, we estimate the impact of this exogenous shock to green innovation using a 2SLS approach. In Panel A of Internet Appendix Table A3, first stage regression estimates show that the pilot program achieved its objective of lowering the costs of applying for green patents, and thus significantly increased green patent applications. However, in the second-stage regressions, where the dependent variable is *G lobbying / total lobbying,* B *lobbying / total lobbying*, and *B lobbying / B + G lobbying*, respectively, the coefficient on green innovation remains insignificant. Next, in Panel B, we take advantage of FOIA data obtained through the USPTO to examine the relation between lobbying and green patents that were given expedited processing, i.e., unexpectedly high levels of green innovation. Consistent with other results, we find no evidence of a significant relation between green innovation and the direction of environmental lobbying.

Our second analysis to address endogeneity focuses on the definition of green innovation. Bolton et al. (2023) show that some patents that are commonly classified as green represent innovation that improves the efficiency of brown operations. They classify patents into three subgroups: brown efficiency patents focus on increasing the efficiency of fossil fuel-based technologies; general efficiency patents focus on process efficiency and thus potentially contribute to reduced emissions; and green patents focus on environmental technologies. In Internet Appendix Table A4, we examine whether our findings regarding green innovators are robust to a narrower definition of green. Findings indicate that even when we exclude brown efficiency

patents from our definition of green innovation, we continue to find no evidence that green innovators are significantly more likely to lobby green. Consistent with the misaligned lobbying hypothesis, we continue to find that green innovators are equally likely to lobby green or brown.

Third, we consider the possibility that firms have multiple divisions, some of which focus on green issues and others which focus on brown. to address this possibility, we examine whether green patenting is positively related to green lobbying within single-segment firms. We re-estimate the regressions in Table 4, but we include an interaction term Green Patents * Single Segment firm. As shown in Internet Appendix Table A5 this interaction term is insignificant in all specifications.

In sum, results indicate that a firm's innovation efforts are not informative regarding the direction in which a firm is lobbying the government. This raises questions regarding what factors influence firms' lobbying decisions, and whether firms' innovation efforts contain information regarding their planned transition to green.

6. What explains green and brown lobbying?

Firms' lobbying is motivated by an effort to protect both current and future sources of cash flows. This generates several predictions. First, we examine the effects of current cash flows: firms whose current cash flows stem from green sources should be more likely to lobby green, whereas firms whose current cash flows derive from brown sources should be more likely to lobby brown.

Our second set of predictions concentrates on future cash flows, with a focus on understanding whether green patents represent an informative signal regarding firms' trajectory toward the green transition. Patents provide firms with exclusive rights, meaning they provide firms with the option to delay their investments (Bloom and Van Reenen, 2002). This option is particularly valuable in times of high uncertainty; environment-related innovation and the associated investments are characterized by both high technological and high regulatory uncertainty. These economics suggest that firms may invest in green innovation for two alternative

reasons. On the one hand, they may invest in green innovation to achieve a planned transition to green. Under this scenario, green innovation represents a proxy for future projected green cash flows, and firms would rationally engage in green lobbying to influence future regulatory requirements. Alternatively, firms may invest in green innovation as a real option, which they will only exercise if necessary, for example if forced by regulatory or competitive forces. Under this scenario, green innovation contains little to no information regarding future projected cash flows, meaning it will analogously not influence firms' lobbying behavior.

We employ several alternative approaches to measure the greenness of each firm's current operations. Both approaches employ text in 10-K forms, as this contains useful information on firms' product markets (Hoberg and Phillips (2010, 2016)). Our first approach searches through the Business Description section of 10-Ks for industry-specific bigrams that indicate pro-environment business practices (and not greenwashing). We identify these bigrams using the Large Language Model ChatGPT, and we list these 12 sets of bigrams in Internet Appendix Table A6.[28] A growing body of literature demonstrates that ChatGPT can extract relevant information (see, e.g., Bhaskar et al., 2023; Goyal et al., 2022; Kim et al., 2023). Using the *tf-idf* algorithm, we decompose each firm-year 10-K Business Description section into bigrams and apply weights to each of these bigrams based on the entire corpus of 10-Ks. Finally, we calculate the cosine similarity between the ChatGPT bigrams and the *tf-idf* weighted 10-K bigrams.

Our second approach relies on patent texts to identify relevant green vocabulary. For each firm-year, we calculate the cosine similarity between the 10-K Business Description text and the patent summary text for all green patents granted to public firms in our sample in the last 5 years using the *tf-idf* algorithm to focus on the most relevant words. Our underlying assumption is that the summary text of recently granted green patents captures the extent of the latest green

[28] Specifically, we employ the ChatGPT API, setting the temperature to zero to ensure replicability. We use the following prompt: "Please provide 25 business sustainability bigrams that indicate true pro-environment practices, not greenwashing, in the 'Consumer Nondurables' industry." We repeat this for each Fama French 12 industry. For the 12th Fama French industry 'Other', we simply ask 'Please provide 25 business sustainability bigrams that indicate true pro-environment practices, not green washing.'

technologies in the industry. Because this measure is based on a technology-related vocabulary, it is arguably less sensitive to greenwashing than other approaches.

We report the results of these analyses in Table 6. We estimate regressions in which the dependent variable is a measure of lobbying. Independent variables of interest include current green operations as a proxy for sources of current cash flows, and patenting as a measure of innovation. Control variables used in Tables 3 and 4 are included, as well as year and industry fixed effects. Standard errors are clustered at the firm level.

We begin by testing our first prediction, that firms tend to lobby in directions that correlate with their current sources of cash flows. We focus our discussion on Panel A, where current green operations are measured using the 25 sustainability-related bigrams, as described above. Results are consistent with predictions. In columns 1 and 2, current green operations are positively related to green lobbying intensity and negatively related to brown lobbying intensity, with the former relation significant at the 1% level. In columns 3 to 5, where we measure the direction of firm's lobbying efforts as brown lobbying as a fraction of green plus brown lobbying dollars (i.e., *B/(G+B)*), the coefficient on current green operations is negative and statistically significant at the 1% level. In economic terms, a one standard deviation increase in a firm's current green operations is associated with an 8.5 – 8.6% reduction in brown lobbying (as a fraction of environmental lobbying).

Next we turn to the role of future cash flows. Lobbying is typically driven by two components: firms' current priorities and firms' strategy for the future. The significance of current operational greenness in explaining lobbying captures the first factor, that is, the influence of current priorities. If innovation reflects firms' strategy for the future – specifically, their planned transition toward green – then green innovation should also be positively related to green lobbying. To allow for the influence of each as well as the potential interaction between the two, in columns 4 and 5 we include: the firm's current green operations, a measure of green innovation, and their interaction. We measure green innovation as either the stock of green patents granted over the past

five years, or the citations-based quality of green patents (as previously described in Table 3).

Findings cast doubt on the common assertion that firms' green innovation represents an informative signal regarding firms' current strategy for the future. Looking at column 4, the coefficients on both # *Green patents* and # *Green patents* × *Current green operations* are insignificant at conventional levels. If green innovation represented an informative signal regarding firms' transition plans, then both these coefficients should be significantly negative. The insignificance of both coefficients indicates that green innovation does not affect environmental lobbying, irrespective of whether firms' operations are green or brown. Findings are similar in column 5, where we use the quality of green patents as a measure of green innovation.

In Panel B of Table 6, we show that these conclusions are also robust to alternative definitions of current green operations. In columns 1 – 2, we similarly employ ChatGPT to identify industry-specific bigrams that capture sustainability practices, but we broaden our search to include 50 bigrams within each industry. In columns 3 – 4, we employ an indicator variable based on the 25 industry bigrams measure. In columns 5 – 6, we employ an indicator variable based on the patent-based vocabulary to measure firms' current operations. Both indicator variables equal one if the underlying continuous variable is in the top quartile, zero otherwise. Conclusions are similar across all these specifications. Using indicator variables, the coefficient estimates imply that firms with high green operations direct 9.6 – 11.2 percentage points less of their environmental lobbying dollars in brown directions. When compared to the mean of *B/(G+B),* this is equivalent to a decrease of 17% - 20%. To ensure that firms' choices to lobby in green or brown directions are not merely determined by variations in political regimes, we re-specify our main regressions separately across years in which the Democratic party was in power and years in which the Republican party was in power. Specifically, we define a Democratic (Republican) regime equal to one if the Democratic party (Republican party) controls two or more of the following positions: president, Senate, and the House. As shown in Internet Appendix Table A7, results are qualitatively similar across these different periods.

We further test the robustness of our results using a firm's green revenues as an alternative measure of current green operations. Specifically, we use the fraction of a firm's total revenues that is generated by green products, services, and economic activities. These data are provided by FTSE Russell, an LSEG Business, and are available for approximately 16% of our firms since 2008.[29] Notwithstanding the lack of power due to the relatively small sample size, the results presented in Internet Appendix Table A8 confirm that the relationship between firms' green operations and green lobbying is positive and significant, whereas green innovation does not contribute to predicting the direction of environmental lobbying.

While green patents are often used to measure firms' commitment to environment-related issues, our findings indicate that this measure ignores key information on firms' true focus. If current cash flows derive more from brown-type operations, then firms engage in brown lobbying to protect those cash flows, irrespective of their stock of green innovation. Our results are most consistent with firms investing in green innovation as a real option, to be exercised only if necessitated by future regulatory or competitive dynamics. Firms' green innovation does not appear to represent an informative signal of planned transition plans.

7. Does lobbying signal future firm actions?

Under the premise that lobbying is motivated by firms' current priorities and their strategy for the future, lobbying activities should relate to firm behavior. In this section, we provide direct evidence on this issue. We discuss our main results in section 7.1, and we present placebo analyses that address endogeneity concerns in section 7.2.

[29] FTSE Russell's Green Revenues Classification System identifies green products and services, primarily in the post-2008 period. When a company is identified to have green revenues, it is mapped to one or more micro sectors and then aggregated at the company level. The classification method relies on multiple data sources: public disclosures, direct company engagement, and company-specific estimates (from non-revenue data such as production volumes or peer data). One challenge with the data is that zero values may indicate either firm-years with insufficient information to identify green revenues or firm-years with zero green revenues. Thus, we limit the sample to firm-years with non-missing and non-zero observations. Several recent papers use these data on green revenues (see, for example, Klausmann et al (2024)).

7.1. Relation between environmental lobbying and subsequent firm emissions

To shed light on the extent to which firms' lobbying behavior represents an informative signal regarding firms' future environmental policies, we examine the relation between firm lobbying and subsequent toxic emissions. Firms devoting more of their lobbying dollars in brown directions arguably represent firms whose operating strategy is browner. Accordingly, we expect these firms' toxic emissions to be higher than those of other firms, over subsequent years.

Results are shown in Table 7. The dependent variable is toxic chemical releases, by each firm each year. As described in section 2.1, these data are provided by the EPA's TRI dataset. The data include on-site toxic releases into the air, surface water, land, and underground. We measure toxic emissions over years t+1, t+2, and t+3, respectively.

We employ two alternative measures of lobbying. In columns 1 – 3, we focus on brown and green lobbying intensity; brown (green) lobbying intensity is measured as brown (green) lobbying dollars as a fraction of total lobbying dollars in year t. In columns 4 – 6, we focus on brown lobbying as a fraction of environmental (brown + green) lobbying in year t.

We additionally include two alternative measures of green innovation. In Panel A of Table 7, we focus on the number of green patents, and in Panel B, we focus on the quality of green patents. In each case, consistent with earlier specifications, we define innovation based on patents granted over the past five years. We additionally control for total lobbying (or total environmental lobbying) dollars, measures of other patenting (i.e., patents not classified as green), firm financial characteristics employed in prior tables, and industry and year fixed effects.

Consistent with predictions, we find that a firm's brown lobbying intensity predicts significantly higher toxic emissions in each of the following three years. Looking at columns 1 – 3 in Panel A, a one standard deviation increase in brown lobbying intensity predicts an increase in emissions by 1.9% in year t+1, by 1.8% in year t+2, and by 1.6% in year 3. Similarly, columns 4 – 6 show that the fraction of environmental lobbying spent in brown directions significantly predicts higher emissions in subsequent years. Both the statistical and economic magnitudes of

these effects are similar in Panel B.

In contrast to the significance of lobbying, green innovation does not provide significant information on a firm's future toxic emissions (see also Bolton et al., 2023). This finding is consistent with other results reported throughout the paper. While many firms appear to devote considerable resources toward green innovation, as evidenced by granted green patents, the extent of green innovation does not represent an informative signal regarding firms' current strategy regarding transition to green. We find similar conclusions when we measure green innovation in terms of the quality of patents, as shown in Panel B. While higher-quality green patents should position firms to adopt technologies that lessen their environmental footprint, we find no evidence that such innovation predicts lower future emissions. These findings echo those in the prior section: firms appear to invest in green innovation as a real option, to exercise only if necessary.

7.2. Endogeneity concerns

A potential concern is that our lobbying measure is not sufficiently precise to capture each firm's efforts to influence the environmental agenda. For example, brown lobbying might be correlated with a firm's overall political leaning, which, in turn, could be related to both the firm's overall lobbying choices and its environmental policies. In this correlated omitted variable scenario, it is not clear what represents a negative signal regarding future emissions: the firm's specific efforts to influence the environmental agenda by lobbying brown, or more general characteristics of the firm. We address this concern through a placebo test.

We begin by forming a sample of lobbying transactions that are unrelated to the environment. Across our entire sample of 177,931 LD-2s, there are on average 2.4 lobbying issues per LD-2, yielding 426,271 LD-2 × lobbying issue observations. The steps outlined in Section 2.4 lead us to identify 64,157 lobbying issues as environment-related. For the placebo analysis, we focus on the remaining 362,114 transactions, which we label as non-environment related.

The second step is to define the political leaning of each of these transactions. Following the approach employed in our main sample (as described in Section 3), we define a lobbying

transaction as Republican- or Democratic-leaning based on the political contributions of the individual lobbyists involved in these transactions.

Our main results in Table 7 suggest that the portion of a firm's environmental lobbying dollars directed in brown directions represents an informative signal regarding the firm's emissions in subsequent years. Here, we examine the extent to which this relation is driven by brown lobbying per se, as opposed to the firm's general political leanings. In Table 8, we estimate regressions similar to those in Table 7, with the exception that the independent variable of interest is the fraction of non-environmental lobbying dollars directed in Republican directions, that is (Republican-leaning lobbying / (Republican-leaning + Democratic-leaning lobbying)) defined across LD-2s containing non-environmental issues. The dependent variable is emissions in years t+1, t+2, and t+3.

If the positive relation between brown lobbying and future emissions in Table 7 is driven by the overall political leanings of the firm, then we will find a significantly positive coefficient on this non-environmental Republican lobbying variable as well. Alternatively, if it is brown lobbying on environmental issues per se that drives results, then we will not find significance in this placebo analysis. Looking at Table 8, we find that the coefficient on the fraction of non-environmental lobbying focused in Republican directions is insignificant in all specifications. In sum, our findings highlight the fact that it is the direction of environmental lobbying that represents an informative signal regarding firms' environmental policies.

8. Does the market recognize firms' lobbying activities?

The growing inflows into ESG funds suggest that investors care about environmental impact. Baker et al. (2023) conclude that over their 2019-2022 sample period investors are willing to pay 20 basis points in higher fees per annum for pro-ESG funds, compared to otherwise similar funds without an ESG mandate. If investors are willing to pay a premium to invest in firms with pro-environmental policies, then this raises the question: are they getting what they are paying for?

Investors who value pro-environmental policies arguably would not want to pay a premium for firms that direct lobbying dollars in brown directions. We take two approaches toward examining this question. In section 8.1, we analyze the ratings of the largest ESG ratings provider, MSCI.[30] In section 8.2, we examine the investment decisions of UN PRI signatories.

8.1 ESG ratings

MSCI ESG ratings are widely followed by asset managers around the world, and they influence a large amount of investment dollars. MSCI provides annual ratings on environmental categories such as carbon emissions, waste management, biodiversity, product carbon footprint, etc. As described in Section 2.1, each firm-year is assigned an industry-adjusted score ranging from zero to ten. This score represents the firm's e-rating.

Results are shown in Table 9, in a format similar to that of Table 7. We regress the e-rating of each firm-year on measures of firm lobbying, firm innovation, and control variables used in prior tables, all of which are defined in year t. We also include industry and year fixed effects. The dependent variable is the e-rating in year t+1, t+2, and t+3, respectively. In columns 1 – 3 we measure lobbying as the fraction of brown or green lobbying dollars over total lobbying dollars; in columns 4 – 6 we define lobbying as the fraction of brown lobbying dollars over environmental lobbying (B/(B+G)). In our main specification, we measure green innovation as the fraction of green patents. For robustness, we utilize the quality of green innovation; results using this measure are qualitatively similar and are reported in Internet Appendix Table A9.

We find that firms' environmental ratings are not significantly related to their lobbying activities, despite evidence that firms' lobbying expenditures contain significant information regarding their environmental strategy (shown in Table 7). In contrast, we find some evidence that green innovation is significantly related to firm's E-ratings, despite evidence that such innovation

[30] In 2007, over two thirds of institutional money managers around the world were using KLD (the predecessor to MSCI) to incorporate ESG factors into investment decisions, and it has become the world's biggest ESG rating agency (Eccles and Stroehle, 2020). Moreover, ESG ratings influence flows into stocks; Pastor et al (2022) conclude that ESG-related flows affected stock returns over the 2012 – 2018 period.

is uninformative regarding firms' transition toward green.

