Investor Rewards to Climate Responsibility: Stock-Price Responses to the Opposite Shocks of the 2016 and 2020 U.S. Elections*

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Abstract

Donald Trump's 2016 election and his nomination of climate skeptic Scott Pruitt to head the Environmental Protection Agency drastically downshifted expectations about U.S. policy toward climate change. Joseph Biden's 2020 election shifted them dramatically upward. We study firms' stock-price movements in reaction to these changes. As expected, the 2016 election boosted carbon-intensive firms. Surprisingly, firms with climate-responsible strategies also gained, especially those firms held by long-run investors. Such investors appear to have bet on a "boomerang" in climate policy. Harbingers of a boomerang appeared during Trump's term. The 2020 election marked its arrival. (*JEL* G14, G38, G41)

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Survey evidence, complemented by anecdotal accounts, indicates that a growing number of investors are attending to environmental issues---climate change in particular---in their investment decisions (see, e.g., Krüger, Sautner, and Starks 2020). The widely cited 2021 letter to CEOs by Larry Fink, the chairman and CEO of BlackRock, the world's largest asset manager, also emphasizes this theme. If the marginal investor invests accordingly, the share price for less climate-conscious companies will suffer.[1] How strongly markets value firms' climate-related performance will reflect not only investors' personal preferences but also their assessments of how government regulations will change and how firms will adapt.

This paper provides clear evidence that firms' climate-related performance and perceived future performance affects their stock market valuations. It shows this by exploiting price reactions of U.S. stocks to the shock to climate policy following the 2016 U.S. election, and the opposite shock from the 2020 U.S. election. These political events provide a rare opportunity to study the interconnections between climate regulation, firms' climate-related performance, and firm value. Four factors are important. First, although climate policy had arguably slowly been making progress up to the 2016 election, Donald Trump's victory sharply reversed that slow progress.[2] Second, the outcome of the 2016 election was largely unexpected.[3] Third, Trump strongly confirmed his intentions to follow through on his stated policy preferences when he appointed Scott Pruitt, a climate change skeptic, to head the Environmental Protection Agency (EPA). The withdrawal from the Paris Agreement and

[1]Moreover, it may nudge them toward more climate-sensitive business practices (Heinkel, Kraus, and Zechner, 2001).

[2]While Hillary Clinton had made fighting climate change a priority (see, e.g., Harrington, 2016), Trump vowed throughout the electoral campaign to dismantle a large part of the Obama-era environmental protections and climate policy, inter alia by scrapping the Clean Power Plan (CPP) and withdrawing the United States from the 2016 United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement.

[3]On Election Day, Betfair gave Hillary Clinton a 83% probability of winning, and FiveThirtyEight gave her a 72% chance of victory.

the replacement of the Clean Power Plan with the Affordable Power Plan in 2017 naturally followed from these two events. Fourth, the outcome of the 2020 Presidential election strongly reversed expectations about U.S. climate policy. During the campaign, Joe Biden vowed to reenter the Paris Agreement on the first day of his administration, to commit the country to carbon-free electricity by 2035 and net-zero carbon emissions by 2050, and to rescind several of his predecessor's executive orders.

Discussions of firms' climate-related performance often neglect an important distinction. Firms differ with respect to both their *current* environmental footprint (most saliently greenhouse gas emissions) and their climate responsibility. Climate responsibility includes their *future*-oriented strategies and voluntary initiatives to prepare for the transition to a low-carbon economy, such as the adoption of ambitious emission reduction targets and green investment plans.

Our study treats these two dimensions separately. We measure current emissions using *Carbon intensity*, defined as the firm's annual greenhouse gases (GHGs) emissions divided by its market value of equity. Management practices and efforts to curb future emissions, that is, *Climate responsibility*, are proxied by climate-specific scores on ESG (Environmental, Social, and Governance) measures. We obtain data on firms' climate-related performance from two leading providers of ESG data: MSCI KLD and Vigeo Eiris.

As expected given their conceptual differences, *Carbon intensity* and *Climate responsibility* are only weakly correlated. This confirms that they capture different dimensions of a firm's climate performance. Section 1 contains examples of firms that score well on one dimension but poorly on the other, thus indicating that they are separate indicators. We begin by studying stock-price reactions to the 2016 shock. Two salient events comprised that shock:

the election of Donald Trump on November 8, 2016, and the nomination of Scott Pruitt to head the EPA on December 7, 2016. The selection of Pruitt---the candidate widely viewed as the most hostile to the environment and the EPA itself---represented the first clear indication that Trump was determined to dismantle environmental protection rules and plans in place at the time. It foretold the wave of approaches to environmental policy that followed. The analysis controls for other characteristics of firms, such as taxes and trade exposure (Wagner, Zeckhauser, and Ziegler, 2018).

Our first result is that investors reacted to the election by rewarding carbon-intensive firms. This result accords with the common narrative reported in the media and with basic economic intuition. Large emitters are those most exposed to the costs of climate regulation. As such, they are penalized by financial markets when regulation is tightened or expected to be tightened, for instance through the adoption of a carbon tax. Conversely, they were rewarded when investor expectations shifted toward a loosening of climate policy.

Our second, and main, result regarding stock-price reactions is more surprising. After both the 2016 election and the Pruitt appointment, investors also rewarded companies demonstrating more responsible climate strategies. How should one interpret this finding?

The ‘‘boomerang hypothesis’’ offers a possible explanation. It holds that investors expected the rollback in climate regulation over the Trump administration to be only transitory and to pave the way for a much more ambitious long-term climate policy than would have prevailed absent the Trump shock. Three pieces of evidence provide insight.

First, in accordance with a long-standing tenet of asset pricing theory, a positive stock-price response can be due to higher expected cash flows, lower uncertainty (discounting), or both. We investigate the cash-flow channel by considering analysts’ forecast changes around the election. Financial analysts indeed increased their expectations of earnings per share of carbon-intensive firms for the near term (for FY2017 and FY2018). However, analysts---who only make projections for a few years forward---did not change their forecasts for climate-responsible firms for the 4 years of the Trump presidency. Neither climate responsibility nor carbon intensity is related to changes in short-term measures of uncertainty, which would also affect stock prices. In sum, the evidence suggests that the observed climate responsibility premium likely reflects investors' considerations of a strong reversal in the more distant future.

Second, prior research strongly suggests that different investors are likely to have been responsible for pricing assets over different horizons. Our focus is on institutional investors. These investors differ greatly in their temporal foci.[4] Therefore, we would expect them to have differing views on appropriate valuation of carbon intensity and climate responsibility. Short-term holders would tilt toward carbon-intensive firms, long-term holders toward climate-responsible ones. We find that investors do bifurcate that way. Specifically, in stocks heavily held by short-term investors, carbon intensity played a bigger role for stock-price reactions; in stocks heavily held by long-term investors, climate responsibility was a key driver.

Third, recent history has presented the unusual opportunity to actually witness a policy boomerang. The prospects for such a boomerang rose shortly after the mid-term elections of 2018, when a number of progressive Democrats upset incumbents, and put the Green New Deal on the party's agenda. During 2019, several Democratic lawmakers, including serious candidates for the presidency, supported the Green New Deal, which was framed as a massive

[4]For example, Bushee (1998) shows that short-term-oriented shareholders heavily discount the value of research and development, and Bushee (2001) finds that high levels of transient ownership are associated with an over- (under)weighting of near-term (long-term) expected earnings. Cella, Ellul, and Giannetti (2013) show that short-term investors responded most strongly to the financial crisis than did longer-term ones.

program for the environment. This support developed over too long a period to provide a clear event study testing ground.

Fortunately for event study research, the Presidential election of November 3, 2020, provided a crisp experiment. On November 3, 2020, Joe Biden defeated Donald Trump in a highly emotional election that pitched two very different visions for America and the world against each other, with particularly dramatic differences regarding climate and environmental policy. Interestingly, the election effectively provides two events for the price of one: First, just before the election, Biden was widely expected to win. However, Trump's showing in the election was stronger than expected. Indeed, in the 3 days immediately following the election, no major news network called the election race for either of the two candidates. Consistent with the surprising possibility of a Trump victory, climate-responsible stocks actually fared poorly in these 3 days. Second, on the weekend of November 7 and 8, all major networks finally called the election for Biden. Consequently, from Monday November 9 onward, climate-responsible stocks performed strongly. They received a further boost when Biden named John Kerry as special envoy for climate, two weeks later, and then another one in early January, when Democrats won the two Georgia Senate runoff races, thus tilting Congress toward Democratic control.[5]

Overall, the expected environmental hostility of the Trump Administration appears to have led to increased demand for climate-responsible firms by long-term investors who

[5]Besides the U.S. election, the other major development of 2020 was, of course, the COVID-19 pandemic. In the COVID-19 crash, companies fared better if they had strong environmental and social (ES) performances (Albuquerque et al., 2020; Garel and Petit-Romec, 2021), though this result has been the subject of some debate (Demers et al., 2020; Mahmoud and Meyer, 2020). Albuquerque et al. (2020) suggest that this outperformance is due to the greater trust that these firms command in crisis times. In light of our results, another possible interpretation is that COVID-19 is a political event that dramatically boosted the election chances of the Democratic candidate, thus making a shift in environmental policy generally more likely.

expected such firms to do better in the long run due to a boomerang in climate regulation post-Trump.

Our analysis makes two central contributions to the literature. First, it provides evidence that corporate environmental responsibility affects firm values.[6] By contrast with regulatory changes considered in the existing literature, the 2016 policy shock is not the continuation of the prior trend toward tighter environmental regulation. Rather, it represented a largely unexpected reversal toward a *rollback* in regulation. This obviates a major concern of the existing literature on regulatory shocks and stock-price responses, namely, that the observed effects are not causal but predominantly merely due to the continuation of preexisting trends. A number of recent studies highlight the role of institutional investor horizon and tastes on ESG investing decisions (Dyck et al., 2019; Fernando, Sharfman, and Uysal, 2017; Gibson, Krüger, and Mitali, 2020; Hwang, Titman, and Wang, 2017; Ilhan et al., 2020; Krüger, Sautner, and Starks, 2020; Starks, Venkat, and Zhu, 2020). Our results indicate that long-term investors' preference for climate responsibility is likely to pay off in the long term, given climate-responsible firms' ability to better cope with future tightening in climate regulation.