The tendency of ratings agencies to incorporate innovation but not lobbying is arguably problematic. Findings throughout the paper indicate that firms tend to use these two competitive strategies jointly, and they are often not focused in the same direction. Green innovators often lobby brown, and lobbying is more informative regarding firms' environmental behaviors.

8.2 UN PRI signatories

Our second approach toward assessing investors' attention to firms' lobbying behavior focuses on UN PRI signatories. Investors who sign onto these principles publicly commit to investing responsibly. Using a format similar to Table 9, we examine if these signatories are less likely to invest in firms that devote resources toward brown lobbying. The dependent variable represents green institutional ownership, defined as shares owned by UN PRI signatories as a fraction of shares owned by all institutional investors. We begin the sample in 2006, the first year of the UN PRI.

As shown in Table 10, results indicate the UN PRI signatories do not incorporate firms' environmental lobbying into their investment decisions. In columns 1 – 3, the dependent variable is *UN PRI ownership*, measured at t+1, t+2, and t+3, respectively. Coefficients on *brown lobbying / total lobbying dollars* and *green lobbying / total lobbying dollars* are nearly all insignificant at conventional levels. In columns 4 – 6, we measure firms' lobbying as *B / (G + B) lobbying*, and the coefficient on this variable is insignificant in all cases. In sum, we find no evidence that UN PRI signatories are less likely to invest in firms that are brown lobbying, compared to those that are green lobbying.[31]

In aggregate, our results indicate that lobbying expenditures contain significant information regarding firms' environmental policies and their associated environmental footprints

[31] We also find no evidence that the investment of UN PRI signatories is sensitive to firms' green innovation, as indicated by the insignificant coefficient on # green patents. This finding is robust to measuring green innovation as the quality of green patents and across different sample periods, as shown in Panels A and B of Internet Appendix Table A10, respectively.

over the subsequent one to three years. However, neither MSCI nor UN PRI signatories appear to incorporate firms' lobbying behavior into their decision-making process. A failure to adequately consider lobbying can contribute to biased ratings and misguided investment decisions. Our findings call into question the extent to which these investors actually focus their investment dollars in firms that are actively transitioning toward green.

9. Conclusion

How do firms manage the technological and regulatory risks associated with the transition to a greener economy? We study how firms use innovation and lobbying as competitive tools to protect their competitive advantage and enhance their growth opportunities in an economic environment characterized by rapid technological change and great uncertainty. We define corporate environmental lobbying and introduce a novel method to identify the direction of lobbying – green or brown – by analyzing the political contributions of each individual lobbyist.

Perhaps surprisingly, we find that green innovators are equally likely to lobby in favor of green or brown legislative agendas. The source of current cash flows is the predominant driver of such lobbying choices. Firms whose current cash flows stem from brown sources tend to lobby brown, irrespective of the extent of green innovation. Our results suggest that firms view patents as options to delay their investments while maintaining their competitive advantage in a framework of high uncertainty (Bloom and Van Reenen (2002)).

We find that firms' environmental lobbying contains significant information on their environmental policies. However, neither MSCI's widely followed environmental ratings nor UN PRI signatories' investment decisions incorporate firms' lobbying behavior.

Overall, our findings indicate that a firm's current innovation activities often do not reflect its current environmental stance. It is reasonable to assume that dollars spent on brown lobbying are more likely to slow than expedite the transition to a greener economy. A significant portion of green innovators engaging in brown lobbying are actively contributing to this slower transition.

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Appendix A
Variable definitions

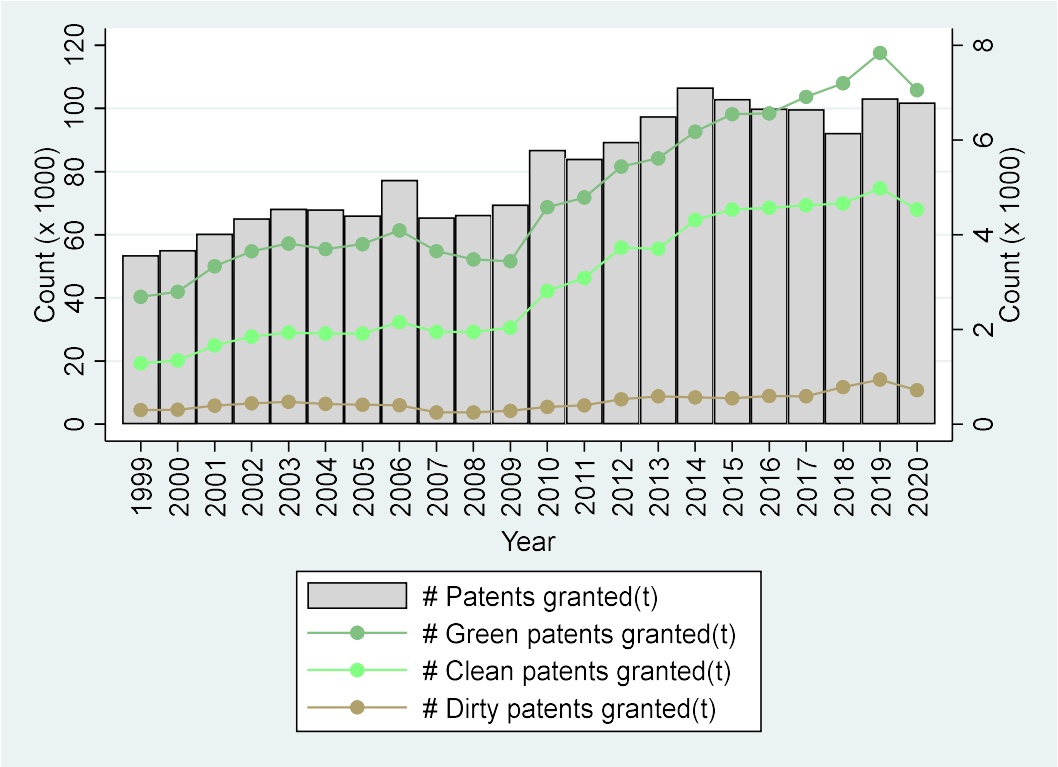
Variable	Definition
Innovation measures	
# All patents	The natural log of one plus the number of patents granted to the firm in the last five years. Source: USPTO PatentsView, extended KPSS patent data
# Green patents	The natural log of one plus the number of green patents granted to the firm in the last five years. We classify patents as relating to green technologies based on the OECD classification. Source: USPTO PatentsView, extended KPSS patent data, and OECD.
# Clean patents	The natural log of one plus the number of clean patents granted to the firm in the last five years. Clean patent definitions are from Dechezlepretre, Muckley, and Neelakantan (2020). Source: USPTO PatentsView, extended KPSS patent data, and Dechezlepretre, Muckley, and Neelakantan (2020)
# Dirty patents	The natural log of one plus the number of dirty patents granted to the firm in the last five years. Dirty patent definitions are from Dechezlepretre, Muckley, and Neelakantan (2020). Source: USPTO PatentsView, extended KPSS patent data, and Dechezlepretre, Muckley, and Neelakantan (2020)
# Other patents	When used with green patents in regressions, this variable represents the natural log of one plus the number of patents granted to the firm in the last five years that are not green. When used with clean patents and dirty patents in regressions, this variable represents the natural log of one plus the number of patents granted to the firm in the last five years that are neither clean nor dirty.
Green $Patents_{quality}$	The natural log of one plus the average forward citations of patents granted to the firm in the last five years. If a firm does not have a patent, this variable is set to zero. Source: USPTO PatentsView, extended KPSS patent data, and OECD.
Clean $Patents_{quality}$	The natural log of one plus the average forward citations of clean patents granted to the firm in the last five years. If a firm does not have a clean patent, this variable is set to zero. Source: USPTO PatentsView, extended KPSS patent data, and Dechezlepretre, Muckley, and Neelakantan (2020)
Dirty $Patents_{quality}$	The natural log of one plus the average forward citations of dirty patents granted to the firm in the last five years. If a firm does not have a dirty patent, this variable is set to zero. Source: USPTO PatentsView, extended KPSS patent data, and Dechezlepretre, Muckley, and Neelakantan (2020)
Other $Patents_{quality}$	When used with green patents in regressions, this variable represents the natural log of one plus the average forward citations of patents granted to the firm in the last five years that are not green. When used with clean and dirty patents in regressions, this variable represents the natural log of one plus the average forward citations of patents granted to the firm in the last five years that are neither clean nor dirty.
Green patents/All patents	The ratio of green patents over all patents granted to the firm in the last five years. Source: USPTO PatentsView, extended KPSS patent data, and OECD.
Clean patents/All patents	The ratio of clean patents over all patents granted to the firm in the last five years. Source: USPTO PatentsView, extended KPSS patent data, and Dechezlepretre, Muckley, and Neelakantan (2020).
Dirty patents/All patents	The ratio of dirty patents over all patents granted to the firm in the last five years. Source: USPTO PatentsView, extended KPSS patent data, and Dechezlepretre, Muckley, and Neelakantan (2020).

Lobbying measures	
I(Lobbying)	Equals one if a firm lobbied, zero otherwise. Source: SOPR and OpenSecrets.
I(G Lobbying)	Equals one if a firm lobbied green, zero otherwise. An LD-2 is defined to be e-related if 1) the LD-2 contains issue codes (in Line 15) in ENG, ENV, FUE, CAW, or WAS, or 2) the description of the issue (in Line 16) in the LD-2 contains at least one of the bills associated with Environmental protection, Energy, Public lands and natural resources, or Water resources development, as defined by https://www.congress.gov/, or 3) the cosine similarity between the e-related vocabulary (as shown in Figure 3) and the description of the issue (in Line 16) is above the benchmark (i.e., the average cosine similarity of e-related transactions identified using the prior two criteria). A lobbyist is defined as a Democratic party-leaning lobbyist if more than 75% of his/her lifetime political contribution (denominator = contributions to the Democratic party + contributions to the Republican party) between 1990-2020 are allocated to the Democratic party. Source: SOPR and OpenSecrets.
I (B Lobbying)	Equals one if a firm lobbied brown, zero otherwise. Source: SOPR and OpenSecrets.
Total Lobbying Dollars	The natural log of one plus the dollar amount spent on lobbying (in $ mil). Source: SOPR and OpenSecrets.
G + B Lobbying Dollars	The natural log of one plus the dollar amount spent on green and brown lobbying (in $ mil). Source: SOPR and OpenSecrets.
G Lobbying / Total Lobbying Dollars	The amount spent on Green lobbying deflated by the total lobbying expenditures. Source: SOPR and OpenSecrets.
B Lobbying / Total Lobbying Dollars	The amount spent on Brown lobbying deflated by the total lobbying expenditures. Source: SOPR and OpenSecrets.
B/(G+B) Lobbying Dollars	The fraction of environmental lobbying dollars (green plus brown) spent on Brown lobbying. Source: SOPR, OpenSecrets.
Other variables	
Current green operations	The cosine similarity between the business description section of firms' 10Ks and 25 industry-specific sustainability-related bigrams obtained from ChatGPT. For robustness, we also define the measure using 1) 50 bigrams, 2) an indicator variable that equals one if the cosine similarity is in the top quartile (quartiles defined each year), or 3) an indicator variable that equals one if the cosine similarity between the business description section of firms' 10Ks and patent summary text for the universe of green patents granted in the last five years is in the top quartile (quartiles are defined each year). Source: ChatGPT, USPTO PatentView, extended KPSS data, OECD, EDGAR
Toxic Emissions	The natural log of one plus the toxic on-site emissions, measured in pounds. Source: Toxic Release Inventory (TRI) dataset, provided by the Environmental Protection Agency (EPA).
E-rating	MSCI environmental rating, which is on a scale of zero to ten, with higher numbers being more favorable ratings. Source: MSCI
Ownership by UN PRI signatories/Total Institutional Ownership	Shares owned by UN PRI signatories as a fraction of shares owned by all institutional investors. Source: UNPRI.org, Thomson Reuters
Firm-level variables	
Size	ln(AT + 1). Source: Compustat.
Leverage	(DLTT + DLC) / AT. Source: Compustat.
ROA	NI/AT. Source: Compustat.
Cash/Assets	CHE/AT. Source: Compustat.

Figure 1
Time series of innovation and green innovation

Panel A shows the number of patents granted to US public firms between 1999 and 2020 each year. Similarly, Panel B shows the cumulative number of patents granted to US public firms between 1999 and 2020 in the last 20 years (e.g., for the year 2000 we count patents granted between 1991 and 2000). Across panels, the primary axis (left-hand side) represents the number of all patents and the secondary axis (right-hand side) represents the number of green, clean, and dirty patents. Patent data are obtained from PatentsView. We use the extended KPSS (Kogan, Papanikolaou, Seru, and Stoffman) patent database to identify patents granted to public firms. We classify patents as relating to green technologies based on the OECD classification. Clean and dirty patent classifications are from Dechezlepretre, Muckley, and Neelakantan (2020).

Panel A: Patent grants



Panel B: Cumulative number of patents

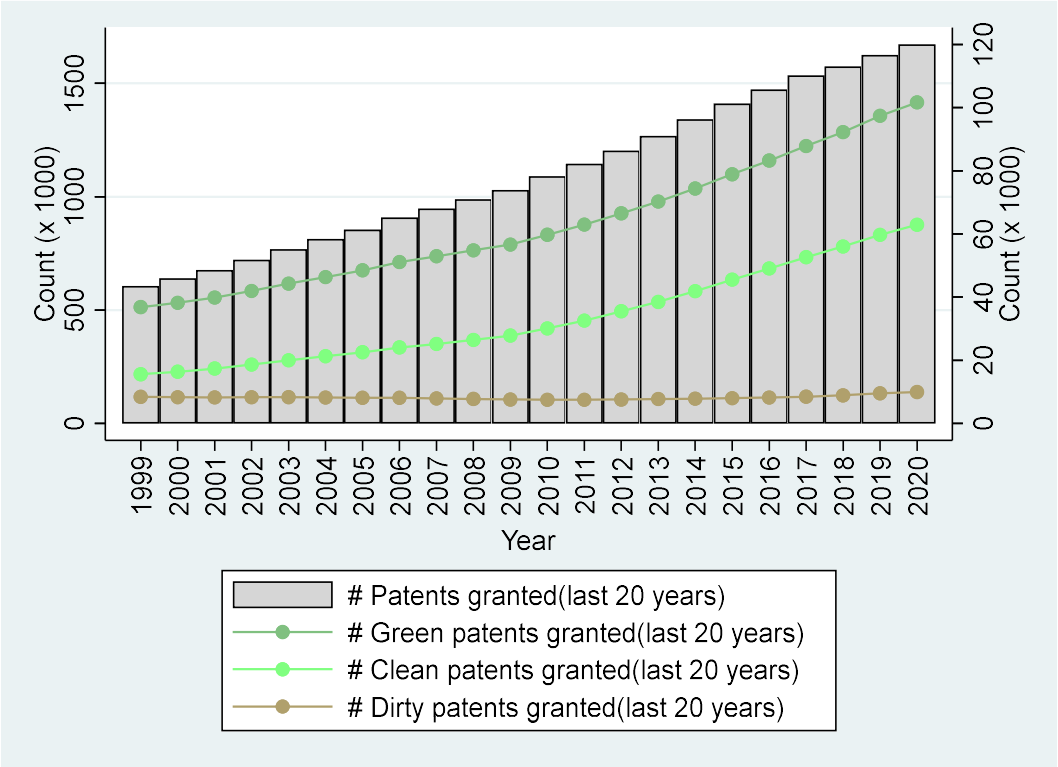


Figure 2
Time-series of lobbying and environmental lobbying

This figure shows the number of lobbying transactions and the amount of lobbying expenditures. The sample consists of 177,931 (37,171) LD-2s (e-related LD-2s) filed by 3,373 (1,130) public firms in the US between 1999-2020. Lobbying data are obtained from the SOPR (Senate Office of Public Records) and OpenSecrets (https://www.opensecrets.org/). We remove duplicate filings and keep the latest amendments to LD-2s using similar strategies as described in Huneeus and Kim (2020). The left axis shows the total number of LD-2s filed each year, and the right axis shows the total lobbying expenditures each year. An LD-2 is defined to be e-related if 1) the LD-2 contains issue codes (in Line 15) in ENG, ENV, FUE, CAW, or WAS, or 2) the description of the issue (in Line 16) in the LD-2 contains at least one of the bills associated with Environmental protection, Energy, Public lands and natural resources, or Water resources development, as defined by https://www.congress.gov/, or 3) the cosine similarity between the e-related vocabulary (as shown in Figure 3) and the description of the issue (in Line 16) is above the benchmark (i.e., the average cosine similarity of e-related transactions identified using the prior two criteria).

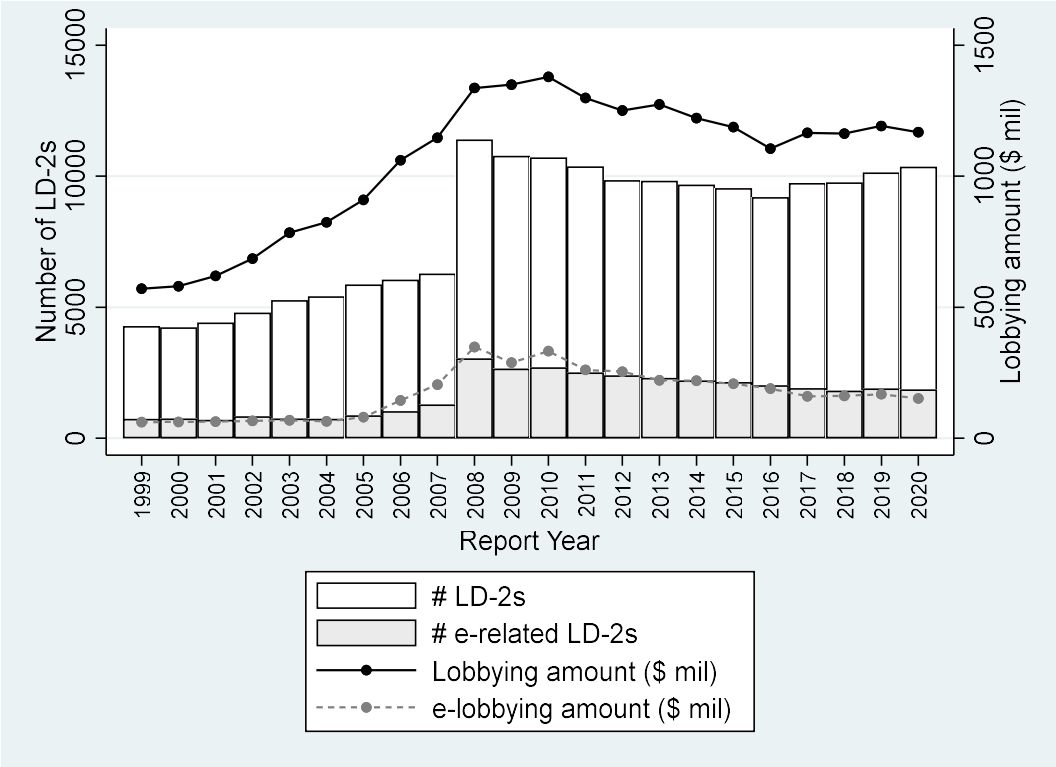


Figure 3
Word cloud for environmental lobbying

This word cloud represents the vocabulary that we identify as pertaining to lobbying issues that are related to the environment. Specifically, a lobbying transaction within an LD-2 is defined to be e-related if 1) the transaction contains issue codes (in Line 15) in ENG, ENV, FUE, CAW, or WAS, or 2) the description of the issue (in Line 16) in the LD-2 contains at least one of the bills associated with Environmental protection, Energy, Public lands and natural resources, or Water resources development, as defined by https://www.congress.gov/. We focus on the LD-2s filed by public firms in the US between 1999-2020. We then form a word vector based on the Line 16 descriptions across all these LD-2s. LD-2s are obtained from the Senate Office of Public Records. Line 16 texts and bill numbers are obtained from OpenSecrets (https://www.opensecrets.org/).

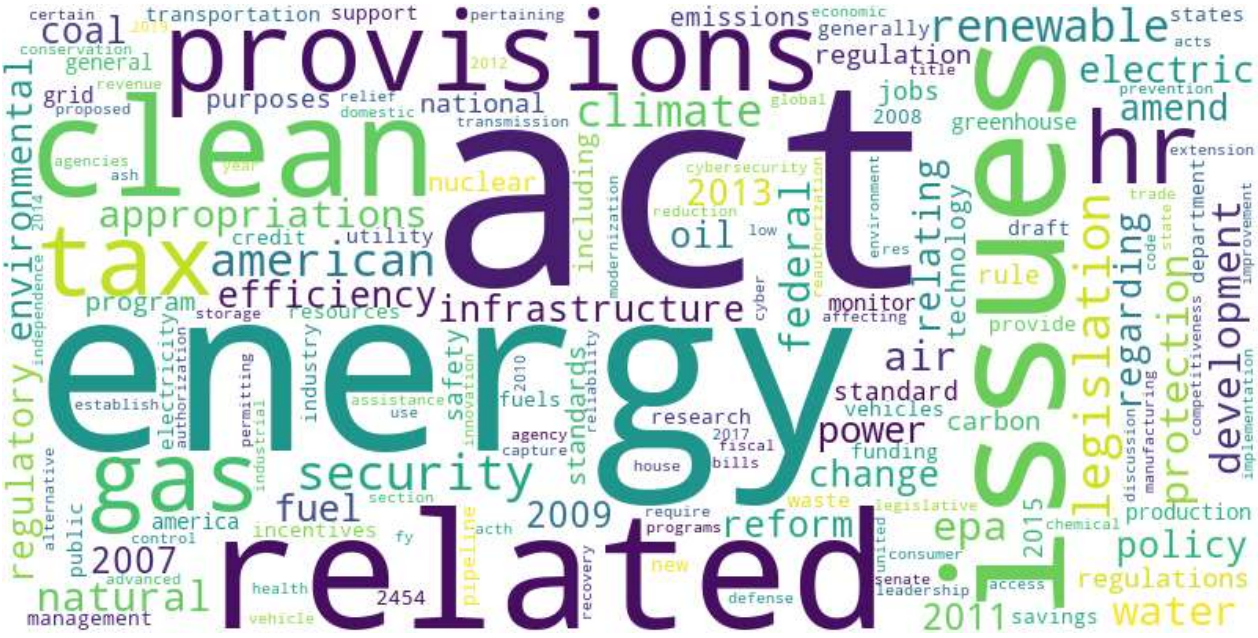
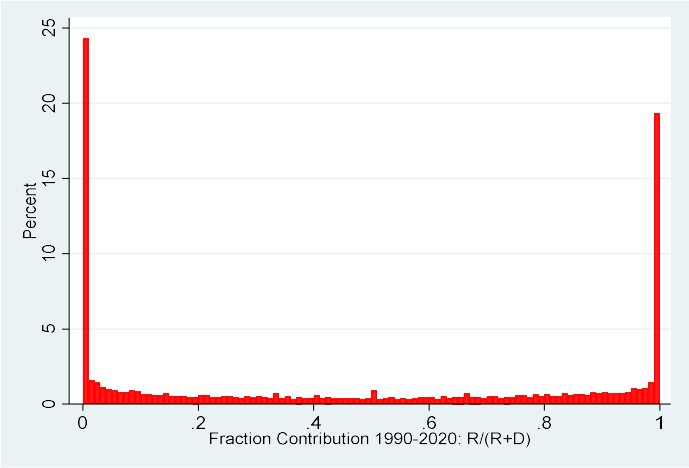


Figure 4
Lobbyists' political contributions

Panel A shows the distribution of political contributions across individual lobbyists. The sample is based on 1,256,534 individual contributions made between 1990 and 2020 associated with 10,658 lobbyists who lobbied for public firms in our sample. For these 10,658 lobbyists, we calculate the sum of individual contributions to the Democratic party (D), the Republican party (R), and the rest (O). To be included in the sample, we require the sum of contributions to the Democratic party and the Republican party to be positive, and the sum of contributions to each category to be nonnegative (i.e., $D \geq 0$; $R \geq 0$). Panel B shows the classification of lobbyists' political orientations in our sample. We define a lobbyist to be Democratic (Republican) party-leaning if more than 75% of the lobbyist's individual contributions are allocated to the Democratic (Republican) party.

Panel A: Lobbyist-level political contributions



Panel B: Classification of lobbyists' political orientation

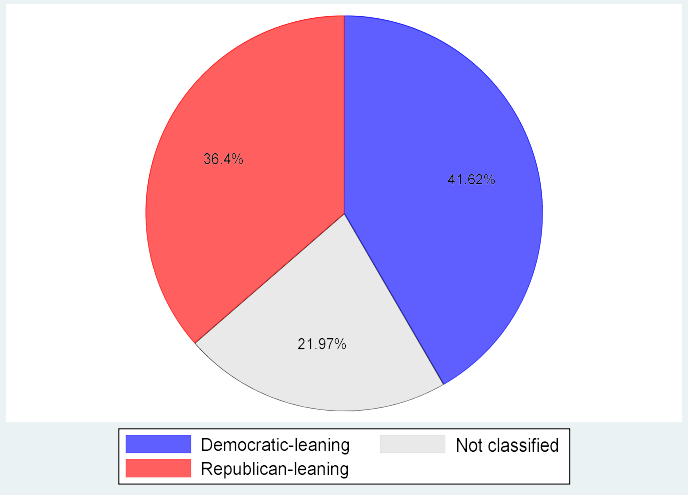
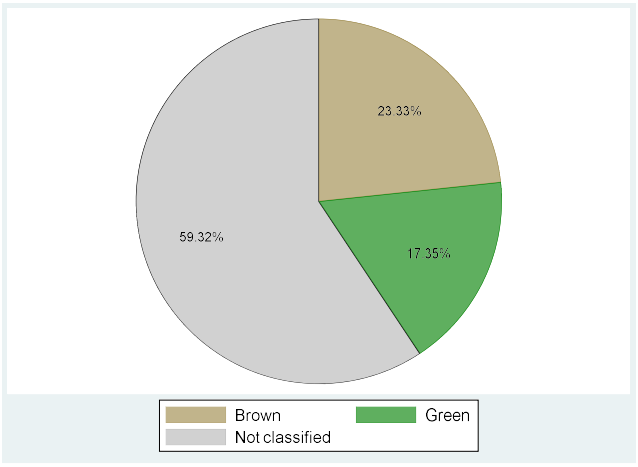


Figure 5
Classification of environmental lobbying

Panel A shows the classification of environment-related (e-related) LD-2s. An e-related LD-2 is classified as Green (Brown) if 1) more than 75% of lobbyists in the LD-2 are Democratic (Republican) party-leaning lobbyists unconditionally or 2) the fraction of lobbyists in the LD-2 whose political orientation can be identified is greater than 50% AND more than 75% of lobbyists in the LD-2—excluding lobbyists whose political orientation cannot be identified—are Democratic (Republican) party-leaning lobbyists. Panel B shows the direction of e-lobbying at the firm-year level. The figure shows the amount of Brown lobbying expenditures divided by the sum of Green and Brown lobbying expenditures. By definition, this measure is available only for firm-years with non-missing Green or Brown lobbying. The amount of Green (Brown) lobbying expenditures at the firm-year level is defined by the sum of lobbying dollars allocated to Green (Brown) issues.

Panel A: Classification of e-related LD-2s



Panel B: Direction of e-lobbying at the firm-year level

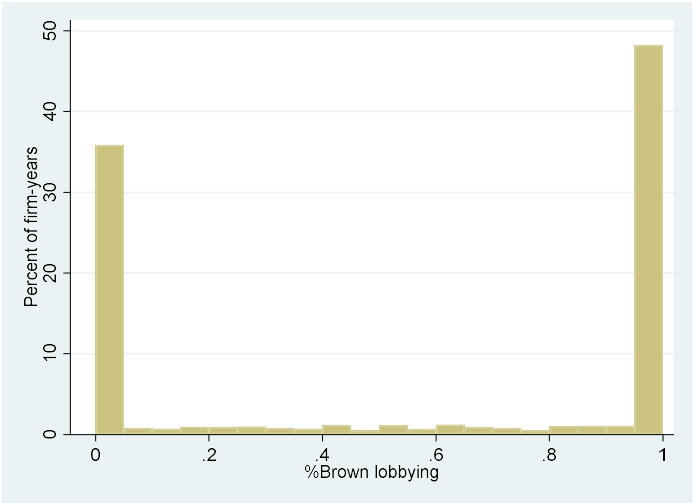
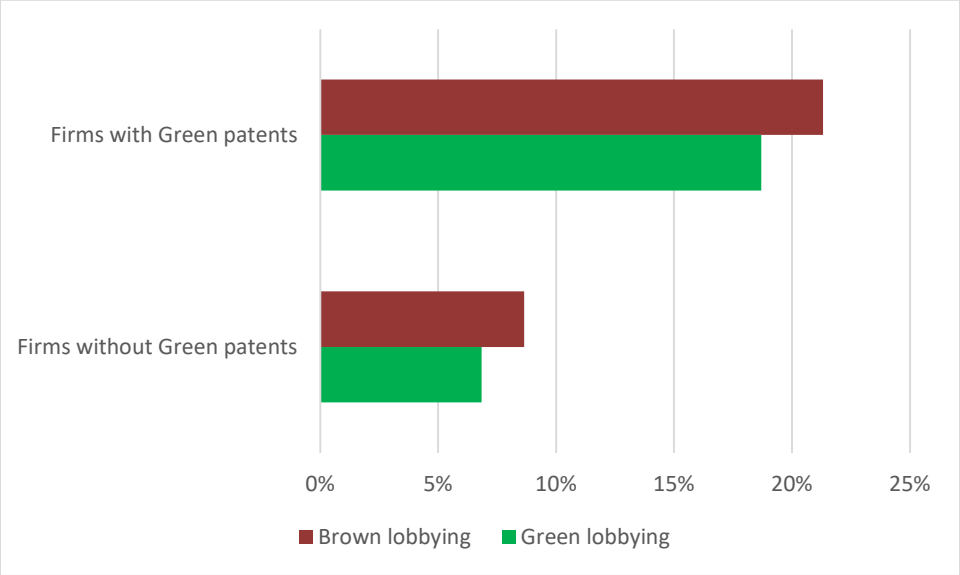


Figure 6
Green and brown lobbying among green innovators and non-green innovators
The sample includes firm-years between 1999 and 2020 with lobbying transactions and at least one patent (granted in the last five years). We limit the sample to firm-years with at least $10 million in assets and positive sales. Panel A shows the fraction of firm-years that lobby green vs. brown. Panel B shows the % of lobbying dollars devoted to green vs. brown.

Panel A: Propensity to lobby brown vs. green



Panel B: % of lobbying dollars devoted to brown vs. green

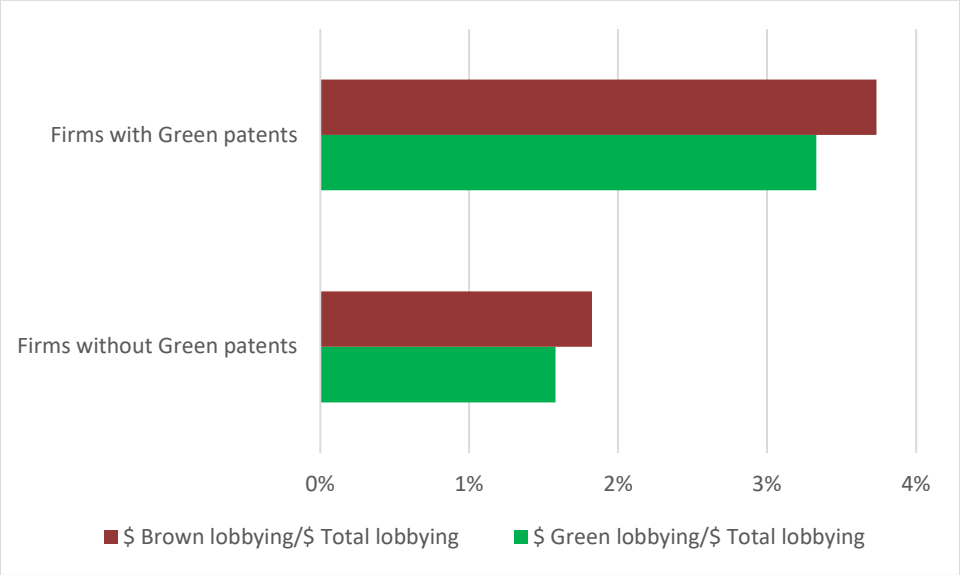
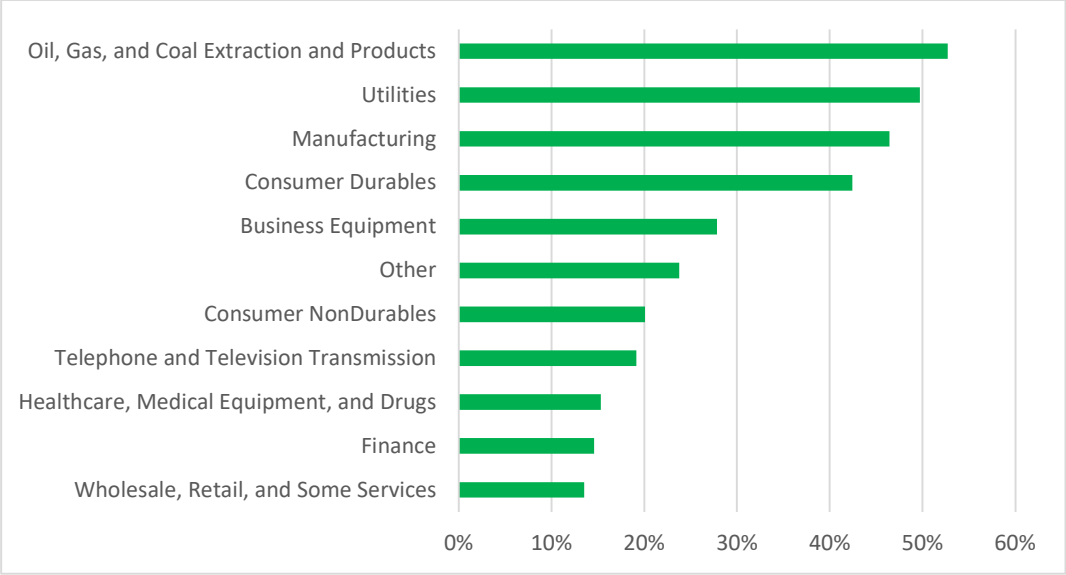


Figure 7
Green innovation and green vs. brown lobbying across industries
The sample includes firm-years between 1999 and 2020 with lobbying transactions and at least one patent (granted in the last five years). We limit the sample to firm-years with at least $10 million in assets and positive sales. Panel A shows the fraction of firm-years in each industry with at least one green patent. Panel B shows the average % of lobbying dollars devoted to green vs. brown by green innovators in each industry. Green innovators are defined as firms that have at least one granted green patent in the last five years. Within each industry, we calculate the average ratio of green (brown) lobbying expenditures divided by the total lobbying expenditures. Industry definition is based on Fama-French 12 industry classification.