Second, the analysis contributes to the burgeoning literature exploring the interconnections between climate change and financial markets. Recent studies include Addoum, Ng, and Ortiz-Bobea (2020, 2019), Andersson, Bolton, and Samama (2016), Baldauf, Garlappi, and Yannelis (2020), Bartram, Hou, and Kim (2021), Berkman, Jona, and Soderstrom (2019), Bernstein, Gustafson, and Lewis (2019), Bolton and Kacperczyk (2020a,b), Ceccarelli, Ramelli,

[6]Prior work has exploited firm-specific CSR events (Krüger, 2015b), narrow adoptions of shareholder resolutions (Flammer, 2015), and disclosure rules (Krüger, 2015a). See Gillan, Koch, and Starks (2021) for a survey of the literature on the shareholder value effects of CSR/ESG.

and Wagner (2021), Choi, Gao, and Jiang (2020), Engle et al. (2020), Hong, Li, and Xu (2019), Ilhan, Sautner, and Vilkov (2021), and Pankratz and Schiller (2019).[7] Our paper complements this growing strand of research by showing that investor rewards to climate-responsible firms strongly depend on expectations about the long-run regulatory environment for climate change. By rolling back climate regulation in the short run and fostering conditions for a boomerang in the long run, Trump's election increased the benefits for investors of holding climate-responsible firms.

1 Sample, Empirical Strategy, and Data

1.1 Sample

Our sample includes all Russell 3000 firms on the day of the election for which the measures of climate-related performance and control variables described below are available. Together, the index constituents represent roughly 98% of the U.S. equity market capitalization.

1.2 Empirical strategy

Because of the long-term trend toward sustainable investing, it is challenging to identify causal links between the sustainability performance of companies and firm values. Too many confounding and unobserved effects can drive either dimension. Event studies that exploit

[7]Berkman, Jona, and Soderstrom (2019) investigate returns on portfolios formed using a measure of firm-specific climate risk based on a textual analysis of 10-Ks around the initial passage of the Paris agreement and the Trump election. That measure reflects a combination of a firm's risk exposure and risk management activities. Their analysis does not control for other expected policy changes following Trump's election, such as tax and trade policies. By controlling for these two policy dimensions and distinguishing between current emissions and future-oriented strategies, our analysis provides a richer understanding of the valuation of firms' climate-related performance.

share-price responses to specific events offer an attractive proposition in this respect (Schwert, 1981). It is particularly advantageous to be able to exploit the two opposite shocks, the first toward an expected rollback in climate regulation (the 2016 climate policy shock) and the second that portends a more than complete reversal (the 2020 U.S. Presidential election).

Our initial analysis focuses on the 2016 climate policy shock, following that year's Presidential election, namely, the shock that led to the "puzzling" climate-responsibility result. Then, in Section 4.3, we turn to stock-price reactions to the 2020 Presidential election.

Throughout the 2016 electoral campaign, Donald Trump and Hillary Clinton expressed sharply divergent views on climate policy. Clinton's views were close to those of then-sitting President Obama. Accordingly, Clinton identified the fight against global warming as a policy priority.[8] By contrast, Trump vowed to drive a radical U-turn on environmental regulation as a means to promote economic well-being. Notable measures he identified were his intention to dismantle the Clean Power Plan and exit the Paris Agreement.

Trump's surprising victory was followed by a few weeks when the intentions of the President Elect to follow through on various of his promises, including those related to the environment, remained unclear. When asked the question "Are you going to take America out of the world's lead of confronting climate change?" during an interview with the *New York Times* on November 23, 2016, Trump replied "I'm looking at it very closely. I'll tell you what. I have an open mind to it." Asked whether he believed human activity causes climate change, he said "I think right now . . . well, I think there is some connectivity. There is some, something" (*New York Times*, 2016). Also, on December 5, 2016, just 2 days before

[8] Clinton's proposals included the objective to "reduce greenhouse gas emissions by up to 30 percent in 2025 relative to 2005 levels and put the country on a path to cut emissions more than 80 percent by 2050" (quotation from Clinton's 2016 electoral campaign site).

the Pruitt nomination, Trump met with former vice president Al Gore to discuss climate issues, a move that suggested a potential softening of his position on the topic (Davenport, 2016). However, a month later, following his equivocal statements, Trump appointed Scott Pruitt to head the EPA, the institution responsible for upholding and implementing federal environmental laws. That appointment represented the first major confirmation that Trump was in fact committed to a harsh scale back on environmental policies (Davenport and Lipton, 2016). As the Attorney General of Oklahoma, Pruitt had undertaken 14 legal actions against the EPA to repeal Obama-era environmental regulations. Four of them directly addressed the Clean Power Plan. The nomination of a climate skeptic and active opponent of the EPA to lead the EPA itself marked a real turning point in the U.S. policy toward climate change, de facto anticipating the drastic regulatory rollback implemented in 2017 (Glicksman, 2017).[9]

The Trump election and Pruitt's nomination each had advantages and disadvantages for identifying the impact of a firm's climate-related performance on its value. The pluses and minuses of the two events as identifiers cut in opposite directions; therefore, they complement each other well for reaching conclusions. The Trump election offers the advantage of having a large surprise component. Its disadvantage is that it shifted expectations on an array of topics, many far removed from environmental policy. Pruitt's nomination has the advantage of being solely focused on environmental issues, shining intense light on policy toward climate change. Its main disadvantage is that although the date was not known in advance, it was a less surprising surprise. None of the five candidates the media rumored for the EPA

[9]Already in March 2017, Trump had issued an Executive Order asking the EPA to review the Clean Power Plan, and in October 2017 the EPA proposed to repeal it completely. Pruitt's nomination also confirmed Trump's actual intentions to withdraw the United States from the 2016 UNFCCC Paris Agreement, a decision formally announced on June 1, 2017.

appointment was strong on the environment.[10] Several were skeptical about human activity being the cause of global warming. However, among the five, Pruitt was the candidate most actively hostile to climate and environmental regulation, as evidenced by his many lawsuits against the EPA to block or cancel major environmental initiatives (including the Clean Power Plan; regulations to limit emissions of methane, carbon dioxide, ozone, and mercury; the Cross-State Air Pollution Rule; and the Clean Water Rule). Pruitt's appointment was far from a certainty. Hence, it represented a major signal on future developments of climate policy, as demonstrated by the shocked reactions it stirred by many green advocacy groups.[11] For these reasons, we consider the Trump election and the Pruitt appointment as the two dramatic events of the 2016 climate policy shock.

The next sections will describe the main climate-related variables of interest to our study and our data set.

1.3 Measures of climate-related performance

1.3.1 Climate responsibility.

Our *Climate responsibility* measures capture whether a firm has undertaken investments that effectively improved its energy efficiency in recent years, has set targets to reduce its future emissions, has adopted frameworks to manage climate change, and/or has launched new products to directly address this class of problems. Such efforts would provide important

[10]The four other names rumored for the job were Kathleen Hartnett White, Jeff Holmstead, Donald Van der Vaart, and Myron Ebell (Cama, 2016).

[11]For instance, on December 7, 2016, the environmental NGO 350.org issued a statement defining Pruitt "puppet of the fossil fuel industry" (350.org, 2016). The environmental group Ceres issued a press release defining Pruitt "not fit for the job" (Ceres, 2016). The Sierra Club stated "Having Scott Pruitt in charge of the U.S. Environmental Protection Agency is like putting an arsonist in charge of fighting fires" (Sierra Club, 2016). Greenpeace, the Environmental Defense Fund, and Friends of the Earth also issued public statements voicing similar concerns.

forward-looking indicators of a company's climate performance and, hence, would represent plausible proxies for the perception of investors with respect to such actions.

Data on corporate climate-related strategies were taken from two different ESG providers, thereby strengthening the robustness of our results. First, following a large part of the finance literature on CSR, we use the MSCI KLD Research & Analytics (MSCI KLD) database (e.g., Hong and Kostovetsky, 2012; Krüger, 2015b; Lins, Servaes, and Tamayo, 2017; Fernando, Sharfman, and Uysal, 2017). The MSCI KLD database provides a set of binary indicators specifying, for each company, the presence of either strengths or concerns on a series of environmental, social, and governance factors. We focus on the two MSCI KLD indicators that specifically address a firm's climate performance. The first, the strength indicator "Env-str-d," equals one for firms demonstrating best practices on the management of risks of increased costs linked to carbon pricing or regulatory caps, and zero otherwise.[12] The second, the weakness indicator "Env-con-f," equals one for firms involved in serious controversies related to their climate change and energy-related policies and initiatives, and zero otherwise.[13] For 2016, these two indicators as well as the accounting information required to compute our control variables are available for 2,102 Russell 3000 firms. (The required accounting information is described in detail in Section 1.4 below.) Accordingly, for each firm, we define the variable *Climate responsibility (kld)* to be the indicator "Env-str-d" minus the indicator "Env-con-f." Aggregating strengths and concerns to derive "net" CSR scores is a common practice in the finance literature using the KLD MSCI data (e.g., Fernando,

[12]Factors affecting this assessment include efforts to reduce exposure through comprehensive carbon policies and implementation mechanisms, including carbon reduction targets, production process improvements, installation of emissions capture equipment, and/or switching to cleaner energy sources.

[13]Factors affecting this indicator include a history of involvement in GHG-related legal cases, widespread impacts due to corporate GHG emissions, resistance to improved practices, and criticism by NGOs.

Sharfman, and Uysal, 2017; Lins, Servaes, and Tamayo, 2017).

Our second source of data on firms' climate-related performance is Vigeo Eiris, now the ESG affiliate of Moody's.[14] As a proxy for firms' climate responsibility, we use the Vigeo Eiris "Energy Transition" score, which we denote as *Climate responsibility (ve)*. The Energy Transition score assesses a firm's strategic approach to reduce carbon emissions and to adapt its business model to manage the risks and the opportunities presented by the regulatory and market environment in the transition to a low-carbon economy. The measure is a forward-looking assessment of firms' climate-related performance in terms of policies (e.g., adoption of ambitious emission reduction targets), measures implemented (e.g., investments in greener technologies), and evolution of key performance indicators (e.g., a recent-year reduction in its carbon footprint). The resultant scores range from 0 to 100. For 2016, this variable is available for 764 Russell 3000 firms. We also define a binary indicator *Climate responsibility leader*, which equals one for firms in the top quartile of the *Climate responsibility (ve)* scores, and zero otherwise. This definition is intended to mirror the KLD "strength" measure.[15]

1.3.2 Carbon intensity.

From Vigeo Eiris, we also obtain information on firms' total absolute yearly Scope 1 and Scope 2 greenhouse gases (GHG) emissions in kilotons of CO2 equivalents in 2015, the latest

[14]Vigeo Eiris evaluates firms in six ESG areas (environment, human rights, human resources, business behavior, community involvement, and corporate governance). Vigeo Eiris scores have been used in various academic contributions (e.g., Ferrell, Liang, and Renneboog (2016); Liang and Renneboog (2017)).

[15]Importantly, both MSCI KLD and Vigeo Eiris choose to cover firms based on index membership; coverage in no way reflects CSR performance. In particular, as of 2016, the MSCI KLD database covers the MSCI USA Investable Market Index (IMI), with 2,400 constituents. Vigeo Eiris uses different indexes, primarily including the Stoxx Global 1800 (accordingly, U.S. firms in the sample are part of the Stoxx North America 600).

data available at the 2016 election.[16] These carbon emissions data are based on information filed through the Carbon Disclosure Project (CDP). When self-reported data are not available, Vigeo Eiris estimates the carbon emissions based on the size of the issuer, the nature of its activities, and the emissions of its peers. In total, carbon emissions are available for 764 companies.[17] We normalize the 2015 total emission data by the market value of equity in the same year and denote the resultant measure *Carbon intensity*. Normalizing GHG emissions by the market value of equity provides a simple indicator of a firm's reliance on GHG emissions in its business activities (Hoffmann and Busch, 2008; Ilhan, Sautner, and Vilkov, 2021). Similar results obtain when GHG emissions were scaled by total sales or total assets. We winsorize *Carbon intensity* at the 99th percentile to control for extreme values. *Carbon intensity* thus quantifies the firm's short-term exposure to the costs (or potential costs) of climate regulation, such as the cutback on permissible admissions, or a carbon tax.[18] However, it provides limited information on a firm's strategic positioning for a potential energy transition.

[16]The GHG Protocol identifies three emission categories: Scope 1 covers direct GHG emissions from sources that are owned or controlled by the firm. Scope 2 covers indirect GHG emissions caused by the organization's consumption of electricity, heat, cooling or steam purchased or brought into its reporting boundary. Scope 3 covers emissions that are a consequence of the operations of a company, but are not directly owned or controlled by the organization, including the supply chain and customers. Although Scope 3 emissions represent a major component of a firm's negative climate externalities, they are still rarely disclosed by firms due the lack of clear unified disclosure standards and the difficulty in their estimation. For instance, under the corporate standards of the GHG Corporate Protocol, companies are required to report all Scopes 1 and 2 emissions, while reporting Scope 3 emissions is only optional (Greenhouse Gas Protocol, 2020).

[17]The carbon emissions data are self-reported for 339 companies and estimated for 425 companies.

[18]Our samples include companies in the financial industry. Since these firms are exposed through their loan portfolios, their Scope 1 and Scope 2 GHG emissions provide an incomplete picture of their exposure to climate risks. However, the climate strategies of financial firms (e.g., limit the exposure to fossil fuel assets in loan portfolios, increase the financing of "green" projects) may be particularly relevant for climate-conscious investors. While we keep financial companies in our sample, the analysis available on request shows that our results hold even when these companies are excluded.

1.3.3 Descriptive statistics of *Climate responsibility* and *Carbon intensity.*

Table 1 provides descriptive statistics of the climate-related variables our analyses employ. Table A1 in the Internet Appendix provides descriptive statistics by Fama-French 12 industries.[19] The table reveals sizable variation across firms within industries on climate-related performance, not merely across industries.

Table 1 here

Table A2 in the Internet Appendix reports the correlations. Our two main variables of interest---*Climate responsibility (kld)* and *Climate responsibility (ve)*---are strongly positively correlated (0.55, $p < .001$). The fact that the correlation is not perfect reflects the difference in structure between the two indicators (one is binary, the other continuous), as well as the different methodological approaches of these two ESG data providers. The MSCI KLD measure to some extent captures firms' relative GHG emissions, while the Vigeo Eiris measure specifically focuses on a firm's managerial strategies to climate change. We consider these differences across indicators useful as they help us to cross-validate our findings.

Climate responsibility (kld) is modestly negatively correlated with *Carbon intensity* (-0.11, $p < .001$). The correlation between *Climate responsibility (ve)* and *Carbon intensity*, illustrated in panel A of Figure 1, though still slightly negative, is insignificant (-0.02, $p >.1$). The same relation holds also when controlling for industry fixed effects and basic firm characteristics (see panel B of the same figure). These low correlations highlight that these variables capture conceptually different dimensions of a firm's climate performance,

[19]To ensure that our analyses appropriately control for sector fixed effects, we analyzed all firms classified as "Other" in the Fama-French industry classifications. We reclassified two of these firms (AES Corporation and Calpine Corporation) to the utilities sector.

one more static (carbon intensity) and one more forward-looking (climate responsibility).

Figure 1 here

Table 2 here

Table 2 reports the number of firms above and below the medians of *Climate responsibility (ve)* and *Carbon intensity* in the Vigeo Eiris sample. It may be interesting to consider a few concrete examples of firms falling into each of these four quadrants. The utility Xcel Energy, one of the top U.S. emitters, was alone responsible for more than 53,000 kt of CO2 emissions equivalent in 2015.[20] Despite its large carbon footprint, this company is considered climate-responsible (i.e., *Climate responsibility (kld)* and *Climate responsibility leader (ve)* equal to one). In 2016, Xcel had already committed to a carbon emission reduction target of 60% by 2030 from its 2005 level (increased to 80% in 2018, with the target of carbon neutrality in 2050), complemented by the progressive retiring of its coal-fired plants and large investments to increase its renewable capacity.[21] Conversely, an example of a high emitter not considered climate-responsible based on our measures is Valero Energy, a major U.S. crude oil refiner also involved in the controversial Keystone XL Pipeline, recently terminated by the Biden Administration.

Firms involved in activities with relatively low Scopes 1 and 2 emissions also can be considered either climate-responsible or not. For instance, Intel and HP exhibit both

[20]This amount is equal to approximately 0.80% of the total 2015 U.S. GHG emissions from all sources based on data from the U.S. EPA's Greenhouse Gas Reporting Program database (GHGRP). Based on GHGRP data, Xcel Energy was ranked 12th in the 2016 Greenhouse 100 Polluters Index of the Political Economy Research Institute of the University of Massachusetts Amherst (see `https://www.peri.umass.edu/greenhouse-100-polluters-index-2018-report-based-on-2015-data`).

[21]Another example of a large emitter with climate-responsibility features is Duke Energy (responsible for more than 100,000 ktCO2e in 2015). In 2016, this company was targeting a reduction of 40% in carbon emissions by 2030; the target increased to 50% in 2019.

relatively low carbon intensities and advanced climate strategies (*Climate responsibility (kld)* and *Climate responsibility leader (ve)* equal to one).[22] In addition to having clear emission reduction targets for their operations, KLD and Vigeo Eiris assess these companies to be committed to improving the energy efficiency of their supply chain and final products, and accelerating the development of clean technologies that would support an energy transition. By contrast, the IT firm Citrix Systems, despite being a low emitter, at least as of 2016, was not considered climate responsible.

1.4 Accounting information

We obtain standard accounting firm characteristics---market value of equity, profitability (ROA), revenue growth, and market leverage---from Compustat Capital IQ. For each company, we use the latest available accounting data before November 2016.[23]

Following the 2016 election, high-tax companies gained compared to low-tax firms, and domestically focused companies gained compared to internationally oriented ones (Wagner, Zeckhauser, and Ziegler, 2018). To control for these effects, we compute the cash effective tax rate (henceforth cash ETR, the ratio of total cash taxes paid to pretax income adjusted for special items during the previous 5 years) from Compustat data.[24] From Bloomberg (and

[22]These companies have been included, since 2016, in the Clean200 list listed by the NGO As You Sow and Corporate Knights, together with 37 other U.S. companies (see `https://www.asyousow.org/clean200`). This list recognizes firms with a high share of ‘‘green’’ revenues, and it excludes all firms operating in fossil-fuel-related activities and utilities that generate less than 50% of their power from renewable sources. Whether or not firms operating in high-emission sectors should be considered a priori ‘‘climate irresponsible’’ is up for debate. For instance, Cohen, Gurun, and Nguyen (2020) recently documented that the energy sector has a large and growing percentage of patenting activity dedicated to green research, more than other less climate-sensitive sectors.

[23]For most companies, this means the December 31, 2015, data. However, several companies have fiscal years that end in other months. Thus, in the MSCI KLD and Vigeo Eiris samples we have, respectively, 26.7% and 32.4% of firms for which calendar year 2016 data are used.

[24]We use the 5-year cash ETR to ensure a larger sample than when using the prior-year cash ETR. The results with 1-year cash ETR are very similar, though slightly weaker because of the smaller number of

Compustat geographical segments data), we collect the percentage of revenues from foreign sources.