Panel A: Fraction of firm-years with green patents



Panel B: % of lobbying dollars devoted to brown vs. green

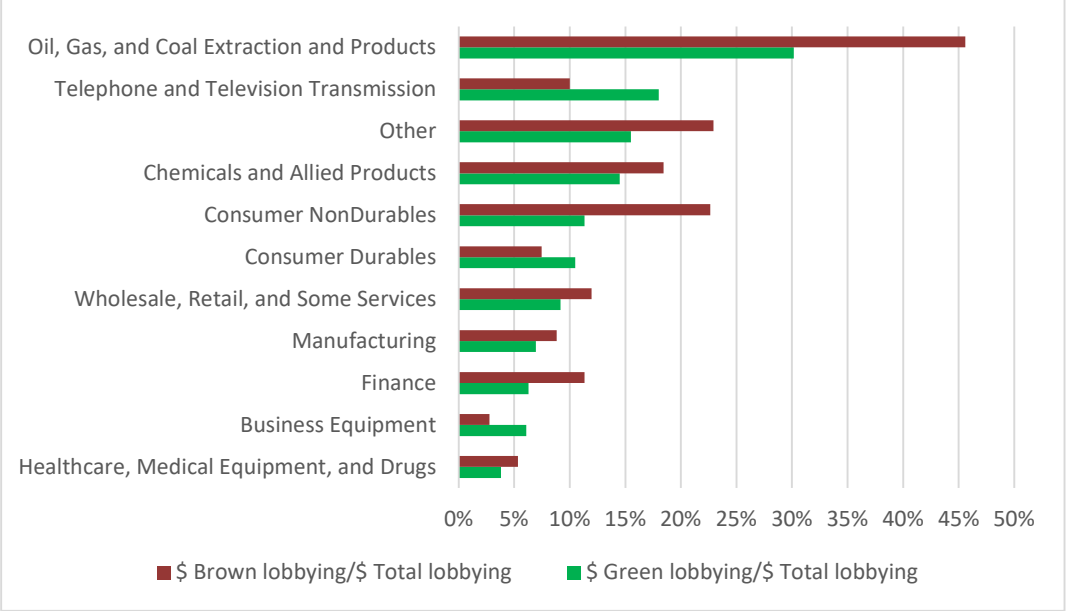


Table 1
Descriptive statistics on firm lobbying

This table provides summary statistics on lobbying activities. The sample includes firm-years between 1999 and 2020, with at least $10 million in assets and positive sales. In column 1, statistics are provided across all firm-years. In columns 2 – 4, the sample is divided into firm-years with at least one green patent, with at least one patent but no green patents, and with no patents, respectively. In columns 5 – 6, the sample consists of firm-years with at least one clean patent and with at least one dirty patent, respectively. We classify patents as relating to green technologies based on the OECD classification. Clean and dirty patent definitions are from Dechezlepretre, Muckley, and Neelakantan (2020). When a patent is classified as both clean and dirty (this may occur when there is more than one technology class for a patent), we define such a patent as neither clean nor dirty. The green patent sample consists of 939 unique firms, the clean patent sample of 602 unique firms, and the dirty patent sample of 256 unique firms. The classification of green versus brown lobbying is described in the text.

	The distribution of environmental lobbying across					
		Firm-years with				
	All firm-years	Green patents	Patents other than Green	No patents	Clean patents	Dirty patents
All firms: # firm-years	88,821	5,241	17,056	66,524	3,261	1,101
% Firm-yrs with: Any lobbying	21.8%	56.9%	29.5%	17.1%	62.4%	74.2%
Firms that lobby: # firm-years	19,381	2,984	5,029	11,368	2,034	817
% Firm-yrs with: Green lobbying	10.7%	20.5%	7.2%	9.6%	22.7%	28.0%
% Firms-yrs with: Brown lobbying	13.0%	22.8%	8.4%	12.4%	23.2%	29.6%
$ Green lobbying	$20,988	$35,396	$10,398	$21,891	$38,361	$41,894
Std Dev($ Green lobbying)	$316,237	$181,153	$78,473	$398,827	$192,663	$149,941
$ Brown lobbying	$26,540	$51,431	$17,384	$24,057	$50,248	$73,213
Std Dev($ Brown lobbying)	$150,501	$216,959	$131,110	$135,850	$193,810	$239,878
Green/All lobbying	2.7%	3.3%	1.5%	3.0%	3.6%	3.0%
Brown/All lobbying	3.2%	3.7%	1.6%	3.8%	3.4%	3.9%
Firms that lobby G or B: # firm-yrs	3,870	1,070	679	2,121	766	375
% Brown (=B/(B+G)): $	56.4%	54.2%	55.1%	57.8%	51.5%	53.2%

Table 2
Lobbying and innovation across industries

This table provides the percent of firm-years, across each Fama-French 12 industry, with green versus brown lobbying, with any patenting, and with green, clean, or dirty patenting. The sample consists of firm-years between 1999 and 2020 with at least one lobbying transaction, and we additionally require firms to have at least $10 million in assets and positive sales. Column 1 shows the number of firm-years in each industry. Columns 2 and 3 show the percent of these firm years with green and brown lobbying, respectively. Columns 4 and 5 show the percent of these firm years with at least one patent and with at least one green patent, respectively. Columns 6 and 7 show the percent of these firm years with at least one clean patent and with at least one dirty patent, respectively. The classification of green versus brown lobbying is described in the text, and the classifications of green, clean, and dirty patents are described in Table 1.

	Firm-years with environmental lobbying transactions:						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	N	Green lobbying	Brown lobbying	At least 1 patent	At least 1 Green patent	At least 1 Clean patent	At least 1 Dirty patent
Utilities	1,299	34.3%	43.3%	14.4%	7.0%	4.5%	2.1%
Oil, Gas, and Coal Extraction and Products	774	29.6%	51.4%	29.3%	20.0%	13.0%	7.4%
Chemicals and Allied Products	715	20.1%	26.7%	70.1%	46.4%	24.9%	10.5%
Manufacturing	2,020	14.7%	14.8%	63.0%	38.2%	29.0%	17.9%
Consumer Durables	467	14.6%	11.6%	70.0%	45.6%	42.6%	19.3%
Other	2,744	9.6%	13.0%	17.5%	4.7%	2.6%	1.7%
Business Equipment	3,126	7.4%	3.9%	67.2%	24.0%	18.7%	3.4%
Consumer NonDurables	1,042	7.3%	11.4%	37.1%	8.7%	4.4%	2.1%
Wholesale, Retail, and Some Services	1,173	5.6%	8.5%	24.6%	4.3%	2.2%	0.6%
Finance	2,513	5.5%	7.6%	17.8%	1.8%	1.2%	0.1%
Telephone and Television Transmission	872	4.8%	3.9%	33.0%	6.9%	5.6%	0.5%
Healthcare, Medical Equipment, and Drugs	2,636	2.5%	3.2%	57.1%	11.1%	4.0%	0.6%
All	19,381	10.7%	13.0%	41.3%	15.4%	10.5%	4.2%

Table 3
Propensity to lobby green and brown

This table shows the relation between firm innovation and firms' propensity to lobby. The sample consists of all firm-years between 2000 and 2020, with at least $10 million in assets and positive sales. In each panel, the dependent variable is an indicator variable denoting the presence of lobbying. *I(Lobbying)* is an indicator variable that equals one if a firm lobbied in year *t*, and zero otherwise; *I(G Lobbying)* and *I(B Lobbying)* represent indicator variables for green lobbying and brown lobbying, respectively, and are defined in a similar manner. In Panel A, we measure innovation based on the natural log of one plus the number of patents granted to the firm in the last five years from $t-5$ to $t-1$. In Panel B, we measure innovation based on the quality of patents; across all patents granted between $t-5$ and $t-1$, we calculate the average truncation bias-corrected forward citations; we define this as zero for firm-years with no patents over the [$t-5$, $t-1$] period. In Panel C, we measure innovation based on the composition of a firm's patent portfolio: *Green patents/All patents* equals the ratio of green patents over all patents granted to the firm in the last five years between $t-5$ and $t-1$, and *Clean patents/All patents* and *Dirty patents/All patents* are defined in a similar manner. By construction, the Panel C sample is based on firms that have at least one granted patent in the last five years from $t-5$ to $t-1$. In Panel D, we measure innovation based on the market value of patents, using the measure of Kogan et al (2017). Patent classification (green, clean, and dirty) is based on the definitions described in Table 1. *Other patents* represent all patents that are not green (in columns 2 and 3 in Panel A; in columns 1 and 2 in Panels B–D) or not clean or dirty (in columns 4 and 5 in Panel A; in columns 3 and 4 in Panels B–D). Green lobbying and brown lobbying are described in the text. In Panels B–D, control variables (*Size*, *Leverage*, *ROA*, and *Cash/Assets*) are not reported. Industry fixed effects are defined at the Fama-French 48 industry level. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

Panel A: Stock of patents

	I(Lobbying)	I(G Lobbying)	I(B Lobbying)	I(G Lobbying)	I(B Lobbying)
# All patents	0.034***				
	(0.003)				
# Green patents		0.033***	0.037***		
		(0.005)	(0.005)		
# Clean patents				0.023***	0.015***
				(0.006)	(0.005)
# Dirty patents				0.043***	0.050***
				(0.012)	(0.012)
# Other patents		-0.001	-0.003*	0.001	0.002
		(0.001)	(0.001)	(0.001)	(0.001)
Size	0.098***	0.014***	0.019***	0.014***	0.019***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Leverage	0.011	-0.012**	-0.025***	-0.012**	-0.025***
	(0.017)	(0.005)	(0.006)	(0.005)	(0.006)
ROA	-0.063***	-0.022***	-0.027***	-0.021***	-0.026***
	(0.011)	(0.003)	(0.003)	(0.003)	(0.003)
Cash/Assets	0.062***	0.009**	0.004	0.008*	0.003
	(0.018)	(0.004)	(0.004)	(0.004)	(0.004)
Observations	78,436	78,436	78,436	78,436	78,436
R-squared	0.300	0.122	0.158	0.125	0.158
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes

Panel B: Quality of patents

	I(G Lobbying)	I(B Lobbying)	I(G Lobbying)	I(B Lobbying)
Green Patents$_{Quality}$	0.036***	0.041***		
	(0.007)	(0.007)		
Clean Patents$_{Quality}$			0.042***	0.040***
			(0.009)	(0.010)
Dirty Patents$_{Quality}$			0.082***	0.089***
			(0.019)	(0.022)
Other Patents$_{Quality}$	0.004	0.003	0.003	0.003
	(0.003)	(0.003)	(0.003)	(0.003)
Observations	78,436	78,436	78,436	78,436
R-squared	0.109	0.147	0.115	0.152
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Panel C: Composition of patent portfolio

	I(G Lobbying)	I(B Lobbying)	I(G Lobbying)	I(B Lobbying)
Green patents / All patents	0.061***	0.082***		
	(0.019)	(0.023)		
Clean patents / All patents			0.074***	0.085***
			(0.028)	(0.028)
Dirty patents / All patents			0.044	0.118**
			(0.045)	(0.058)
# All patents	0.010***	0.005*	0.009***	0.005*
	(0.002)	(0.003)	(0.002)	(0.003)
Observations	26,901	26,901	26,901	26,901
R-squared	0.149	0.207	0.148	0.206
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Panel D: Market value of patents

	I(G Lobbying)	I(B Lobbying)	I(G Lobbying)	I(B Lobbying)
Green Patents$_{MktValue}$	0.026***	0.030***		
	(0.004)	(0.005)		
Clean Patents$_{MktValue}$			0.022***	0.025***
			(0.005)	(0.005)
Dirty Patents$_{MktValue}$			0.033***	0.041***
			(0.008)	(0.008)
Other Patents$_{MktValue}$	0.005**	0.009***	0.007***	0.011***
	(0.002)	(0.003)	(0.002)	(0.003)
Observations	78,436	78,436	78,436	78,436
R-squared	0.119	0.162	0.126	0.170
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Table 4
Dollars spent on environmental lobbying

This table shows the relation between innovation and lobbying expenditures. The sample consists of all firm-years between 2000 and 2020, with at least $10 million in assets and positive sales. In column 1, the dependent variable is the natural log of total dollars spent on lobbying in year *t*. In column 2(3), the dependent variable is the fraction of lobbying dollars spent on green (brown) lobbying in year *t*. In columns 4-7, the dependent variable equals the fraction of environmental lobbying dollars (green plus brown) spent on brown lobbying. In columns 1 - 4, we measure innovation based on the natural log of one plus the number of patents granted to the firm in the last five years from *t* – 5 to *t* – 1. In column 5, we measure innovation using patent quality, defined as the average truncation bias-corrected forward citations for patents granted in the last five years. In column 6, we measure innovation based on the composition of a firm's patent portfolio in the last five years. In column 7, we measure green innovation as the market value of green patents granted in the last five years, using the measure of Kogan et al (2017). The green patent classification is based on the definition described in Table 1, all other patents are defined in Table 3, and green and brown lobbying are described in the text. Industry fixed effects are defined at the Fama-French 48 industry level. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

		G	B				
	$ Lobbying	Lobbying/ Lobbying	Lobbying/ Lobbying	B/(G+B) Lobbying Dollars			
# Green patents	0.100***	-0.003	0.000	0.021			
	(0.015)	(0.002)	(0.002)	(0.017)			
# Other Patents	0.030***	-0.001	-0.003***	-0.016			
	(0.005)	(0.001)	(0.001)	(0.012)			
Green Patents$_{Quality}$					0.034		
					(0.037)		
Other Patents$_{Quality}$					-0.053		
					(0.035)		
Green/All patents						0.056	
						(0.079)	
# Patents						-0.015	
						(0.013)	
Green Patents$_{MktValue}$							-0.001
							(0.012)
Other Patents$_{MktValue}$							0.008
							(0.011)
Size	0.074***	-0.001	0.001	0.017	0.015	0.020	0.010
	(0.004)	(0.002)	(0.001)	(0.014)	(0.012)	(0.020)	(0.013)
Leverage	-0.060***	0.008	-0.010	-0.126	-0.126	0.044	-0.108
	(0.018)	(0.008)	(0.007)	(0.087)	(0.086)	(0.117)	(0.086)
ROA	-0.051***	-0.015*	-0.005	-0.010	-0.018	0.028	-0.011
	(0.009)	(0.009)	(0.006)	(0.103)	(0.103)	(0.135)	(0.104)
Cash/Assets	-0.003	-0.002	-0.009	-0.265**	-0.269**	-0.200	-0.282**
	(0.018)	(0.011)	(0.007)	(0.123)	(0.122)	(0.163)	(0.123)
Observations	78,436	17,951	17,951	3,676	3,676	2,086	3,676
R-squared	0.366	0.078	0.124	0.104	0.104	0.156	0.103
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 5: Addressing Endogeneity

This table examines innovation and lobbying activities before and after the USPTO Pilot program for green technologies. The sample is based on firm-years between 2007-2012, with at least $10 million in assets and positive sales. Treated equals one if a firm applied for at least one green patent between 1/1/2006 and 11/30/2009, and zero otherwise. Post is a dummy variable that equals one for firm-years 2010-2012, and zero otherwise. In column 1, the sample is based on all firm-years. In columns 2-4, the sample is restricted to firm-years with lobbying activities. In columns 5-6, the sample is restricted to firm-years with green or brown lobbying activities. In columns 1, 2, and 5, the dependent variable is the natural log of one plus the number of patent applications. In column 3(4), the dependent variable is green (brown) lobbying / total lobbying dollars. In column 6, the dependent variable is brown lobbying / (green + brown lobbying) dollars. The green patent classification is based on the definition described in Table 1, and green and brown lobbying are described in the text. Industry fixed effects are defined at the Fama-French 48 industry level. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

	(1)	(2)	(3)	(4)	(5)	(6)
	# Green patents	# Green patents	G Lobbying/ Lobbying	B Lobbying/ Lobbying	# Green patents	B/(G+B) Lobbying Dollars
Treated x Post	0.026**	0.064***	-0.001	-0.002	0.109**	-0.069
	(0.012)	(0.022)	(0.008)	(0.008)	(0.054)	(0.048)
Treated	0.259***	0.278***	-0.005	0.010	0.316***	0.146**
	(0.021)	(0.031)	(0.012)	(0.011)	(0.079)	(0.063)
Size	0.018***	0.050***	-0.001	-0.000	0.116***	-0.010
	(0.003)	(0.009)	(0.002)	(0.002)	(0.026)	(0.017)
Leverage	-0.022	-0.020	0.021	-0.016	0.094	-0.156
	(0.017)	(0.055)	(0.015)	(0.011)	(0.241)	(0.125)
ROA	-0.016**	-0.076**	-0.047**	0.005	-0.079	0.207
	(0.007)	(0.034)	(0.021)	(0.011)	(0.142)	(0.144)
Cash/Assets	0.010	0.136***	-0.001	-0.008	0.404*	-0.242
	(0.011)	(0.049)	(0.015)	(0.013)	(0.206)	(0.173)
Sample	All firm-yrs	Firms-yrs with lobbying	Firms-yrs with lobbying	Firms-yrs with lobbying	Firms-yrs with G or B lobbying	Firms-yrs with G or B lobbying
Observations	21,792	5,416	5,416	5,416	1,324	1,324
R-squared	0.258	0.324	0.092	0.122	0.480	0.142
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 6. Source of current cash flows and the direction of environmental lobbying

The sample consists of firm-years between 2000 and 2020 with non-missing values for green or brown lobbying and *Current green operations* and with at least $10 million in assets and positive sales. In Panel A, in columns 1 and 2, the dependent variable equals the fraction of lobbying dollars spent on green and brown lobbying, respectively. In columns 3-5, the dependent variable equals the fraction of environmental lobbying dollars (green plus brown) spent on brown lobbying. *Current green operations* is defined using the cosine similarity between 25 industry-specific sustainability-related bigrams and the business description section of firms' 10Ks. In Panel B, in columns 1-2, we measure *Current green operations* using the cosine similarity between 50 industry-specific sustainability-related bigrams and the firms' business description section of 10Ks; in columns 3-4, *Current green operations* represents an indicator variable equal to one if the Panel A measure is in the top quartile, zero otherwise; in columns 5-6, *Current green operations* is defined based on the cosine similarity between green patent texts and firms' 10Ks, and it similarly represents an indicator variable equal to one if this measure is in the top quartile, zero otherwise. These measures are all explained in more detail in the text. All other variables are defined in prior tables and in Appendix A. Industry fixed effects are defined at the Fama-French 48 industry level. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1%, respectively.