Table 3 here

Panel A in Table 3 provides descriptive statistics of accounting information. For the sake of brevity, we show summary statistics only for the 2,102 firms included in the MSCI KLD sample. This sample represents around 88% of the total U.S. market capitalization as of November 2016 (while the 764 firms in the Vigeo Eiris sample represent 78% of it).

Cash ETR and the share of foreign revenues are not always available for these companies. Given that previous research has already established the effect of these firm characteristics after the 2016 U.S. election, to avoid reducing the sample sizes, we replace missing values of these variables with zero and include a dummy variable equal to one (and zero elsewhere) to absorb the effect of this adjustment in our empirical specifications. This treatment is employed for 274 firms with missing Cash ETR and for 637 firms with missing foreign revenues out of the 2,102 firms in the MSCI KLD sample.

1.5 Stock returns

We obtain daily stock-return data from October 1, 2015, through December 29, 2017, on all U.S. common stocks (except closed-end funds) traded on NYSE, Amex, and Nasdaq from CRSP. In our analysis, we consider returns on the Russell 3000 constituents as of November 8, 2016.

We consider three sets of returns: raw returns, abnormal returns calculated with respect

observations. In line with the extant literature, we restrict the sample to those firms with positive tax rates below 100%.

to the capital asset pricing model (CAPM), and abnormal returns calculated with respect to the Fama-French three-factor model. To compute abnormal returns, we utilize daily data for the market excess return, the size and value factor returns (Fama and French, 1993), and the return on the riskless asset from Ken French's website. Betas are estimated using 1 year of daily data, from October 1, 2015, through September 30, 2016.[25]

To obtain CAPM-adjusted returns, we first estimate each stock's market beta from an ordinary least squares (OLS) regression of daily stock returns in excess of the riskless asset return on the market excess returns. We then compute abnormal returns for all days in the following quarter as the daily excess return on the stock minus beta times the market excess return. We compute Fama-French-adjusted returns in a similar fashion.

In what follows, CAPM-adjusted returns serve as our primary dependent variable. However, as we show in the robustness section, our main results are robust to using raw and Fama-French-adjusted returns, as well as to controlling for factor exposures. Section 2.5 in the Internet Appendix discusses advantages and disadvantages of different adjustments to returns.

Throughout the paper, we report returns in percentage points. Descriptive statistics of CAPM-adjusted returns for the MSCI KLD sample are reported in panel B of Table 3.

[25]For most firms, data are available for the entire estimation window. Where they are not, betas are estimated using returns from the date the firm was first traded through the end of the estimation window, provided that the firm has at least 126 daily return observations available. If fewer than 126 observations are available, no abnormal returns are computed for that firm to avoid our results being affected by imprecise beta estimates.

2 Industry-Level Stock-Price Reactions

We first analyze stock-price reactions at the industry level. In 2016, 7,631 large facilities in nine industry sectors---power plants, petroleum and natural gas systems, refineries, chemicals, waste, metals, minerals, pulp and paper, and others (including coal mines and electronics manufacturing)---accounted for about half of U.S. emissions.[26]

Figure 2 here

As Figure 2 shows, stock prices in these industries gained substantially following Trump's election victory, as one might expect. Specifically, this figure plots the industry coefficients when CAPM-adjusted returns on the first day after the election (light blue bars) and cumulative abnormal returns through year-end 2016 (red bars) are regressed on Fama-French 30-industry dummies and firm characteristics (log(market cap), revenue growth, profitability, and market leverage) using all firms in the Russell 3000 sample for which all control variables are available (2,798 firms). The coefficients are reported in descending order by the abnormal returns achieved on the first post-election day.

Adjusting for the market's overall move, the stocks of "dirty" industries performed very well on the day after the election. In particular, investors immediately turned the coal, steel, metals, and petroleum and natural gas industries into notable relative winners. Shifts in investor expectations about other policy areas (such as Trump's pledge to revive American manufacturing and his tough announced stance on trade) undoubtedly account for some of these industry-level returns (see Wagner, Zeckhauser, and Ziegler (2018) for a discussion).

[26] Data are from the EPA's Greenhouse Gas Reporting Program (GHGRP), which requires annual reporting of facility-level GHG data for the top-emitting sectors of the U.S. economy. Detailed information on the 2016 emissions of the top-emitting industries is available at `https://www.epa.gov/ghgreporting/ghgrp-industrial-profiles`.

Still, it is striking how great were the relative short-term gains that high-emission industries enjoyed.

Among the carbon-intensive industries, all but the utilities sector fared quite well after the election. Quite possibly, utilities suffered because investors pivoted from low-beta/low-risk industries (also including beer, tobacco, and food products) into high-beta industries in response to Trump's pledge to revive growth and the potential consequence of increased long-term interest rates.

Figure 2 also reveals that the cumulative abnormal returns through year-end 2016 differed substantially from the immediate market reaction. In particular, investors' optimism appears to have been excessive about the prospects for the coal[27] and metal industries in the new regime. On the other hand, petroleum and natural gas companies, as well as chemicals and steel works, enjoyed substantial increases in abnormal returns through year-end. Presumably, these adjustments reflected a normal digestive process of information conveyed by a shock.

Figure 2's simple descriptive results strongly suggest that Trump's election, combined with Republican control of the House and the Senate, represented good news for high-emissions sectors. However, variability among firms within the same industry was typically as large as it was across industries, in terms of both abnormal returns and efforts to mitigate climate change. For instance, as Table A1 in the Internet Appendix indicates, the energy sector included both firms trying to proactively manage climate-related issues and firms basically neglecting such concerns. (This is shown by the standard deviation of *Climate responsibility (ve)*, which actually exceeds the sector mean.) And while the average abnormal return on

[27]The relative decline of stock prices of the coal industry continued during the first year of the Trump presidency. See Fisman and Zitzewitz (2017).

the day after the election of firms in that sector was 2.64 percentage points, the spread around that value was great. The 25th percentile was -0.06 percentage points and the 75th percentile was 3.33 percentage points.

The next section will capitalize on this variability across firms to investigate how firms' climate responsibility affected their stock prices after the 2016 policy shock.

3 Within-Industry Stock-Price Reactions

Table 4 shows the results of regressions of individual stock CAPM-adjusted returns on firms' *Climate responsibility (kld)* following our two key events: the Trump election on November 8, 2016, and Pruitt's nomination on December 7, 2016. The results for raw and Fama-French-adjusted returns are very similar and are reported in Section 2.5 in the Internet Appendix. Controls in the regression are the cash ETR, share of foreign revenues, market leverage, log(market cap), revenue growth, profitability, and industry fixed effects.[28]

Table 4 here

Interestingly, firms displaying a high level of climate responsibility enjoyed a 44-basis-points (bps) higher abnormal return on the first trading day after the election. Their cumulative abnormal returns grew strongly by the third day, reaching 139 bps, and remain positive, although not quite statistically significant through the 10th trading day after the election. At that point firms with strong climate responsibility remained 72 bps ahead of otherwise similar stocks. Companies at the forefront of climate responsibility benefited further

[28]The primary analysis includes industry fixed effects according to the Fama-French 12-industry classification in order to keep things comparable once we move to the smaller Vigeo Eiris sample. The robustness section in the Internet Appendix shows that the results continue to hold with Fama-French 30-industry fixed effects.

following the nomination of Scott Pruitt, securing an additional 107-bps higher abnormal return in the following 10 trading days.

Figure 3 here

To illustrate, Figure 3 shows the average residual cumulative abnormal returns of the top and bottom half of firms by *Climate responsibility (kld)* not explained by standard firm characteristics and the effect of other anticipated policy changes following the Trump election. By construction, the two lines move symmetrically, and the spread between them represents the return on an equally weighted, long-short portfolio along climate responsibility, adjusting for other firm characteristics. Before the 2016 climate policy shock, the two lines are close to zero, indicating common pre-trends of the two groups.[29] After each of the two events, climate-responsible firms significantly outperform otherwise similar companies.

The coefficients for the control variables in Table 4 accord with the results established in the prior literature. After the election, domestically focused firms and those with a higher cash ETR fared relatively better than did low-tax and internationally oriented companies, and market leverage had a negative and highly statistically significant effect. All these findings are consistent with those documented in Wagner, Zeckhauser, and Ziegler (2018), which had a larger sample available.

Overall, similar results obtain when using the Vigeo Eiris sample, as Table 5 shows. The coefficients for the control variables, available on request, are in line with those discussed above but are omitted to conserve space.

[29]Indeed, when we run 253 cross-sectional regressions of daily abnormal returns from October 1, 2015, through September 30, 2016, using the same specification as in column 1 of Table 4, we obtain an average coefficient for *Climate responsibility (kld)* equal to -0.010 (with a standard deviation of 0.182). This check further confirms that the effect we identify is not a mere continuation of a preexisting trend.

Table 5 here

The point estimate for *Climate responsibility (ve)* on the first day is slightly negative, but becomes positive and economically important after 3 days, although not statistically significant. The directional effect becomes much clearer and more significant after Pruitt's nomination. The effect is economically important: A one standard deviation higher *Climate responsibility (ve)* secures a 49-bps ($= 16.32 \times 0.030\%$) increase in 3-day cumulative CAPM-adjusted returns after Pruitt's nomination, about one-seventh of a standard deviation of those returns.[30]

When comparing the results in Table 4 with those in panel A of Table 5, note that the two measures of firms' climate strategies are structurally different: the Vigeo Eiris measure is continuous, while the MSCI KLD measure is binary and merely separates out good performers (about 11% of firms). To facilitate comparisons, panel B of Table 5 reports the regression results when using the binary variable *Climate responsibility leader (ve)*, equal to one for firms in the top quartile of *Climate responsibility (ve)* and zero otherwise. (We use the top quartile rather than the top 11% given the smaller size of the Vigeo Eiris sample.)

As can be seen, a high level of *Climate responsibility (ve)* is associated with a 131-bps higher cumulative abnormal return at the end of the third trading day after the election, similar to the level we observed in the MSCI KLD sample. This positive and significant effect persists through the 10th trading day after the election. Firms with high climate responsibility also outperform following Pruitt's nomination, securing an additional 68 bps after 3 days.

Consider now the effects of *Carbon intensity*. The literature suggests that firms more

[30]Figure A5 in the Internet Appendix illustrates these results in binned scatter plots.

exposed to the (actual or potential) compliance costs of climate regulation incur a firm-value penalty (e.g., Matsumura, Prakash, and Vera-Muñoz, 2014; Bolton and Kacperczyk, 2020a; Ilhan, Sautner, and Vilkov, 2021). Table 5 indicates that after the election, high carbon-intensity firms gained relative to those less carbon intensive. This result reflects the common narrative, including anecdotal accounts in the press, that after the election investors reacted by boosting the prices of large GHG emitters. The coefficients for carbon intensity remain statistically significant and with a similar economic size through the end of day 10 post-election.

As columns 5 to 8 show, stock-price movements after Pruitt's nomination are unrelated to *Carbon intensity*. This suggests that this nomination did not affect investors' policy expectations on carbon pricing or regulatory caps on emissions. Results were similar when GHG emissions were scaled by total sales or total assets.

We conducted extensive robustness checks to ensure the reliability of our findings. First, because climate responsibility and carbon intensity are effectively uncorrelated, including them separately in a regression yields coefficients little different from those when both are included. Further results, reported in the Internet Appendix, show that our findings are robust to (a) using adjusted t-statistics based on the empirical distribution of coefficient estimates, (b) controlling for industry fixed effects at a finer level of granularity, (c) controlling for other dimensions of corporate governance, (d) using raw and Fama-French-adjusted returns, and (e) using the generic environmental score from Refinitiv's Asset4 database.

4 The Boomerang Hypothesis

Our results show that markets rewarded two distinct dimensions of firms' climate-related performance in response to policy shocks. Following the Trump election, both high carbon-intensive firms (and industries) got price boosts, as did climate-responsible firms.

The observed reward for carbon intensity is hardly surprising. Trump's ascension, with a Republican-controlled Congress, led investors to expect a substantial loosening of climate policy, particularly in controlling carbon emissions, that occurred.

Investor rewards to climate responsibility are of far greater interest, as they are contrary to conventional thinking. Why this reward? A potential explanation---that we outlined in a 2018 version of this paper---is that investors expected the reversal in climate policy during the Trump era to be transitory. The combination of a hostile regime, and deteriorated environmental conditions would heighten environmental concerns among both activist and middle-of-the-spectrum voters. That concern in turn would pave the way for more aggressive regulatory action, enhancing the value of climate responsibility.

Two factors may have driven this expectation. First, investors may have expected that the regime's negative stance on environmental policy reinforced by a slide in environmental conditions would stimulate environmental concerns among both activist and moderate voters. That in turn would create a *boomerang effect* where direct government climate regulation post-Trump would end up being more stringent than it would have been had the election gone to Clinton. The Trump election shone a spotlight on global warming; his projected lax policies could be expected to spur a counter movement. Second, investors may have foreseen that proenvironmental consumers and investors, as part of the ESG movement more generally, would increase their demand for climate-responsible products and stocks, to the benefit of climate-responsible firms. Stronger climate preferences and stricter future policies are interconnected, as the former make a powerful comeback of climate regulation more likely.

In other words, the explanation we propose is that the 2016 climate policy shock had two contemporaneous effects: (1) reduced costs to firms from climate regulation over the Trump presidency, favoring more carbon-intensive firms, and (2) an increase in the uncertainty and expected costs of climate policy in the longer run, with the possibility of a regulatory boomerang post-Trump (either after 4 or 8 years). As a result, the competitive advantages of climate-responsible firms were boosted over what they were before the 2016 election. Together, we call this the *boomerang hypothesis*.

This section presents three analyses to test this hypothesis: First, it analyzes changes in analysts' earnings forecasts after the 2016 election. Second, it investigates the role of investor horizon for the pricing of the two climate-related dimensions. Third, and finally, it documents stock-price effects after a swift and powerful boomerang came into view following the 2020 election.[31]

4.1 Changes in earnings expectations and short-term uncertainty

The classical decomposition (Campbell and Shiller, 1988) shows that stock returns are driven by changes in per-share earnings expectations and/or discount rates. A traditional approach to project the market's expectations about a firm's prospects is to use revisions in analysts'

[31] In principle, an expected policy reversal in 4 years could affect carbon-intensive and climate-responsible firms differently if they had systematically different duration (for instance if a larger part of the value of climate-responsible firms came from the distant future). However, both measures of climate performance are positively correlated with dividend yields and negatively correlated with revenue growth.

earnings forecasts as its proxy (Fried and Givoly, 1982; Brown and Rozeff, 1978).[32]

The IBES Detail History database (stock-split-adjusted) provided our financial analysts' forecasts. For each analyst-firm combination, we employed the last forecast reported between June 30 and November 8, 2016, and the last forecast reported between November 9 and December 31, 2016. Four forecast horizons were analyzed, computed on the basis of the end date of the accounting period covered by the forecast (variable "Forecast period end date"): FY 2016 (fiscal year ending between December 30, 2016, and September 30, 2017), 2017 (between October 1, 2017, and September 30, 2018), FY 2018 (between October 1, 2018, and September 30, 2019), and FY 2019 (between October 1, 2019, and September 30, 2020).[33]

The EPS forecast at each horizon was normalized by the stock price at the end of the prior fiscal year.[34] For each firm, we compute the change in earnings forecasts as the difference before and after the election in the average forecast. We multiply this change by 100 to ease interpretation. To control for extreme values, we winsorize forecast revisions at the 1st and 99th percentiles for each horizon. As one would expect, there was a strong positive relation between forecast revisions from November 8 through December 31, 2016, and cumulative abnormal returns over the same period (see Figure A3 in the Internet Appendix).[35]

[32]Recent applications of this method include, for instance, Liu, Shu, and Wei (2017), who use it to interpret stock-price effects of political uncertainty, and Landier and Thesmar (2020), who use it to better understand the drivers of stock prices in the early phase of COVID-19.

[33]Ideally, one would check whether longer-term forecasts correlated particularly positively with climate responsibility. However, for FY 2020, our sample contains only 293 datapoints, which is too few for reliable inferences.

[34]Our definition of forecast revisions follows the approach used in, e.g., Liu, Shu, and Wei (2017). We obtain similar results when measuring forecast revisions as the percentage change in EPS forecasts, excluding observations with negative baseline forecasts (as done in, e.g., Landier and Thesmar, 2020) or using their absolute value at the denominator (as in, e.g., Ivković and Jegadeesh, 2004). We also obtain similar results when looking at the change in the median EPS forecast, instead of the average forecast.

[35]The positive relation between stock returns and analysts' forecast revisions is a well-established finding. Investors and analysts react to new information and also influence each other. See Kothari, So, and Verdi (2016) for a review of the literature on analysts' forecasts and asset pricing.

In Table 6, we test whether after the Trump election, financial analysts revised their expectations on future earnings to address firms' climate-related performance. Specifically, we regress forecast revisions on *Carbon intensity*, *Climate responsibility leader (ve)*, and control variables. As expected, we observe no significant relation between a firm's climate performance and the change in its average forecast for FY2016 (column 1). Such short-term forecasts could not be influenced by Trump's policies and, thus, serve as a placebo test. However, as expected, we observe that financial analysts anticipated Trump's policies would bring a boost to carbon-intensive firms' earnings in FY2017 and FY2018 (columns 2 and 3). Climate responsibility is not associated with any statistically significant revisions over these time horizons.[36]

Table 6 here

Table 7 analyzes other possible determinants of the stock-price effects of firms' climate performance following the 2016 climate policy shock. The regression results in column 1 indicate that between January and December 2017, carbon-intensive firms experienced a decrease in the Amihud (2002)'s measure of stock illiquidity compared to what happened between October 2015 and September 2016 (the equivalent length pre-event period). The decrease in illiquidity further strengthens when comparing 2019 with the pre-event period. We interpret this result as a further signal of the short-term benefits of the rolling-back of climate regulation for investors holding stocks of carbon-intensive firms.[37]

[36]The same finding holds when adopting the climate responsibility measure from MSCI KLD. In results available on request, we do not find a clear relation between the change in dispersion and either carbon intensity or climate responsibility. This result suggests that the observed stock-price effect of the two climate-related dimensions were not significantly driven by a further polarization of investors' green preferences.

[37]An interpretation for this result is that the Trump election caused a release in the average selling pressure on carbon-intensive stocks. Selling pressure is a significant driver of stock illiquidity and its effect on stock prices (Brennan, Huh, and Subrahmanyam, 2013). As investors demand a premium to hold illiquid

Table 7 here

Columns 3 to 6 show the percentage changes between 2016 and 2017 and between 2016 and 2019 in market beta (columns 3 and 4) and return volatility (columns 5 and 6) for individual stocks. No relation is observed between these proxies of realized short-term risk with our measures of corporate climate performance.

Overall, these results indicate that following the 2016 election, (a) the stock-price effect of carbon intensity was driven by an increase in cash flow expectations for carbon-intensive firms, but not necessarily by a decrease in their short-run uncertainty and (b) the observed climate-responsibility premium was likely driven by a change in earnings expectations and/or uncertainty over a far longer run. For the climate responsibility finding, the above analyses have the limitation that analysts' forecasts only extend for a few years. Therefore, they cannot capture (in the manner that stock prices do as a distillation) market participant's projections about longer run developments. These limitations prompted the next section's analysis of stock-price reactions as a function of the institutional shareholder structure of companies.

4.2 The role of investor horizon

The investment horizon of institutional investors is a major determinant of various corporate actions, and how those actions are priced in financial markets.[38] The horizons of institutional

stocks (Amihud, 2002; Acharya and Pedersen, 2005), the stock-price effect of carbon intensity after the 2016 election also may be partially motivated by an expected reduction in the associated stock illiquidity.