Panel A: Current Green operations based on industry-specific bigrams in firms' 10Ks

	Dept Variable =				
	G Lobbying/ Lobbying	B Lobbying/ Lobbying	B/(G+B) Lobbying Dollars		
Current Green Operations	24.110***	-3.365	-27.312***	-27.433***	-27.865***
	(3.464)	(2.869)	(7.195)	(7.464)	(7.499)
Current Green Operations * # Green Patents				-0.785	
				(8.066)	
Current Green Operations * Quality(Green Patents)					8.765
					(22.493)
# Green patents				0.025	
				(0.018)	
# Other Patents				-0.019	
				(0.012)	
$\text{Green Patents}_{\text{Quality}}$					0.035
					(0.043)
$\text{Other Patents}_{\text{Quality}}$					-0.059
					(0.036)
Size	-0.007***	-0.004**	0.017	0.021	0.018
	(0.002)	(0.002)	(0.012)	(0.015)	(0.012)
Leverage	0.006	-0.020*	-0.113	-0.124	-0.121
	(0.013)	(0.011)	(0.090)	(0.091)	(0.090)
ROA	-0.019	-0.005	-0.060	-0.054	-0.061
	(0.015)	(0.012)	(0.107)	(0.106)	(0.106)
Cash/Assets	-0.011	-0.026**	-0.267**	-0.254**	-0.263**
	(0.016)	(0.012)	(0.127)	(0.127)	(0.126)
Observations	10,785	10,785	3,282	3,282	3,282
R-squared	0.140	0.175	0.114	0.117	0.117
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes

Panel B: Alternative measures of Current Green operations

	Dept Var = B/(G+B) Lobbying Dollars					
	Current Green Ops defined using 50 Industry-specific bigrams (continuous variable)		Current Green Ops defined using 25 Industry-specific bigrams (dummy variable)		Current Green Ops defined using Green patent vocabulary (dummy variable)	
Current green operations	-54.250***	-55.160***	-0.109***	-0.096**	-0.109***	-0.112***
	(14.965)	(14.920)	(0.042)	(0.041)	(0.042)	(0.041)
Current green operations *	3.003		0.036**		0.027	
# Green patents	(14.473)		(0.016)		(0.020)	
Current green operations *		24.295		0.101		0.099
$\text{Green Patents}_{\text{Quality}}$		(40.075)		(0.066)		(0.066)
# Green patents	0.023		0.008		0.008	
	(0.018)		(0.020)		(0.023)	
# Other patents	-0.019		-0.019		-0.017	
	(0.012)		(0.012)		(0.012)	
$\text{Green Patents}_{\text{Quality}}$		0.032		0.000		-0.002
		(0.044)		(0.048)		(0.047)
$\text{Other Patents}_{\text{Quality}}$		-0.058		-0.062*		-0.059
		(0.036)		(0.036)		(0.036)
Size	0.020	0.017	0.026*	0.022*	0.023	0.021*
	(0.015)	(0.012)	(0.015)	(0.012)	(0.015)	(0.012)
Leverage	-0.124	-0.123	-0.122	-0.128	-0.121	-0.118
	(0.091)	(0.090)	(0.091)	(0.090)	(0.090)	(0.089)
ROA	-0.059	-0.064	-0.064	-0.065	-0.085	-0.085
	(0.105)	(0.105)	(0.107)	(0.106)	(0.106)	(0.105)
Cash/Assets	-0.256**	-0.263**	-0.231*	-0.235*	-0.235*	-0.238*
	(0.127)	(0.125)	(0.127)	(0.126)	(0.126)	(0.125)
Observations	3,282	3,282	3,282	3,282	3,282	3,282
R-squared	0.117	0.117	0.115	0.114	0.115	0.115
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 7
Environmental lobbying and real outcomes

This table shows the relation between environmental lobbying and firms' toxic emissions. The sample is as described in prior tables, with the added requirement that firms have available data on toxic emissions. The dependent variable is toxic emissions, as reported by firms to the EPA, in years t+1, t+2, and t+3. The direction of firms' environmental lobbying is measured as either the fraction of lobbying dollars spent on brown and green lobbying, respectively (columns 1 – 3 of each panel) or the fraction of environmental lobbying dollars (green plus brown) spent on brown lobbying (columns 4 – 6 of each panel). We additionally control for either total lobbying dollars or environmental (G+B) lobbying dollars. In Panel A we measure innovation as the natural log of one plus the number of patents granted to the firm. In Panel B we measure innovation as the quality of patents, calculated using the average truncation bias-corrected forward citations for patents granted to the firm. All independent variables are defined in year t, with the exception of patent-related variables which are defined over the five years up and including year t. Industry fixed effects are defined at the Fama-French 48 industry level. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

Panel A: Measuring innovation as stock of patents

	Dep't Variable = Toxic Emissions at:					
	t+1	t+2	t+3	t+1	t+2	t+3
B Lobbying / Total Lobbying Dollars	1.302**	1.219**	1.083*			
	(0.605)	(0.602)	(0.605)			
G Lobbying / Total Lobbying Dollars	0.023	-0.043	0.037			
	(1.020)	(1.017)	(0.984)			
B/(G+B) Lobbying Dollars				0.922**	0.897**	0.748*
				(0.424)	(0.444)	(0.441)
# Green Patents	-0.106	-0.143	-0.099	-0.144	-0.133	-0.061
	(0.185)	(0.185)	(0.187)	(0.253)	(0.270)	(0.294)
# Other Patents	-0.031	-0.027	-0.061	-0.157	-0.205	-0.268
	(0.144)	(0.145)	(0.143)	(0.234)	(0.245)	(0.258)
Total Lobbying Dollars	0.150	0.041	-0.098			
	(0.454)	(0.449)	(0.442)			
G + B Lobbying Dollars				1.384**	1.585**	1.616**
				(0.658)	(0.632)	(0.672)
Size	0.993***	1.041***	1.064***	0.843***	0.913***	0.927***
	(0.214)	(0.216)	(0.214)	(0.263)	(0.270)	(0.265)
Leverage	-0.179	-0.195	-0.175	-1.680	-1.447	-2.267
	(1.322)	(1.362)	(1.363)	(2.214)	(2.174)	(2.185)
ROA	0.322	-0.552	-0.596	-0.921	-1.290	-1.622
	(1.935)	(1.981)	(1.611)	(2.910)	(3.051)	(2.554)
Cash/Assets	-1.557	-1.758	-2.017	-4.242	-3.888	-4.145
	(1.978)	(2.072)	(2.031)	(3.684)	(4.096)	(3.804)
Observations	1,995	1,981	1,966	750	758	771
R-squared	0.470	0.466	0.463	0.487	0.482	0.456
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Measuring innovation as quality of patents

	Dep't Variable = Toxic Emissions at:					
	t+1	t+2	t+3	t+1	t+2	t+3
B Lobbying / Total Lobbying Dollars	1.259**	1.159*	1.016*			
	(0.603)	(0.600)	(0.599)			
G Lobbying / Total Lobbying Dollars	0.021	-0.021	0.079			
	(1.010)	(1.006)	(0.978)			
B/(G+B) Lobbying Dollars				0.861**	0.803*	0.616
				(0.418)	(0.430)	(0.414)
Green Patents$_{Quality}$	0.184	0.153	0.192	-0.933	-0.926	-0.703
	(0.380)	(0.400)	(0.383)	(0.609)	(0.599)	(0.604)
Other Patents$_{Quality}$	-0.299	-0.356	-0.477	-0.428	-0.778	-0.979
	(0.507)	(0.526)	(0.543)	(0.790)	(0.794)	(0.820)
Total Lobbying Dollars	0.046	-0.080	-0.213			
	(0.467)	(0.465)	(0.461)			
G + B Lobbying Dollars				1.432**	1.722***	1.743***
				(0.651)	(0.636)	(0.665)
Size	0.935***	0.977***	1.002***	0.713***	0.776***	0.779***
	(0.197)	(0.199)	(0.198)	(0.234)	(0.241)	(0.242)
Leverage	-0.154	-0.182	-0.172	-2.007	-1.958	-2.802
	(1.326)	(1.363)	(1.363)	(2.294)	(2.237)	(2.266)
ROA	0.451	-0.380	-0.407	-1.504	-2.113	-2.443
	(1.907)	(1.936)	(1.583)	(2.946)	(3.032)	(2.626)
Cash/Assets	-1.923	-2.143	-2.376	-4.232	-4.133	-4.503
	(1.976)	(2.052)	(2.021)	(3.620)	(3.969)	(3.732)
Observations	1,995	1,981	1,966	750	758	771
R-squared	0.469	0.464	0.462	0.490	0.487	0.459
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 8
Placebo Test

This table shows the relation between non-environmental lobbying and firms' toxic emissions. The sample is as described in prior tables, with the added requirement that firms have available data on toxic emissions. The dependent variable is toxic emissions, as reported by firms to the EPA, in years t+1, t+2, and t+3. The direction of firms' non-environmental lobbying is measured as the fraction of non-environmental lobbying dollars spent in Republican directions, as described in further detail in the text. We additionally control for the amount of non-environmental lobbying dollars. In columns 1 – 3, we measure innovation as the natural log of one plus the number of patents granted to the firm. In columns 4 – 6, we measure innovation as the quality of patents, calculated using the average truncation bias-corrected forward citations for patents granted to the firm. All independent variables are defined in year t, with the exception of patent-related variables which are defined over the five years up and including year t. The green patent classification is based on the definition described in Table 1, All Other Patents are defined in Table 3, and green and brown lobbying are described in the text. Industry fixed effects are defined at the Fama-French 48 industry level. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

	Dep't Variable = Toxic Emissions at:					
VARIABLES	t+1	t+2	t+3	t+1	t+2	t+3
Rep/(Rep+Dem) Non-environmental	0.406	0.321	0.024	0.387	0.311	0.001
Lobbying Dollars	(0.475)	(0.479)	(0.470)	(0.477)	(0.478)	(0.469)
# Green patents	-0.084	-0.086	-0.042			
	(0.189)	(0.199)	(0.205)			
# Other Patents	-0.159	-0.173	-0.194			
	(0.158)	(0.162)	(0.170)			
$\text{Green Patents}_{\text{Quality}}$				-0.005	0.050	0.114
				(0.418)	(0.442)	(0.441)
$\text{Other Patents}_{\text{Quality}}$				-0.520	-0.619	-0.842
				(0.581)	(0.609)	(0.642)
Non-environmental Lobbying Dollars	-0.258	-0.462	-0.637	-0.414	-0.609	-0.765
	(0.526)	(0.522)	(0.550)	(0.563)	(0.565)	(0.593)
Size	1.307***	1.322***	1.339***	1.143***	1.147***	1.188***
	(0.225)	(0.229)	(0.234)	(0.176)	(0.176)	(0.174)
Leverage	-0.946	-1.152	-1.270	-0.958	-1.183	-1.388
	(1.521)	(1.541)	(1.557)	(1.571)	(1.574)	(1.584)
ROA	-0.807	-2.005	-2.318	-0.623	-1.829	-2.159
	(2.182)	(2.276)	(2.114)	(2.191)	(2.229)	(2.027)
Cash/Assets	-2.133	-2.117	-2.647	-2.658	-2.667	-3.094
	(2.559)	(2.663)	(2.632)	(2.581)	(2.645)	(2.618)
Observations	1,307	1,295	1,287	1,307	1,295	1,287
R-squared	0.518	0.506	0.500	0.513	0.501	0.498
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 9
Environmental lobbying and environmental ratings

This table shows the relation between environmental lobbying and firms' environmental ratings. The sample is as described in prior tables, with the added requirement that firms have available data on MSCI environmental ratings. The dependent variable is the firm's MSCI environmental rating, which is on a scale of zero to ten, with higher numbers being more favorable ratings. The direction of firms' environmental lobbying is measured as either the fraction of lobbying dollars spent on brown and green lobbying, respectively (columns 1 – 3 of each panel) or the fraction of environmental lobbying dollars (green plus brown) spent on brown lobbying (columns 4 – 6 of each panel). We additionally control for either total lobbying dollars or environmental (G+B) lobbying dollars. We measure innovation as the natural log of one plus the number of patents granted to the firm. All independent variables are defined in year t, with the exception of patent-related variables which are defined over the five years up and including year t. The green patent classification is based on the definition described in Table 1, All Other Patents are defined in Table 3, and green and brown lobbying are described in the text. Industry fixed effects are defined at the Fama-French 48 industry level. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

	Dep't Variable = E-rating at:					
	t+1	t+2	t+3	t+1	t+2	t+3
B lobbying / Total Lobbying Dollars	0.144	0.179	0.175			
	(0.213)	(0.204)	(0.210)			
G lobbying / Total Lobbying Dollars	0.335	0.330	0.494**			
	(0.262)	(0.259)	(0.247)			
B/(G+B) Lobbying Dollars				-0.089	-0.147	-0.133
				(0.130)	(0.128)	(0.127)
# Green patents	0.110**	0.096*	0.078	0.043	0.037	0.046
	(0.050)	(0.051)	(0.052)	(0.074)	(0.077)	(0.082)
# Other patents	0.107***	0.118***	0.131***	0.161***	0.173***	0.170***
	(0.033)	(0.034)	(0.035)	(0.061)	(0.060)	(0.062)
Total Lobbying Dollars	0.328***	0.326***	0.325***			
	(0.080)	(0.083)	(0.084)			
G + B Lobbying Dollars				0.075	0.141	0.168
				(0.217)	(0.238)	(0.222)
Size	0.166***	0.167***	0.164***	0.209***	0.196***	0.176**
	(0.043)	(0.043)	(0.043)	(0.069)	(0.070)	(0.070)
Leverage	0.346	0.333	0.302	-0.035	-0.066	-0.079
	(0.232)	(0.238)	(0.244)	(0.422)	(0.429)	(0.465)
ROA	0.463*	0.314	0.316	0.464	0.373	0.266
	(0.271)	(0.267)	(0.278)	(0.548)	(0.548)	(0.567)
Cash/Assets	0.410	0.365	0.312	1.184	0.673	0.410
	(0.304)	(0.311)	(0.313)	(0.736)	(0.713)	(0.697)
Observations	9,218	8,846	8,440	2,454	2,367	2,266
R-squared	0.264	0.268	0.271	0.376	0.370	0.357
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 10
Environmental lobbying and UN PRI Signatory ownership

This table shows the relation between environmental lobbying and green institutional ownership. Green institutions are defined as institutions that signed up for PRI (Principles for Responsible Investment). The sample is as described in prior tables, but starts in 2006, the first year of the UNPRI signatory directory. The dependent variable is ownership by UNPRI signatories as a fraction of total institutional ownership, which ranges from 0 to 1. The direction of firms' environmental lobbying is measured as either the fraction of lobbying dollars spent on brown and green lobbying, respectively (columns 1 – 3 of each panel) or the fraction of environmental lobbying dollars (green plus brown) spent on brown lobbying (columns 4 – 6 of each panel). We additionally control for total lobbying dollars or environmental (G+B) lobbying dollars. We measure innovation as the natural log of one plus the number of patents granted to the firm. All independent variables are defined in year t, with the exception of patent-related variables which are defined over the five years up and including year t. The green patent classification is based on the definition described in Table 1, All Other Patents are defined in Table 3, and green and brown lobbying are described in the text. Industry fixed effects are defined at the Fama-French 48 industry level. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

	Dept' Var = Ownership by UN PRI Signatories / Total Institutional Ownership at					
	t+1	t+2	t+3	t+1	t+2	t+3
B Lobbying / Total Lobbying Dollars	0.015	0.013	0.002			
	(0.011)	(0.011)	(0.009)			
G Lobbying / Total Lobbying Dollars	0.023*	0.010	0.013			
	(0.012)	(0.011)	(0.012)			
B/(G+B) Lobbying Dollars				-0.003	0.001	-0.005
				(0.006)	(0.007)	(0.007)
# Green patents	0.003	0.003	0.002	0.003	0.004	0.005
	(0.002)	(0.002)	(0.002)	(0.003)	(0.004)	(0.003)
# Other Patents	0.000	0.000	0.001	0.001	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)
Total Lobbying Dollars	-0.006*	-0.004	-0.002			
	(0.003)	(0.003)	(0.003)			
G + B Lobbying Dollars				0.008	0.006	0.015
				(0.010)	(0.010)	(0.012)
Size	-0.002	-0.004**	-0.005***	-0.005	-0.007**	-0.008**
	(0.001)	(0.001)	(0.002)	(0.003)	(0.003)	(0.003)
Leverage	-0.024**	-0.016	-0.020*	-0.008	-0.017	-0.047
	(0.010)	(0.011)	(0.012)	(0.026)	(0.027)	(0.031)
ROA	0.012	0.005	-0.011	0.005	-0.015	-0.082*
	(0.014)	(0.016)	(0.018)	(0.029)	(0.031)	(0.043)
Cash/Assets	-0.018	-0.023*	-0.037***	-0.008	-0.008	-0.020
	(0.012)	(0.012)	(0.012)	(0.038)	(0.042)	(0.039)
Observations	12,560	12,013	11,460	2,829	2,697	2,563
R-squared	0.693	0.685	0.676	0.711	0.674	0.658
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Internet Appendix to

Firms' transition to green: innovation and lobbying

By: Sungjoung Kwon, Michelle Lowry, and Michela Verardo

Internet Appendix A
LD-2 form example
This appendix shows selected pages from an LD-2 filed by Nickles Group (client = Exxon Mobil). The report can be viewed online here: https://lda.senate.gov/filings/public/filing/10006a62-3189-4bdb-b990-cc2bdc02bd4a/print/ .