[38]For instance, Derrien, Kecskés, and Thesmar (2013) find that a longer-horizon shareholder base attenuates the effect of stock mispricing on corporate policies. Cella, Ellul, and Giannetti (2013) show that stocks held by more long-term investors are more resilient to market downturns. Gaspar et al. (2013) find that shareholder investment horizons influence payout policy choices. Cremers, Pareek, and Sautner (2020) find that an increase in short-horizon investors is associated with cuts to long-term investment and increased short-term earnings.

investors are particularly important with respect to pricing corporate and environmental responsibility, which is likely to pay off only in the long run.[39] Posit that markets anticipated the rollback of climate policy to be temporary, with probable intensification to follow, as the boomerang hypothesis suggests. The Trump era would still be a boon to carbon-intensive firms, despite their required change in ways later. Investors with a myopic view of firm value would happily pursue and thereby boost the price of carbon-intensive firms.

Conversely, we expect the climate responsibility premium to be amplified by the presence of more far-sighted and longer-term investors. An analogy is helpful here. Cella, Ellul, and Giannetti (2013) show that long-term investors helped mitigate the impact of the financial crisis on stocks. The Trump election is effectively a crisis for climate-responsible stocks. In the presence of a large fraction of long-term investors for these stocks, the stocks will incur less selling pressure; hence, they will outperform. Moreover, firms whose institutional owners have longer horizons can more easily keep their focus and policies oriented toward long-term value.

To test for these conjectures, we follow the existing literature and posit that a high (low) portfolio turnover by an investor indicates a short (long) investment horizon (Froot, Perold, and Stein, 1992). We compute investors' portfolio turnover based on Thomson Reuters 13-F data following the definition of Carhart (1997), that is, the minimum between total buys and total sells divided by average assets during the quarter. We then classify as short- and long-horizon institutional investors the 13-F institutions in the bottom and top

[39]Starks, Venkat, and Zhu (2020) provide evidence of a segmentation of institutional investors based on their investment horizon. Long-term investors have higher stakes in high-ESG firms and behave more patiently toward them. Chen, Dong, and Lin (2020) find that institutions with longer investment horizons are more likely to positively influence portfolio firms' CSR policies. Similarly, Glossner (2019) finds that long-term investors lead to more CSR activities. See Matos (2020) for a review of the literature on institutional investors and ESG.

quartiles of portfolio turnover in Q3-2016.[40] We then define the variables *Short-horizon IO* and *Long-horizon IO* as the percentage of the total 13-F institutional ownership held by short-horizon and long-horizon investors as of September 30, 2016.

As one would expect, we observe that *Short-horizon IO* correlates positively with *Carbon intensity* (0.08, $p < .05$) and negatively with *Climate responsibility (ve)* (-0.14, $p < .001$). By contrast, *Long-horizon IO* correlates negatively with *Carbon intensity* (-0.08, $p < .05$), and positively with *Climate responsibility (ve)* (0.29, $p < .001$). In short, long-term holders both shun carbon-intensive firms and embrace climate-responsible firms.

Table 8 regresses (cumulative) abnormal returns after the Trump election on the interactions of *Carbon intensity* and *Climate responsibility leader (ve)* with *Short-horizon IO* and *Long-horizon IO* as the independent variables. The regressions control for firm characteristics and industry. We observe that a higher short-horizon institutional investor base is associated with an amplified price effect of carbon intensity.[41] Conversely, a higher long-horizon institutional investor base is associated with an amplified price effect of climate responsibility.

Table 8 here

Overall, these results suggest that the time horizon of institutional investors plays a significant role for the pricing of climate performance. Corporate climate responsibility appears to appeal to long-term investors, but to repel short-term investors.

[40] Specifically, we identify as long-term investors those with portfolio turnover below 0.023 and as short-term investors those with turnover above 0.137 (the median turnover is 0.058). We compute the turnover through the algorithm used in Ben-David, Franzoni, and Moussawi (2012). We thank the authors for making their SAS code available on WRDS.

[41] Table A10 in the Internet Appendix shows that the same result holds when we define short-horizon IO as the percentage of Q3-2016 institutional ownership held by "transient" investors according to the Bushee (1998, 2001) classification.

4.3 The boomerang shows on the horizon

Survey evidence suggests that already shortly after the Trump election it was possible to identify early indicators of a possible boomerang to stricter policy than expected before the election.[42] At the corporate level, Sautner et al. (2020) find increased coverage of climate-related topics during firms' earnings calls after the Trump election, even with specific reference to regulation. In 2019, harbingers of a strongly intensified future climate policy began to be seen. For instance, in February 2019, several prominent Democratic candidates for the 2020 Presidential nomination supported a resolution in Congress to develop a "Green New Deal." Their resolution set for a policy plan aspiring, among other things, to power the U.S. economy with 100% renewable energy within 10 years (Crooks, 2019). Events like the "climate strike" in September 2019 revealed growing political support for bolder climate actions, actions that would represent a direct backlash to Trump lax and loosened policies.

Drastically tightened policies later became a cornerstone of Joe Biden's announced policies on the environment, and a major element in his electoral campaign. Specifically, and basically immediately, Biden promised to rejoin the Paris Agreement on the first day of his administration. However, he promised to "go much further" (wording from Biden's 2020 electoral campaign site). For example, he announced his intention to decarbonize the entire U.S. power sector by 2035 and to "ensure the U.S. achieves a 100% clean energy economy and reaches net-zero emissions no later than 2050." Importantly, Biden's stated intentions imply a much more ambitious climate regulation than under the Obama Administration, and

[42]In a March 2017 poll, 45% of Americans declared to worry "a great deal" about global warming, up from 37% in March 2016 (Gallup, 2017). A December 2018 survey found that 29% of Americans are now "alarmed" about climate change (up 8 percentage points since March 2018), and another 47% are "concerned" or "cautious" (Gustafson, Leiserowitz, and Maibach, 2019).

what would have likely ensued under a Clinton Administration. Biden's big picture climate goals were supplemented by concrete intended actions in related areas, such as the rescinding the contentious Department of Labor's "Financial factors in selecting plan investments" rule, which was issued on October 30, 2020. That rule explicitly limited the ability of pension funds to consider nonpecuniary factors in their investment strategies.[43]

Just before the 2020 election, a boomerang was clearly expected to arrive should Biden triumph and should Democrats control Congress. Given such an outcome, climate-responsible stocks would thrive. The step-by-step support for the Green New Deal makes it difficult to identify a clean event window during the Trump presidency. The 2020 Presidential election, by contrast, provided sharp and swift shifts in probabilities of vastly disparate climate policies.

As an event study, the 2020 election offers intriguing features. The final outcome was mostly anticipated by market participants. On the 2020 Election Day, Betfair gave Joe Biden a 78% probability of winning and FiveThirtyEight gave him 89%. In principle, the outcome of a high-probability event is not well suited for an event study. If the favored event comes in, there is little update of expectations.[44] However, the event experienced short-term shocks in both directions. On the day after the election, no winner had emerged, an implicit uptick for Trump. For 3 days, from Wednesday, November 4, through Friday, November 6, the major news networks refrained from calling the election. They finally did so on the weekend of November 7 and 8. Given the surprisingly close result and the realistic possibility of a second Trump term, we expect investors to have reconsidered what they had presumably

[43]See, for example, *National Law Review* (2021).

[44]For a discussion of methods usable for event studies based on anticipated outcomes, see, for example, Langer and Lemoine (2020) and Borochin, Celik, Tian, and Whited (2021).

already priced-in before the election. Conversely, we expect markets to have (re)priced the expected effects of tighter climate regulation when outcome uncertainty was progressively resolved and Biden emerged as the final winner.[45] Despite these advantages for testing, one should keep in mind that in the days after the election also brought a mini-torrent of news on COVID-19 vaccines and related topics. That news too, no doubt affected relative stock-price moves.

For all firms included in our baseline data set, we retrieve stock prices for the most recent period from Compustat Security daily and compute CAPM-adjusted returns as the daily excess return on the stock minus the stock's beta in 2019 times the market excess return.[46] From Compustat, we also retrieve standard 2019 accounting information: revenue growth, profitability, market leverage, and market cap (as of November 3, 2020). The percent of foreign revenues is drawn from Compustat segment data and refers to 2018. For cash ETR, we use the ratio of total cash taxes paid to pretax income adjusted for special items during the 5 years before the Trump election. That treatment provides a relatively clean proxy for the potential winners and losers from a rollback of the corporate tax cut that was implemented by the 2017 Tax Cuts and Jobs Act. For *Climate responsibility (kld)* and *Climate responsibility (ve)* we use the 2018 scores obtained from MSCI KLD and Vigeo Eiris. For *Carbon intensity*,

[45]Prediction markets, such as PredictIt, and gambling houses, such as Ladbrokes, did tip odds toward a Biden win late on November 4 and in advance of the market open on November 5. On the other hand, even after most political commentators called the race for Biden, Trump refused to concede and made several attempts to hold up the final ratification by the Electoral College, so some residual uncertainty about the change in Administration remained for some time.

[46]The 2019 market beta is estimated by regressing daily excess returns from January 2, 2019, through December 31, 2019, on a constant and the daily market factor. The market excess return and the return on the riskless asset (the daily 1-month U.S. Treasury-bill rate) are from Kenneth French's website. As the Fama-French market factors from French's website, at the time we are writing, are available only up to the end of November 2020, we compute the market factor from November onward as the value-weighted portfolio return of all firms listed on NYSE, NYSE Arca, Amex, or Nasdaq, for which data are available on Compustat. Our computed market factor and the Fama and French's market factor in November 2020 have a correlation of 99.9%.

we use the 2017 Scope 1 and Scope 2 GHG emissions, divided by the market value of equity before the election. Table A11 in the Internet Appendix shows descriptive statistics.

We analyze two sets of abnormal returns. The first starts from the day after the election (Wednesday, November 4, 2020) and the second starts on the first trading day after Biden was declared a winner by the major media networks (Monday, November 9, 2020).

Table 9, panel A, shows the results for *Climate responsibility (kld).* On the days immediately following the election, climate responsibility is associated with *lower* abnormal returns, net of the effect of other firm characteristics. Following the surprisingly close result, markets appear to have enhanced the chances of a Trump second term relative to preelection expectations. Thus, the observed negative coefficient for climate responsibility represented a diminution of the effects of the expected climate policy change that markets had priced in the run up to the election.[47]

In columns 3 to 6, we investigate what happened after Biden was announced as the winner. *Climate responsibility (kld)* is associated with an outperformance of almost 2.2% on November 9, which increases to 3.1% after 10 trading days. This effect is highly statistically significant and economically important. It represents more than one-fifth of the standard deviation of cumulative returns over the same period (14.65%).

A similar pattern emerges in panel B for *Climate responsibility leader (ve)* (and similar findings are also obtained with the continuous variable *Climate responsibility (ve)*). Interestingly, the coefficients for *Carbon intensity* are not statistically significant. We interpret this finding to indicate that investors, even under the concrete possibility of a slender victory by

[47]This reversal is also interesting because it suggests that the correlation of stock returns and climate responsibility can be genuinely attributed to changes in the political balance of power, not merely to an increase in attention to the topic of climate change.

Trump, had no hope for another consequential boost for high carbon-intensive firms.

Table 9 here

The results for the control variables are also informative. First, they too reflect the shift in signs between the first 3 days after the election and thereafter. Second, for the tax status and foreign revenues, in the days after Biden's win became clear, we observe effectively the opposite effect of what the Trump election had produced (Wagner, Zeckhauser, and Ziegler, 2018). Thus, these results reconfirm the relevance of corporate taxes and international orientation for firm value.

Finally, Figure 4 shows how climate-responsible firms generally outperformed beyond the 10-day window after Biden was declared the winner. They received additional boosts when John Kerry was nominated Presidential Envoy for Climate with a seat on the National Security Council (a sign that climate change would be a priority for the incoming Administration in its foreign policy) and Cabinet status. After a brief pause, climate-responsible firms gained again after the two runoff elections for Senate seats (both in Georgia) where both Democrats triumphed. These two outcomes meant that (with Vice President Harris casting the deciding vote in the Senate), Congress had flipped to Democratic control, albeit razor thin in the Senate. Arguably, this situation would allow Biden to achieve sweeping proclimate legislation, that is, beyond Executive Orders, at least through the 2022 midterm elections.

Figure 4 here

5 Conclusion

With Donald Trump's 2016 surprise election, expectations about U.S. climate policy took a punch on the chin. Stock prices responded to the anticipation of laxer regulation during the Trump administration and carbon-intensive firms enjoyed a short-run bump in price, as conventional theory would predict.

What about climate-responsible firms, those displaying ESG-like forward-looking strategies to deal with the energy transition? If investors expected the timeline of climate regulation and control to be bumped down during the Trump presidency, but then return to the same slope, with no other expected consequences, climate responsibility would have been penalized in stock prices. In fact, however, climate responsibility was rewarded.

The "boomerang hypothesis" offers a possible explanation. It holds that investors anticipated the down draft for climate regulation over the Trump administration to be transitory, but more important to be impactful for the future. It would pave the way for climate regulation post-Trump that was significantly more stringent than it would have been otherwise.

Three analyses support this explanation. First, analysts' short-term earnings forecast revisions following the 2016 election are positively related to carbon intensity, but not to climate responsibility. This indicates that the climate responsibility premium we observed depended on investors' considerations regarding a more distant future.

Second, we show that the stock-price effect of climate responsibility following the 2016 election was amplified by a firm's long-term institutional ownership base. By contrast, the boost associated with carbon intensity was amplified by the presence of short-term institutional investors.

Third, and finally, after the 2020 U.S. election, the value of climate-responsible firms soared in anticipation of the costs and opportunities for firms from Biden's ambitious climate agenda.

While some observers assert that financial markets put a premium on short-termist thinking, our analysis identifies a significant group of investors who take a long-term perspective when assessing a firm's value. In this instance, they value a firm's climate-responsible strategies as preparation for a more climate-conscious economy.

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Figures and Tables

Figure 1. Relation between *Carbon intensity* and *Climate responsibility (ve)*
This figure depicts binned scatter plots of firms' *Carbon intensity* against *Climate responsibility (ve)*. Panel A shows the plain relation between the two variables. Panel B controls for Fama-French 12-industry indicators and basic firm characteristics (market cap, leverage, profitability, and revenue growth).

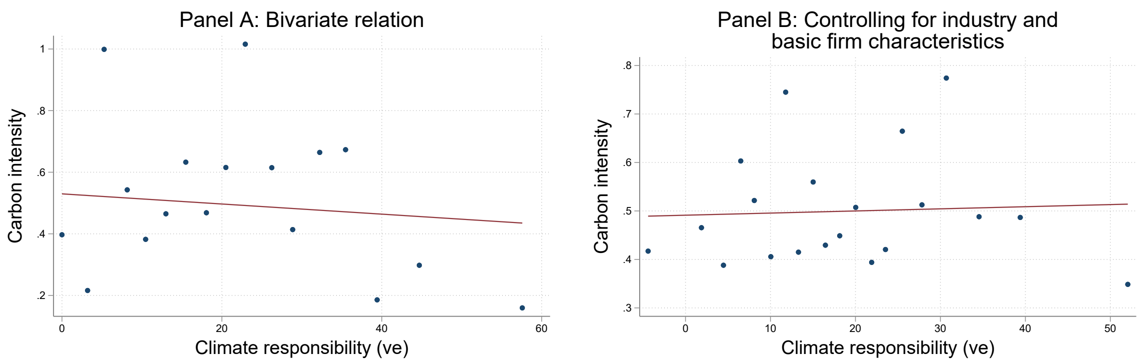

Figure 2. Abnormal returns after the 2016 election by industry
This figure plots the industry coefficients when regressing CAPM-adjusted returns on the day after the election (light blue bars) and through year-end 2016 (red bars) on Fama-French 30-industry dummies and firm characteristics (log(market cap), revenue growth, profitability, and market leverage). The sample includes the 2,798 Russell 3000 index constituents as of November 8, 2016, for which controls are available. The "Everything else" industry is used as the base level.

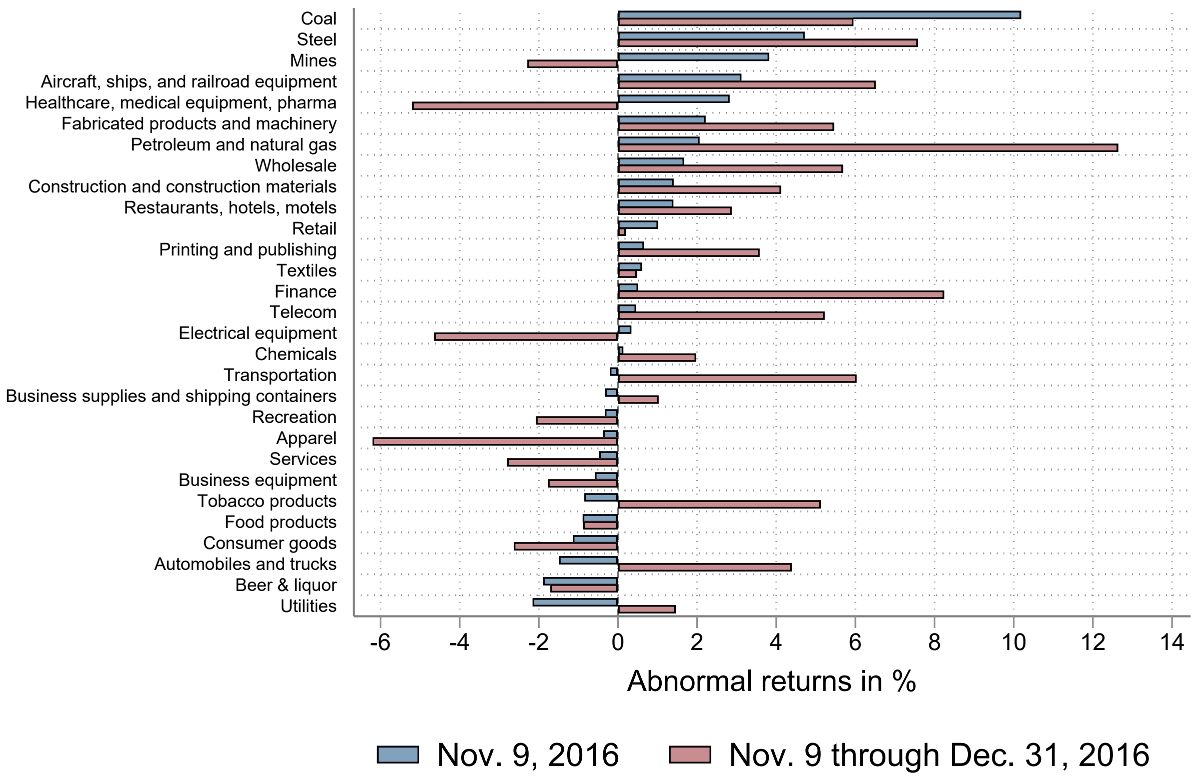

Figure 3. Rewards to climate responsibility after the 2016 climate policy shock This figure shows the cumulative CAPM-adjusted returns for high and low climate-responsibility firms net of the combined impacts on returns of standard firm characteristics (log(market cap), revenue growth, profitability, market leverage, and Fama-French 12-industry fixed effects) and other anticipated policy changes following the Trump election (cash ETR, foreign revenues). Returns begin cumulating 20 trading days before the 2016 Presidential election. The high (low) climate responsibility category includes firms with a 2016 climate responsibility score by MSCI KLD above (below) the sample median after orthogonalizing by standard firm characteristics. The vertical lines represent Election Day (November 8, 2016) and the day after the Pruitt nomination (December 7, 2016). The sample includes 2,102 Russell 3000 constituent firms as of November 8, 2016.