Clerk of the House of Representatives	Secretary of the Senate
Legislative Resource Center	Office of Public Records
B-106 Cannon Building	232 Hart Building
Washington, DC 20515	Washington, DC 20510

Secretary of the Senate
Received: Feb 05, 2008

LOBBYING REPORT

Lobbying Disclosure Act of 1995 (Section 5) - **All Filers Are Required To Complete This Page**

1. Registrant Name:

NICKLES GROUP

2. Address:
601 13th St. NW Suite 250 N, Washington, DC 20005

3. Principal place of business (if different from line 2):

4. Contact Name: PAMELA FLEMING
Telephone: 2026370214
E-mail (optional): mail@nicklesgroup.com

Senate ID #: 293335-583
House ID #:

7. Client Name: ☐ Self

EXXON MOBIL CORPORATION

TYPE OF REPORT

8. Year 2007 Midyear (January 1 - June 30): ☐ **OR** Year End (July 1 - December 31): ☒

9. Check if this filing amends a previously filed version of this report: ☐

10. Check if this is a Termination Report: ☐ => Termination Date: 11. No Lobbying Activity: ☐

INCOME OR EXPENSES

Complete Either Line 12 **OR** Line 13

12. Lobbying Firms

INCOME relating to lobbying activities for this reporting period was:

Less than $10,000: ☐

$10,000 or more: ☒ => Income (nearest $20,000): 150,000.00

Provide a good faith estimate, rounded to the nearest $20,000, of all lobbying related income from the client (including all payments to the registrant by any other entity for lobbying activities on behalf of the client).

Registrant Name: NICKLES GROUP Client Name: EXXON MOBIL CORPORATION

LOBBYING ACTIVITY.

Select as many codes as necessary to reflect the general issue areas in which the registrant engaged in lobbying on behalf of the client during the reporting period. Using a separate page for each code, provide information as requested. Attach additional page(s) as needed.

15. General issue area code: BUD (one per page)

16. Specific lobbying issues:

S.Con.Res. 21, budget resolution, issues related to tax and energy policy.

17. House(s) of Congress and Federal agencies contacted:
HOUSE OF REPRESENTATIVES
SENATE

18. Name of each individual who acted as a lobbyist in this issue area:

Name: MARSHALL, HAZEN
Covered Official Position (if applicable): U.S. SENATE BUDGET COMMITTEE, STAFF DIRECTOR

19. Interest of each foreign entity in the specific issues listed on line 16 above.**None**

Registrant Name: NICKLES GROUP Client Name: EXXON MOBIL CORPORATION

LOBBYING ACTIVITY.

Select as many codes as necessary to reflect the general issue areas in which the registrant engaged in lobbying on behalf of the client during the reporting period. Using a separate page for each code, provide information as requested. Attach additional page(s) as needed.

15. General issue area code: ENG (one per page)

16. Specific lobbying issues:

H.R. 6, Clean Energy Act of 2007; H.R. 2776, Renewable Energy and Energy Conservation Tax Act of 2007; S.1321, Energy Savings Act; H.R. 2337, Energy Policy Reform and Revitalization Act; H.R. 2643 and S. 1696, Interior and Environment Appropriations for FY08; H.R. 2264 and S. 879, NOPEC; S. 1263, Petroleum Price Gouging Protection Act; issues related to energy taxes, revenue offsets, outer continental shelf leases and user fees, royalties, price gouging, foreign trade, climate change, and refinery issues.

17. House(s) of Congress and Federal agencies contacted:
Executive Office of the President (EOP)
HOUSE OF REPRESENTATIVES
SENATE

18. Name of each individual who acted as a lobbyist in this issue area:

Name: JONES HENSLER, RACHEL
Covered Official Position (if applicable): U.S. SENATE BUDGET COMMITTEE, TAX POLICY DIR.
Name: MARSHALL, HAZEN
Covered Official Position (if applicable): U.S. SENATE BUDGET COMMITTEE, STAFF DIRECTOR
Name: NICKLES, DON
Covered Official Position (if applicable): U.S. SENATOR
Name: WILD, BRIAN
Covered Official Position (if applicable): EXEC. OFFICE OF THE VP, DPTY ASST. FOR LEG. AFF.

19. Interest of each foreign entity in the specific issues listed on line 16 above.**None**

Registrant Name: NICKLES GROUP Client Name: EXXON MOBIL CORPORATION

LOBBYING ACTIVITY.

Select as many codes as necessary to reflect the general issue areas in which the registrant engaged in lobbying on behalf of the client during the reporting period. Using a separate page for each code, provide information as requested. Attach additional page(s) as needed.

15. General issue area code: ENV (one per page)

16. Specific lobbying issues:

S. 1766, Low Carbon Economy Act; S. 2191, America's Climate Security Act of 2007, issues related to climate change.

17. House(s) of Congress and Federal agencies contacted:
Executive Office of the President (EOP)
HOUSE OF REPRESENTATIVES
SENATE

18. Name of each individual who acted as a lobbyist in this issue area:

Name: MARSHALL, HAZEN
Covered Official Position (if applicable): U.S. SENATE BUDGET COMMITTEE, STAFF DIRECTOR
Name: NICKLES, DON
Covered Official Position (if applicable): U.S. SENATOR
Name: WILD, BRIAN
Covered Official Position (if applicable): EXEC. OFFICE OF THE VP, DPTY ASST. FOR LEG. AFF.

19. Interest of each foreign entity in the specific issues listed on line 16 above.**None**

Registrant Name: NICKLES GROUP Client Name: EXXON MOBIL CORPORATION

LOBBYING ACTIVITY.

Select as many codes as necessary to reflect the general issue areas in which the registrant engaged in lobbying on behalf of the client during the reporting period. Using a separate page for each code, provide information as requested. Attach additional page(s) as needed.

15. General issue area code: FUE (one per page)

16. Specific lobbying issues:

H.R. 6, Clean Energy Act of 2007; H.R. 2776, Renewable Energy and Energy Conservation Tax Act of 2007; S.1321, Energy Savings Act; H.R. 2337, Energy Policy Reform and Revitalization Act; H.R. 2643 and S. 1696, Interior and Environment Appropriations for FY08; H.R. 2264 and S. 879, NOPEC; S. 1263, Petroleum Price Gouging Protection Act; issues related to energy taxes, revenue offsets, outer continental shelf leases and user fees, royalties, price gouging, foreign trade, climate change, and refinery issues.

17. House(s) of Congress and Federal agencies contacted:
Executive Office of the President (EOP)
HOUSE OF REPRESENTATIVES
SENATE

18. Name of each individual who acted as a lobbyist in this issue area:

Name: JONES HENSLER, RACHEL
Covered Official Position (if applicable): U.S. SENATE BUDGET COMMITTEE, TAX POLICY DIR
Name: MARSHALL, HAZEN
Covered Official Position (if applicable): U.S. SENATE BUDGET COMMITTEE, STAFF DIRECTOR
Name: NICKLES, DON
Covered Official Position (if applicable): U.S. SENATOR
Name: WILD, BRIAN
Covered Official Position (if applicable): EXEC. OFFICE OF THE VP, DPTY ASST. FOR LEG. AFF.

19. Interest of each foreign entity in the specific issues listed on line 16 above.**None**

Registrant Name: NICKLES GROUP Client Name: EXXON MOBIL CORPORATION

LOBBYING ACTIVITY.

Select as many codes as necessary to reflect the general issue areas in which the registrant engaged in lobbying on behalf of the client during the reporting period. Using a separate page for each code, provide information as requested. Attach additional page(s) as needed.

15. General issue area code: TAX (one per page)

16. Specific lobbying issues:

H.R. 6, Clean Energy Act of 2007; H.R. 2776, Renewable Energy and Energy Conservation Tax Act of 2007; H.R. 976, Small Business Tax Relief Act of 2007; H.R. 1591 and H.R. 2206, emergency supplemental appropriations for FY07, issues related to energy taxes, revenue offsets, outer continental shelf leases and user fees, royalties, price gouging, foreign trade, climate change, and refinery issues; all matters related to R&D credit oil & gas taxation and taxation of exec. comp.

17. House(s) of Congress and Federal agencies contacted:
Executive Office of the President (EOP)
HOUSE OF REPRESENTATIVES
SENATE

18. Name of each individual who acted as a lobbyist in this issue area:

Name: JONES HENSLER, RACHEL
Covered Official Position (if applicable): U.S. SENATE BUDGET COMMITTEE, TAX POLICY DIR.
Name: MARSHALL, HAZEN
Covered Official Position (if applicable): U.S. SENATE BUDGET COMMITTEE STAFF DIRECTOR
Name: NICKLES, DON
Covered Official Position (if applicable): U.S. SENATOR
Name: WILD, BRIAN
Covered Official Position (if applicable): EXEC. OFFICE OF THE VP, DPTY. ASST FOR LEG. AFF

19. Interest of each foreign entity in the specific issues listed on line 16 above.**None**

Signature: ON FILE Date: Feb 05, 2008

Printed Name and Title: PAMELA FLEMING, ADMINISTRATIVE DIRECTOR

Registrant Name: NICKLES GROUP Client Name: EXXON MOBIL CORPORATION

Information Update Page:

Complete ONLY where registration information has changed.

LOBBYIST UPDATE

23. Name of each previously reported individual who is NO LONGER expected to act as a lobbyist for the client

ISSUE UPDATE

24. General lobbying issues previously reported that NO LONGER pertain

AFFILIATED ORGANIZATIONS

25. Add the following organization(s)

26. Name of each previously reported organization that is NO LONGER affiliated with the registrant or client

FOREIGN ENTITIES

27. Add the following foreign entities

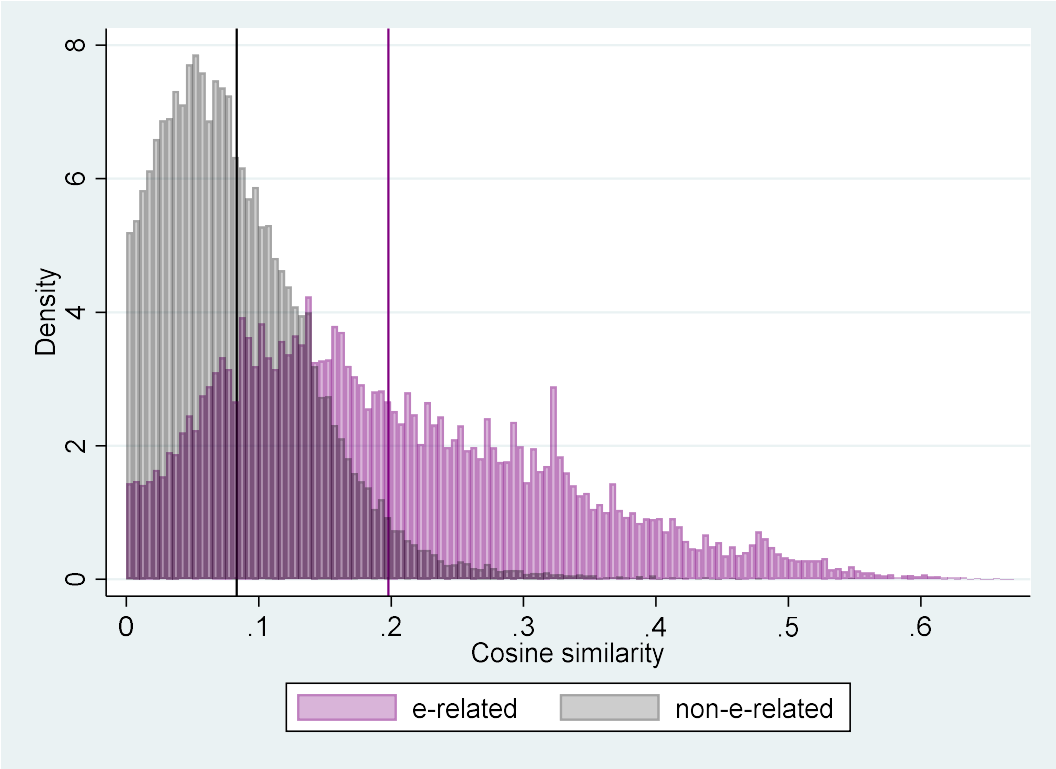
28. Name of each previously reported foreign entity the NO LONGER owns, OR controls, OR is affiliated with the registrant, client or affiliated organization

Signature: ON FILE Date: Feb 05, 2008

Printed Name and Title: -

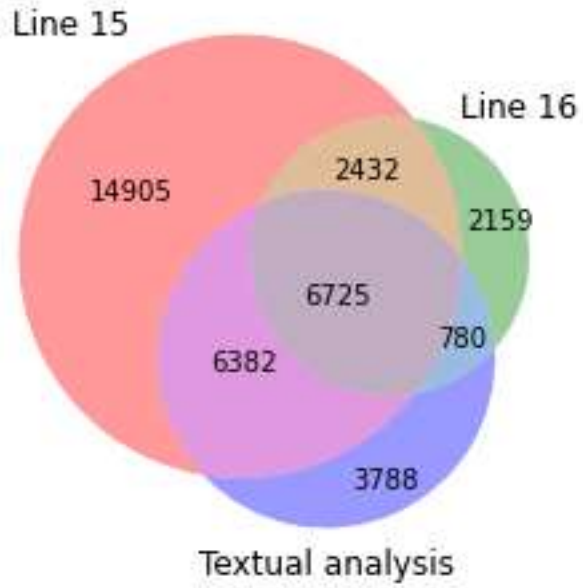
Internet Appendix Figure A1
Cosine similarity between environment-related vocabulary and alternative sets of lobbying transactions

This figure shows the distribution of cosine similarity between our environment-related vocabulary (as depicted in Figure 3) and Line 16 of Form LD-2. Cosine similarity scores for e-related lobbying transactions are colored purple, and cosine similarity scores for non-e-related lobbying transactions are colored gray. Vertical lines represent the means of cosine similarity scores for each category.