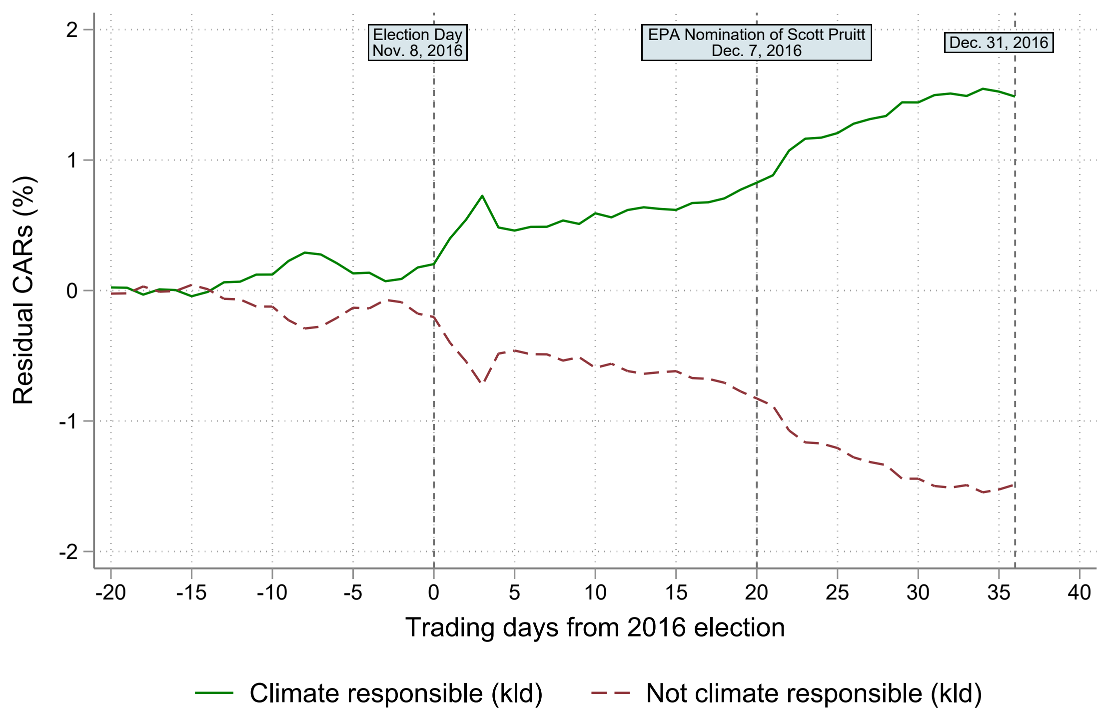

Figure 4. Rewards to climate responsibility after the 2020 election
This figure shows the cumulative CAPM-adjusted returns for high and low climate-responsibility firms net of the combined impacts on returns of standard firm characteristics (log(market cap), revenue growth, profitability, market leverage, and Fama-French 12-industry fixed effects), the cash ETR, and foreign revenues. Returns begin cumulating 20 trading days before the 2020 Presidential election. The high (low) climate responsibility category includes firms with a 2018 climate responsibility score by MSCI KLD above (below) the sample median after orthogonalizing by standard firm characteristics. The vertical lines indicate events of interest for the final electoral outcome and climate policy. As of November 3, 2020, the sample includes 1,643 Russell 3000 constituent firms also included in the main (2016) sample.

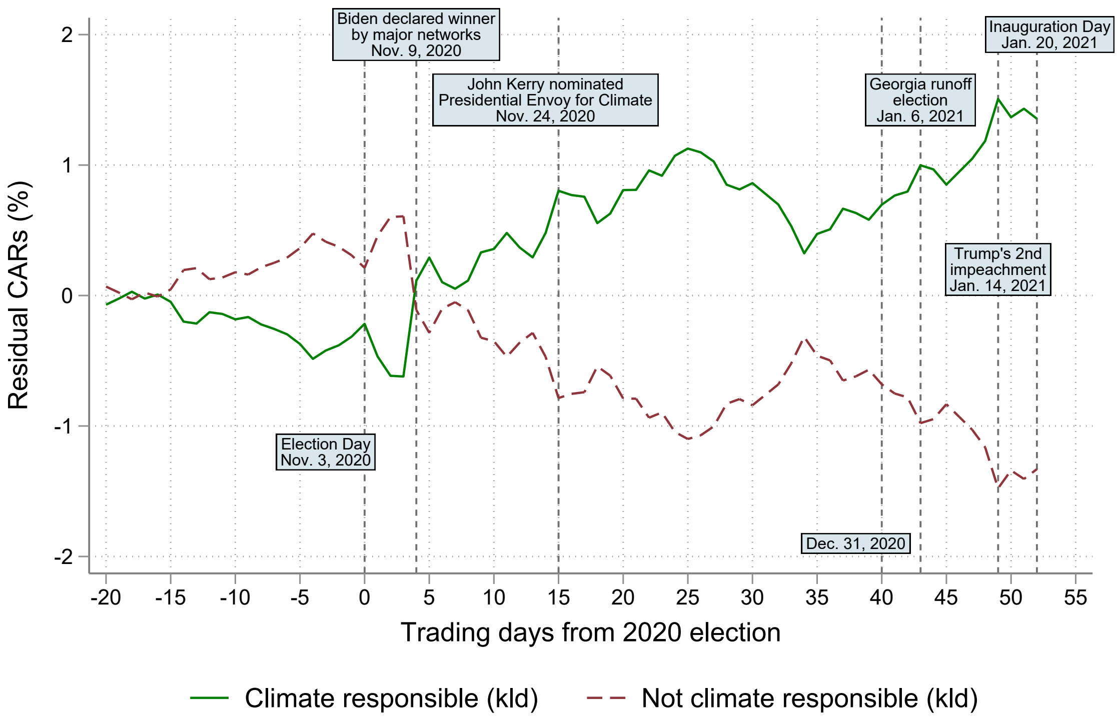

Table 1: Descriptive statistics of climate-related variables

This table shows the descriptive statistics of climate-related variables for the Russell 3000 constituents for which standard controls (log(market cap), revenue growth, profitability, and market leverage) are available. *Climate responsibility (kld)* is computed as the climate strength indicator (Env-str-d, 0 or 1) minus the climate weakness indicator (Env-con-f, 0 or 1) from MSCI KLD. *Climate responsibility (ve)* is an absolute score from 0 to 100 from Vigeo Eiris; it assesses firms' strategic approach to climate change risks and opportunities. *Climate responsibility leader (ve)* is a dummy variable equal to one for firms in the top quartile of *Climate responsibility (ve)*. *Carbon intensity* is computed as the 2015 Scope 1 and Scope 2 GHG emissions in kt of CO2 equivalents (ktCO2eq) provided by Vigeo Eiris, divided by the market value of equity in million USD, winsorized at the 99th percentile.

	N	Min	p25	Mean	p50	p75	Max	SD
Climate responsibility (kld)	2,102	0.00	0.00	0.11	0.00	0.00	1.00	0.31
Climate responsibility (ve)	764	0.00	4.00	18.81	16.50	30.50	78.00	16.32
Climate responsibility leader (ve)	764	0.00	0.00	0.26	0.00	1.00	1.00	0.44
Carbon intensity	764	0.00	0.01	0.50	0.04	0.21	10.13	1.44

Table 2: Sample composition by firm characteristics, Vigeo Eiris

This two-by-two matrix shows the number of firms with *Climate responsibility (ve)* and *Carbon intensity* below or equal to the median and above the median.

	Carbon intensity		
Climate responsibility (ve)	Below or equal to the median	Above the median	Total
Below or equal to the median	181	201	382
Above the median	201	181	382
Total	382	382	764

Table 3: Descriptive statistics of firm accounting characteristics and abnormal stock returns

This table shows descriptive statistics of firm accounting information (panel A) and stock returns (panel B) for Russell 3000 constituent firms for which the MSCI KLD climate-related indicators and standard controls (log(market cap), revenue growth, profitability, and market leverage) are all available. Accounting data refer to fiscal year 2015 for 1,541 companies and to fiscal year 2016 for 561 companies. Revenue growth, profitability, market leverage, and the cash ETR are obtained from Compustat or computed based on Compustat data. The market value of equity (market cap) is obtained from Bloomberg. Percent foreign revenue is from Bloomberg, supplemented by Compustat segment data. Individual stocks' abnormal returns are calculated with respect to the CAPM, and are expressed in percentage points. (We also consider raw returns and abnormal returns relative to the Fama-French three-factor model, whose descriptive statistics are reported in Table A3 in the Internet Appendix.) To obtain CAPM-adjusted returns, we first estimate each stock's market beta from an OLS regression of daily excess returns from October 1, 2015, through September 30, 2016, on the market excess returns, when at least 126 daily return observations are available. We then compute abnormal returns for all days in the following quarter as the daily excess return on the stock minus beta times the market excess return.

A. Accounting information

	N	Min	p25	Mean	p50	p75	Max	SD
log(market cap)	2,102	4.99	6.76	7.89	7.69	8.72	13.31	1.45
Revenue growth	2,102	-100.00	-3.66	15.54	4.13	13.76	3,380.13	139.06
Profitability	2,102	-291.46	0.71	2.73	4.13	9.68	133.64	18.58
Market leverage	2,102	0.00	0.08	0.27	0.24	0.41	3.02	0.25
Cash ETR	1,828	0.00	9.44	20.87	21.19	29.69	99.54	14.82
Percent foreign revenues	1,465	0.00	0.00	25.25	18.53	44.62	100.00	26.54

B. Abnormal stock returns

	N	Min	p25	Mean	p50	p75	Max	SD
Election (November 9, 2016)	2,102	-33.99	-1.21	1.20	0.87	3.22	42.01	4.58
Cumulative 3-day	2,102	-34.92	-1.25	3.94	3.58	8.77	106.47	8.25
Cumulative 5-day	2,102	-56.12	-1.33	4.32	4.06	9.32	114.96	8.96
Cumulative 10-day