Internet Appendix Figure A2
Classification of LD-2s

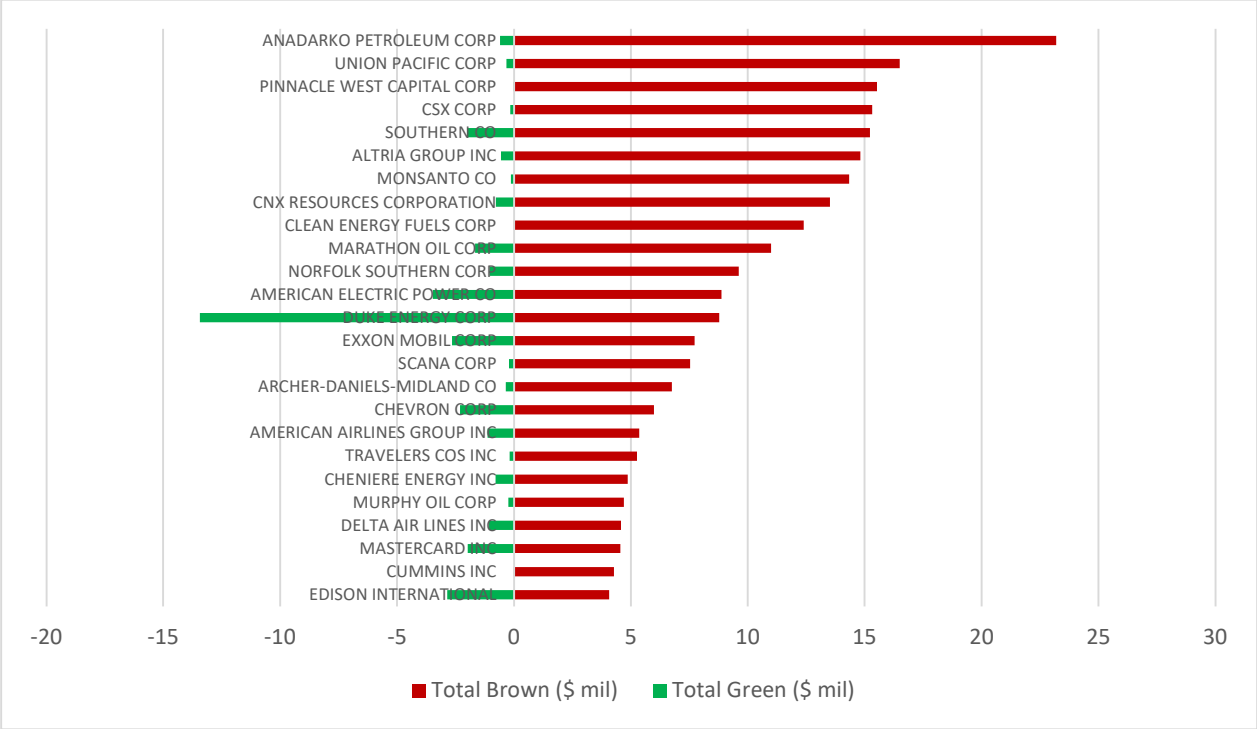
This figure shows the universe of LD-2s that are classified as environment-related. Each observation represents an LD-2 form. An LD-2 is defined to be e-related if 1) the LD-2 contains issue codes (in Line 15) in ENG, ENV, FUE, CAW, or WAS, or 2) the description of the issue (in Line 16) in the LD-2 contains at least one of the bills associated with Environmental protection, Energy, Public lands and natural resources, or Water resources development, as defined by https://www.congress.gov/, or 3) the cosine similarity between the e-related vocabulary (as shown in Figure 3) and the description of the issue (in Line 16) is greater than the average cosine similarity of e-related lobbying transactions identified in steps 1) and 2). Lobbying data are obtained from the SOPR (Senate Office of Public Records) and OpenSecrets.



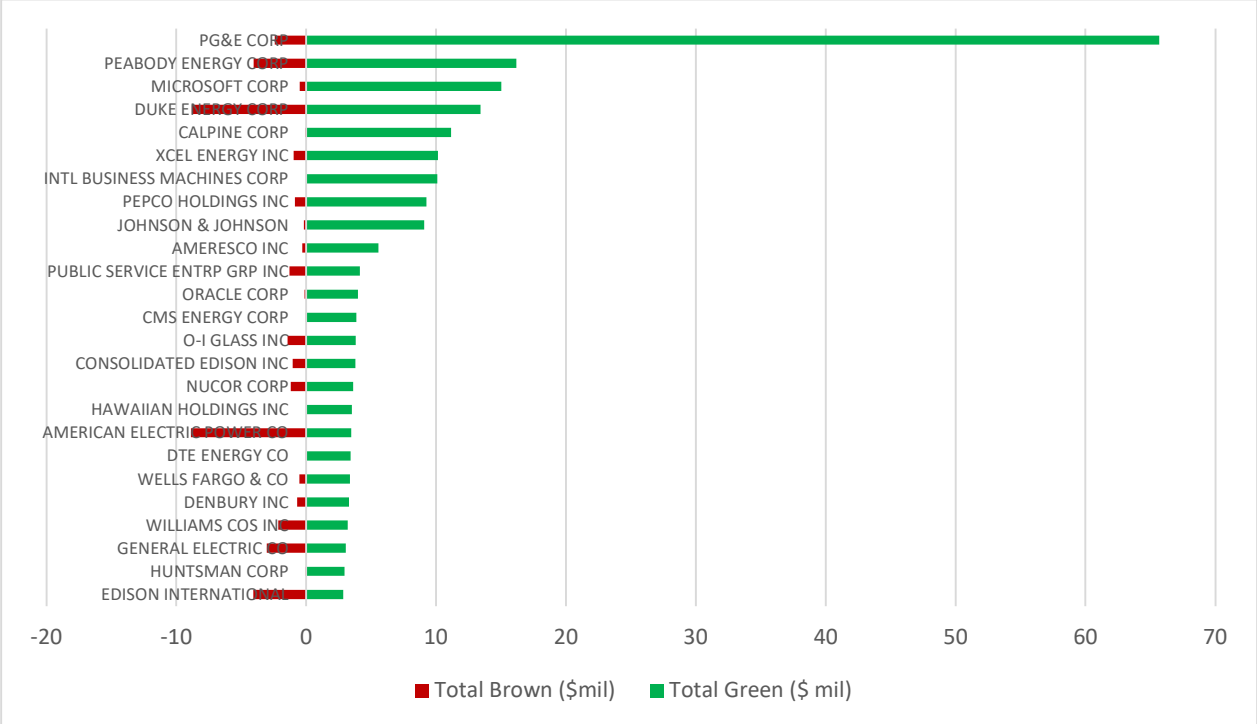
Internet Appendix Figure A3
Within-firm heterogeneity in lobbying

This figure shows the dollars spent in green and brown lobbying, among the 25 firm-years that spent the most dollars lobbying brown (Panel A) and green (Panel B), during our sample period.

Panel A: Top 25 brown lobbying companies



Panel B: Top 25 green lobbying companies



Internet Appendix Table A1
Classification of lobbyists' political orientation

This table shows the transition matrix of lobbyists' political orientation: Panel A shows this matrix across all lobbyists, and Panel B is based on the sample of lobbyists who lobbied for public firms.. A lobbyist is defined as a Democratic party-leaning lobbyist if more than 75% of his/her political contributions to either of the main political parties (i.e., Democratic or Republican) between 1990-2020 are allocated to the Democratic party. Analogously, lobbyists are defined as Republican party-leaning.

Panel A: All lobbyists

	Democratic(t+1)	Republican(t+1)	Unclassified(t+1)
Democratic(t)	97.1%	0.2%	2.7%
Republican(t)	0.3%	96.0%	3.7%
Unclassified(t)	3.6%	3.0%	93.4%

Panel B: Lobbyists who lobbied for public firms

	Democratic(t+1)	Republican(t+1)	Unclassified(t+1)
Democratic(t)	96.8%	0.2%	3.0%
Republican(t)	0.2%	96.6%	3.2%
Unclassified(t)	3.6%	3.3%	93.1%

Internet Appendix Table A2
Are investors who have committed to Science Based Target Initiative (SBTI) less likely to lobby brown?

This table shows regressions similar to those in Table 4, with the exception that we include an additional independent variable, SBTI, which equals one for investors that have signed onto the Science Based Target Initiative, zero otherwise.

	$ Lobbying	G Lobbying/ Lobbying	B Lobbying/ Lobbying	B/(G+B) Lobbying Dollars		
# Green patents	0.083***	0.002	-0.005	-0.026		
	(0.016)	(0.003)	(0.003)	(0.030)		
# Other Patents	0.033***	-0.001	-0.000	-0.000		
	(0.007)	(0.002)	(0.001)	(0.023)		
Green Patents$_{Quality}$					-0.046	
					(0.072)	
Other Patents$_{Quality}$					0.061	
					(0.075)	
Green/All patents						-0.041
						(0.137)
# Patents						-0.028
						(0.025)
SBTI	0.104***	0.008	0.005	0.100	0.102	0.113
	(0.031)	(0.008)	(0.007)	(0.081)	(0.083)	(0.104)
Size	0.081***	-0.006*	0.000	0.032	0.017	0.043
	(0.005)	(0.003)	(0.003)	(0.024)	(0.022)	(0.034)
Leverage	-0.055**	-0.003	0.013	0.019	0.056	0.054
	(0.023)	(0.012)	(0.012)	(0.160)	(0.164)	(0.256)
ROA	-0.105***	0.013	-0.010	-0.223	-0.229	0.020
	(0.018)	(0.011)	(0.011)	(0.166)	(0.173)	(0.335)
Cash/Assets	0.006	-0.025	-0.004	-0.105	-0.138	-0.350
	(0.032)	(0.017)	(0.012)	(0.234)	(0.236)	(0.350)
Observations	12,132	3,319	3,319	672	672	344
R-squared	0.393	0.092	0.153	0.141	0.138	0.222
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Internet Appendix Table A3
Additional approaches to addressing endogeneity

Panel A is similar in spirit to Table 5, with the exception that it employs a 2SLS specification instead of a difference-in-difference specification. It shows the relation between innovation and lobbying expenditures, using the USPTO Green Pilot program as an instrument to control for endogeneity. The sample consists of firm-years starting three years prior to the beginning of this program and ending in the last program year, i.e., 2007 to 2012. Columns 1 and 4 show first-stage regressions, where the instrument is USPTO Green Pilot Program, which is an indicator variable equal to 1 for the years the program was in effect: 2010, 2011, and 2012 among firms that applied for green patents between 1/1/2006 and 11/30/2009. Columns 2, 3 and 5 show second-stage regressions. The dependent variable in columns 1 and 4 is ln(#green patent applications in year t), and the dependent variables in columns 2, 3, and 5 are green lobbying / total lobbying dollars, brown lobbying / total lobbying dollars, and B/(G+B) lobbying dollars, respectively. Columns 1 – 3 include firms with any lobbying, and columns 4 – 5 are restricted to firms with environmental (G or B) lobbying. In Panel B, we estimate OLS regressions, examining whether firms that were granted more patents under the green tech pilot program were more likely to lobby green versus brown. The dependent variable equals brown / total lobbying dollars in Col 1, green / total lobbying dollars in Col 2, and brown / (green plus brown) lobbying dollars in Col 3. The sample begins in 2013 (approximately three years after the program started) and extends until 2015 (approximately three years after it ends). # Green tech pilot program patents is calculated using the FOIA data: it represents the stock of patents (defined over years t – 3 to t – 1) on which a firm successfully obtained expedited processing under the pilot program. # Non-pilot program patents represents all other patents the firm obtained over this period. All other variables are defined in prior tables and in Appendix A. Industry fixed effects are defined at the Fama-French 48 industry level. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1%, respectively.

Panel A: 2SLS

	ln(# Green patent apps)	G Lobbying/ Lobbying $	B Lobbying/ Lobbying $	ln(# Green patent apps)	B/(G+B) Lobbying $
	First Stage	*Second Stage*	*Second Stage*	*First Stage*	*Second Stage*
USPTO Green Pilot Program	0.280***			0.323***	
	(0.031)			(0.065)	
ln(# Green patent apps)		-0.020	0.023		0.092
		(0.035)	(0.036)		(0.166)
Size	0.066***	-0.000	-0.001	0.144***	-0.010
	(0.010)	(0.003)	(0.003)	(0.030)	(0.031)
Leverage	-0.051	0.020	-0.016	0.012	-0.195
	(0.056)	(0.015)	(0.012)	(0.238)	(0.123)
ROA	-0.081**	-0.048**	0.006	-0.180	0.177
	(0.034)	(0.022)	(0.011)	(0.147)	(0.151)
Cash/Assets	0.176***	0.002	-0.011	0.492**	-0.247
	(0.051)	(0.017)	(0.014)	(0.213)	(0.191)
Observations	5,416	5,416	5,416	1,324	1,324
R-squared	0.289			0.462	
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
First stage F-stat		80.79	80.79		24.97

Panel B: FOIA data

	G Lobbying/ Lobbying $	B Lobbying/ Lobbying $	B/(G+B) Lobbying $
# Green tech pilot program patents	0.008	-0.005	-0.036
	(0.014)	(0.008)	(0.060)
# Non-pilot program patents	-0.005	-0.002	-0.003
	(0.003)	(0.002)	(0.017)
Size	-0.001	0.002	0.022
	(0.004)	(0.003)	(0.024)
Leverage	-0.001	-0.013	0.142
	(0.017)	(0.017)	(0.190)
ROA	-0.028	-0.017	0.361
	(0.028)	(0.015)	(0.263)
Cash/Assets	0.015	-0.006	0.056
	(0.027)	(0.017)	(0.284)
Observations	2,403	2,403	583
R-squared	0.113	0.166	0.143
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

Internet Appendix Table A4
Alternative measures of green innovation

This table shows regressions similar to those in columns 4 – 6 of Table 4, with the exception that we employ alternative measures of green innovation. Similar to Table 4, masures of green innovation include #green patents (column 1), quality of green patents (column 2), and intensity of green patenting (column 3). However, we use the Bolton, Kacperczyk, and Wiedemann (2023) classification of *Green*, *General efficiency*, and *Brown efficiency* patents. *Other* patents represent all patents that are not green, general efficiency, or brown efficiency. Industry fixed effects are defined at the Fama-French 48 industry level. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

	Dependent Variable = B/(G+B) Lobbying Dollars		
	(1)	(2)	(3)
# Green + General efficiency patents	-0.020		
	(0.019)		
# Brown efficiency patents	0.024		
	(0.018)		
# Other patents	0.002		
	(0.016)		
Green + General efficiency $Patents_{Quality}$		-0.043	
		(0.033)	
Brown efficiency $Patents_{Quality}$		0.054	
		(0.056)	
$Other\ Patents_{Quality}$		0.007	
		(0.041)	
(Green + Gen'l efficiency patents)/All patents			-0.059
			(0.071)
Brown efficiency patents/All patents			0.188
			(0.196)
# Patents			-0.017
			(0.013)
Size	0.018	0.015	0.020
	(0.014)	(0.012)	(0.020)
Leverage	-0.127	-0.122	0.043
	(0.087)	(0.087)	(0.118)
ROA	-0.017	-0.015	0.022
	(0.105)	(0.106)	(0.138)
Cash/Assets	-0.238*	-0.269**	-0.168
	(0.123)	(0.123)	(0.163)
Observations	3,676	3,676	2,086
R-squared	0.104	0.104	0.157
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

Internet Appendix Table A5
Robustness across single-segment firms versus multi-segment firms

This table shows regressions similar to those in columns 4 – 6 of Table 4, with the exception that the green patenting measure is interacted with an indicator variable equal to one if the firm has only one segment, zero otherwise. The green patenting measure equals # Green patents in column 1, Green patents$_{Quality}$ in column 2, and intensity of green patenting in column 3. Other patenting measure denotes # Other patents (column 1), Other patents$_{quality}$ (column 2), and the number of all patents (column 3). Industry fixed effects are defined at the Fama-French 48 industry level. Standard errors are clustered at the firm level and reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1%, respectively. Variable definitions are in Appendix A.

	Dept Var = B / (G+B) Lobbying Dollars		
Green patenting measure	# Green Patents	Green Patents$_{Quality}$	Intensity of Green Patenting
Green patenting measure	0.023	0.039	0.075
	(0.017)	(0.040)	(0.086)
Green patenting * single segment	-0.024	-0.056	-0.142
	(0.034)	(0.095)	(0.173)
Other patenting measure	-0.016	-0.052	-0.014
	(0.012)	(0.035)	(0.013)
Single segment	-0.022	-0.019	0.025
	(0.043)	(0.041)	(0.060)
Size	0.016	0.014	0.019
	(0.014)	(0.012)	(0.020)
Leverage	-0.126	-0.124	0.046
	(0.087)	(0.086)	(0.117)
ROA	-0.023	-0.032	0.022
	(0.102)	(0.102)	(0.135)
Cash/Assets	-0.249**	-0.257**	-0.207
	(0.124)	(0.123)	(0.167)
Observations	3,676	3,676	2,086
R-squared	0.105	0.105	0.157
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes

Internet Appendix Table A6
Industry-specific bigrams

Our first measure of firms' *Current green operations* is based on industry-specific bigrams within 10Ks. We identify using artificial intelligence. We ask ChatGpt "Please provide 25 bigrams that indicate sustainable business practices, not greenwashing, in the '*Consumer Nondurables*' industry." We repeat this for each of the first 11 Fama French 12 industry groups. For the 12th Fama French industry '*Other'*, we simply ask 'Please provide 25 business sustainability bigrams that indicate true pro-environment practices, not green washing.' The bigrams for all 12 industries are shown below.

Consumer Nondurable	Consumer Durables	Manu-facturing	Oil, Gas, Coal	Chemicals	Business Equipment	Telephone and TV Trans-mission	Utilities	Wholesale and Retail	Healthcare Medical Equipment Drugs	Finance	General (Other)
Renewable energy	Renewable energy	Renewable energy	Carbon capture	Renewable resources	Renewable energy	Renewable energy	Renewable energy	Renewable energy	Renewable energy	Green bonds	Renewable energy
Sustainable sourcing	Recycled materials	Waste reduction	Emission reduction	Green chemistry	Energy efficiency	Carbon neutral	Carbon neutral	Ethical sourcing	Waste reduction	Impact investing	Carbon neutral
Ethical labor	Energy efficiency	Energy efficiency	Renewable energy	Waste reduction	Waste reduction	Energy efficiency	Energy efficiency	Fair trade	Ethical sourcing	Ethical investing	Ethical sourcing
Carbon neutral	Carbon footprint	Carbon footprint	Energy efficiency	Energy efficiency	Carbon footprint	Waste reduction	Green infrastructure	Carbon neutral	Carbon footprint	Carbon footprint	Waste reduction
Waste reduction	Sustainable sourcing	Sustainable sourcing	Waste management	Carbon footprint	Sustainable sourcing	Sustainable sourcing	Sustainable sourcing	Waste reduction	Green packaging	Renewable energy	Green technology
Eco-friendly packaging	Waste reduction	Green manufacturing	Water conservation	Sustainable sourcing	Recycled materials	Green technology	Emission reduction	Recycled materials	Energy efficiency	Social impact	Sustainable materials
Organic materials	Ethical labor	Circular economy	Biodiversity protection	Eco-friendly processes	Green manufacturing	Eco-friendly materials	Clean technology	Sustainable packaging	Sustainable materials	Sustainable finance	Fair trade
Fair trade	Green manufacturing	Eco-friendly materials	Sustainable sourcing	Biodegradable materials	Eco-friendly packaging	Emission reduction	Waste management	Energy efficiency	Water conservation	ESG criteria	Circular economy
Water conservation	Circular economy	Water conservation	Green technology	Circular economy	Water conservation	Circular economy	Water conservation	Local suppliers	Recycled content	Climate risk	Energy efficiency
Energy efficiency	Water conservation	Emission control	Environmental stewardship	Emission control	Circular economy	Resource conservation	Eco-friendly	Organic products	Eco-friendly	Green finance	Water conservation
Recycled content	Eco-friendly packaging	Resource optimization	Climate action	Water conservation	Ethical labor	Ethical labor	Grid modernization	Water conservation	Circular economy	Responsible investing	Eco-friendly packaging
Green manufacturing	Low emissions	Recycled content	Clean energy	Clean technology	Low emissions	Water conservation	Smart meters	Green logistics	Low emissions	Circular economy	Biodiversity protection
Biodiversity protection	Fair trade	Pollution prevention	Eco-friendly	Pollution prevention	Resource optimization	Green infrastructure	Solar power	Circular economy	Green chemistry	Clean energy	Low emissions
Circular economy	Resource optimization	Ethical labor	Pollution control	Resource optimization	Green certifications	Sustainable packaging	Wind energy	Eco-friendly	Responsible manufacturing	Carbon neutral	Social responsibility
Low emissions	Biodiversity protection	Lifecycle assessment	Resource optimization	Lifecycle assessment	Sustainable innovation	Low emissions	Hydro power	Supply chain	Sustainable sourcing	Green loans	Community engagement
Responsible production	Lifecycle assessment	Clean technology	Sustainable development	Sustainable innovation	Lifecycle assessment	Clean energy	Biomass energy	Social responsibility	Biodegradable products	Sustainable growth	Green buildings

Sustainable agriculture	Sustainable innovation	Sustainable packaging	Low-carbon	Environmental stewardship	Environmental stewardship	Environmental stewardship	Geothermal energy	Community engagement	Clean energy	Ethical banking	Responsible investing
Climate action	Green supply	Biodiversity protection	Green infrastructure	Responsible manufacturing	Pollution control	Responsible sourcing	Energy storage	Employee welfare	Environmental stewardship	Green investments	Climate action
Zero waste	Renewable resources	Green supply	Circular economy	Toxicity reduction	Green logistics	Green supply	Demand response	Biodiversity protection	Resource efficiency	Social responsibility	Sustainable agriculture
Biodegradable products	Environmental stewardship	Low-impact	Carbon neutrality	Sustainable packaging	Biodiversity protection	Sustainable innovation	Electric vehicles	Transparent reporting	Sustainable innovation	Environmental stewardship	Clean energy
Social responsibility	Carbon neutral	Zero waste	Renewable integration	Renewable feedstocks	Climate action	Eco-conscious design	Green tariffs	Climate action	Green supply	Sustainable portfolios	Zero waste
Environmental stewardship	Sustainable design	Environmental stewardship	Sustainable innovation	Green solvents	Renewable resources	Renewable resources	Climate action	Zero waste	Sustainable development	Green infrastructure	Green supply
Green supply	Responsible sourcing	Sustainable innovation	Environmental compliance	Eco-efficient production	Sustainable design	Green manufacturing	Environmental stewardship	Green certification	Zero waste	Low-carbon	Environmental stewardship
Clean technology	Green energy	Green certification	Green investment	Sustainable development	Green procurement	Sustainable development	Sustainable development	Responsible sourcing	Climate action	Sustainable development	Sustainable innovation
Sustainable innovation	Zero waste	Responsible production	Community engagement	Climate action	Responsible production	Climate action	Circular economy	Sustainable growth	Sustainable practices	Green initiatives	Resource efficiency

Internet Appendix Table A7
Sources of current cash flows and the direction of environmental lobbying, across political regimes

This table is similar to Table 6, with the exception that each column shows a subset of firm-years. Odd-numbered columns include only years in which the Democratic party was in power, defined as firm-years in which the Democratic party controls two or more of the following positions: president, Senate, and the House. Even-numbered columns include only years in which the Republican party was in power, defined analogously. In columns 1-4 (5-8), current green operations are defined using 25 industry-specific bigrams (green patent texts). In columns 1, 2, 5, and 6 (3, 4, 7, and 8), innovation is defined using the stock of patents (quality of patents).

	Dept Var = B/(G+B) Lobbying Dollars							
	Current Green Ops defined using 25 Industry-specific bigrams (continuous variable)				Current Green Ops defined using Green patent vocabulary (continuous variable)			
Current green operations	-22.323***	-32.059***	-22.954***	-34.378***	-1.866***	-1.609***	-1.525**	-1.845***
	(7.550)	(7.794)	(7.638)	(8.413)	(0.655)	(0.585)	(0.670)	(0.564)
Current green ops x # Green patents	6.863	-3.818			0.523**	0.053		
	(12.327)	(7.422)			(0.223)	(0.231)		
Current green ops x Green patents$_{Quality}$			21.147	18.146			0.927	0.905
			(22.449)	(46.315)			(1.057)	(0.914)
# Green Patents	0.044*	0.006			-0.008	0.003		
	(0.024)	(0.022)			(0.038)	(0.036)		
# Other Patents	-0.026*	-0.010			-0.023	-0.011		
	(0.015)	(0.015)			(0.015)	(0.015)		
Green Patents$_{Quality}$			0.029	0.047			-0.042	-0.023
			(0.054)	(0.051)			(0.112)	(0.097)
Other Patents$_{Quality}$			-0.058	-0.060			-0.059	-0.063
			(0.050)	(0.042)			(0.050)	(0.042)
Size	0.012	0.027	0.013	0.020	0.016	0.030*	0.016	0.024
	(0.018)	(0.017)	(0.016)	(0.015)	(0.018)	(0.017)	(0.015)	(0.015)
Leverage	-0.078	-0.171	-0.066	-0.164	-0.070	-0.169*	-0.057	-0.162
	(0.126)	(0.105)	(0.125)	(0.106)	(0.127)	(0.102)	(0.125)	(0.103)
ROA	0.151	-0.154	0.151	-0.155	0.075	-0.226*	0.094	-0.233**
	(0.148)	(0.117)	(0.150)	(0.116)	(0.145)	(0.119)	(0.147)	(0.117)
Cash/Assets	-0.157	-0.280*	-0.145	-0.306**	-0.104	-0.245	-0.092	-0.271*
	(0.167)	(0.155)	(0.167)	(0.153)	(0.166)	(0.152)	(0.166)	(0.149)
Observations	1,609	1,670	1,609	1,670	1,609	1,670	1,609	1,670
R-squared	0.143	0.117	0.139	0.119	0.151	0.119	0.141	0.123
Political power	Dem	Rep	Dem	Rep	Dem	Rep	Dem	Rep
Year FE, Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Internet Appendix Table A8
Green revenues and the direction of environmental lobbying.

This table is similar to Table 6, with the exception that current green operations are measured by the fraction of a firm's total revenues that is derived from green activities. The data come from FTSE Russell's Green Revenues Classification System, which identifies green products and services across the whole value chain covering 10 green sectors, 64 subsectors and 133 micro sectors. The sample comprises a total of 1,699 firm-years since 2008.

	Dep't Variable =			
	G Lobbying/ Lobbying	B Lobbying/ Lobbying	G Lobbying/ Lobbying	G Lobbying/ Lobbying
% Green revenue	0.064*	0.006	0.083*	0.018
	(0.036)	(0.025)	(0.045)	(0.029)
% Green revenue x # Green patents			-0.019	
			(0.015)	
% Green revenue x Green $Patents_{Quality}$				-0.061
				(0.053)
# Green patents			-0.003	
			(0.008)	
# Other Patents			0.007	
			(0.006)	
Green $Patents_{Quality}$				0.012
				(0.026)
Other $Patents_{Quality}$				-0.003
				(0.017)
Size	-0.011	-0.001	-0.013	-0.001
	(0.008)	(0.006)	(0.011)	(0.005)
Leverage	-0.052	-0.032	-0.061	-0.033
	(0.073)	(0.049)	(0.077)	(0.050)
ROA	-0.036	0.010	-0.053	0.016
	(0.066)	(0.037)	(0.067)	(0.040)
Cash/Assets	-0.059	-0.062	-0.066	-0.058
	(0.068)	(0.049)	(0.074)	(0.048)
Observations	1,699	1,699	1,699	1,699
R-squared	0.118	0.127	0.122	0.130
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Internet Appendix Table A9
Environmental lobbying and environmental ratings, using alternative definition of innovation

Panel A is similar to Table 9, with the exception that we measure innovation as the quality of patents, calculated using the average truncation bias-corrected forward citations for patents granted to the firm. In Panel B, Columns 1 – 3 (4 – 6) replicate the regressions shown in columns 1 – 3 of Table 9, with the exception that they are based on the pre-2015 (2015 and later) subperiods.

Panel A: Alternative definition of green innovation

	Dep't Variable = E-rating at:					
	t+1	t+2	t+3	t+1	t+2	t+3
B Lobbying / Total Lobbying Dollars	0.120	0.157	0.153			
	(0.216)	(0.206)	(0.211)			
G Lobbying / Total Lobbying Dollars	0.282	0.258	0.403*			
	(0.254)	(0.249)	(0.237)			
B/(G+B) Lobbying Dollars				-0.087	-0.134	-0.110
				(0.130)	(0.129)	(0.129)
Green Patents$_{Quality}$	0.263**	0.286**	0.322***	0.228	0.347**	0.449***
	(0.109)	(0.111)	(0.110)	(0.154)	(0.161)	(0.159)
Other Patents$_{Quality}$	0.073	0.092	0.100	0.428**	0.381**	0.284
	(0.104)	(0.104)	(0.103)	(0.200)	(0.182)	(0.175)
Total Lobbying Dollars	0.430***	0.426***	0.423***			
	(0.080)	(0.083)	(0.085)			
G + B Lobbying Dollars				0.083	0.138	0.163
				(0.226)	(0.249)	(0.235)
Size	0.235***	0.237***	0.232***	0.335***	0.324***	0.300***
	(0.041)	(0.041)	(0.041)	(0.060)	(0.060)	(0.059)
Leverage	0.312	0.298	0.268	0.042	0.029	0.007
	(0.234)	(0.241)	(0.247)	(0.433)	(0.442)	(0.479)
ROA	0.517*	0.365	0.364	0.693	0.602	0.561
	(0.280)	(0.275)	(0.286)	(0.580)	(0.579)	(0.589)
Cash/Assets	0.643**	0.590*	0.538*	1.470**	0.937	0.705
	(0.300)	(0.307)	(0.308)	(0.734)	(0.705)	(0.695)
Observations	9,218	8,846	8,440	2,454	2,367	2,266
R-squared	0.252	0.256	0.260	0.365	0.359	0.347
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Earlier vs later subsamples

	Dep't Variable = E-rating at:					
	t+1	t+2	t+3	t+1	t+2	t+3
	Lobbying years: Pre-2015			Lobbying years: 2015 and later		
B Lobbying / Total Lobbying Dollars	0.012	0.056	0.079	0.414	0.581	0.657
	(0.250)	(0.228)	(0.230)	(0.358)	(0.388)	(0.418)
G Lobbying / Total Lobbying Dollars	0.432	0.394	0.509*	0.319	0.279	0.502
	(0.300)	(0.287)	(0.267)	(0.415)	(0.435)	(0.454)
# Green patents	0.151***	0.138***	0.107**	0.018	-0.011	-0.004
	(0.054)	(0.053)	(0.053)	(0.069)	(0.074)	(0.080)
# Other Patents	0.156***	0.153***	0.157***	0.042	0.050	0.038
	(0.033)	(0.033)	(0.034)	(0.048)	(0.052)	(0.057)
Total Lobbying Dollars	0.272***	0.276***	0.282***	0.476***	0.511***	0.540***
	(0.076)	(0.080)	(0.080)	(0.134)	(0.144)	(0.157)
Size	0.116**	0.127***	0.136***	0.221***	0.231***	0.246***
	(0.045)	(0.043)	(0.042)	(0.061)	(0.065)	(0.071)
Leverage	0.039	0.107	0.203	0.834***	0.804**	0.623*
	(0.270)	(0.262)	(0.256)	(0.280)	(0.313)	(0.355)
ROA	0.557	0.253	0.191	0.501	0.478	0.576
	(0.364)	(0.325)	(0.313)	(0.328)	(0.360)	(0.402)
Cash/Assets	0.065	0.102	0.201	0.647	0.678	0.621
	(0.331)	(0.328)	(0.318)	(0.406)	(0.445)	(0.491)
Observations	5,748	6,213	6,578	3,470	2,632	1,860
R-squared	0.250	0.249	0.257	0.359	0.381	0.385
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Internet Appendix Table A10
Environmental lobbying and green instituitional ownership – robustness check

Panel A is similar to Table 10, with the exception that we measure innovation as the quality of patents, calculated using the average truncation bias-corrected forward citations for patents granted to the firm in the last five years. In Panel B, Columns 1 – 3 (4 – 6) replicate the regressions shown in columns 1 – 3 of Table 10, with the exception that they are based on the pre-2015 (2015 and later) subperiods.

Panel A: Alternative measure of green innovation

	Dept' Var = Ownership by UN PRI Signatories / Total Institutional Ownership at					
	t+1	t+2	t+3	t+1	t+2	t+3
B Lobbying / Total Lobbying Dollars	0.014	0.012	0.002			
	(0.011)	(0.011)	(0.009)			
G Lobbying / Total Lobbying Dollars	0.022*	0.009	0.013			
	(0.012)	(0.011)	(0.012)			
B/(G+B) Lobbying				-0.003	0.002	-0.005
				(0.006)	(0.007)	(0.007)
Green patents$_{Quality}$	0.006	0.007*	0.008*	0.004	0.008	0.011
	(0.004)	(0.004)	(0.004)	(0.008)	(0.009)	(0.008)
Other patents$_{Quality}$	0.003	0.003	0.002	0.018*	0.013	0.004
	(0.004)	(0.004)	(0.004)	(0.010)	(0.009)	(0.008)
Total Lobbying Dollars	-0.005*	-0.003	-0.001			
	(0.003)	(0.003)	(0.003)			
G + B Lobbying Dollars				0.008	0.006	0.015
				(0.009)	(0.010)	(0.012)
Size	-0.002	-0.003**	-0.005***	-0.005*	-0.007**	-0.007**
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)
Leverage	-0.023**	-0.015	-0.020*	-0.005	-0.014	-0.047
	(0.010)	(0.011)	(0.012)	(0.026)	(0.027)	(0.031)
ROA	0.012	0.005	-0.012	0.004	-0.016	-0.083*
	(0.014)	(0.016)	(0.018)	(0.028)	(0.031)	(0.044)
Cash/Assets	-0.019	-0.023*	-0.036***	-0.009	-0.008	-0.019
	(0.012)	(0.012)	(0.012)	(0.036)	(0.041)	(0.037)
Observations	12,560	12,013	11,460	2,829	2,697	2,563
R-squared	0.693	0.685	0.676	0.712	0.674	0.658
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Earlier vs later subsamples

	Dept' Var = Ownership by UN PRI Signatories / Total Institutional Ownership at					
	t+1	t+2	t+3	t+1	t+2	t+3
	Lobbying years: Pre-2015			Lobbying years: 2015 and later		
$ B lobbying/Lobbying	0.011	0.014	0.002	0.031	0.016	0.019
	(0.012)	(0.012)	(0.010)	(0.021)	(0.024)	(0.025)
$ G lobbying/Lobbying	0.024	0.007	0.013	0.012	0.009	0.006
	(0.015)	(0.013)	(0.012)	(0.020)	(0.025)	(0.029)
# Green Patents	0.004*	0.004	0.002	-0.000	-0.001	-0.000
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)
# Other Patents	0.000	0.001	0.001	-0.001	-0.000	-0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
ln($ lobbying amount)	-0.004	-0.002	0.001	-0.011**	-0.011*	-0.011*
	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)	(0.006)
Size	-0.002	-0.004**	-0.005***	-0.000	-0.002	-0.004
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Leverage	-0.019	-0.017	-0.022*	-0.033**	-0.015	-0.013
	(0.013)	(0.012)	(0.013)	(0.015)	(0.017)	(0.017)
ROA	-0.038**	-0.042**	-0.052**	0.093***	0.101***	0.102***
	(0.019)	(0.019)	(0.021)	(0.016)	(0.020)	(0.022)
Cash/Assets	-0.007	-0.011	-0.026**	-0.024	-0.038*	-0.060**
	(0.014)	(0.013)	(0.013)	(0.021)	(0.022)	(0.026)
Observations	8,673	9,069	9,391	3,887	2,943	2,067
R-squared	0.560	0.575	0.601	0.244	0.169	0.146
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes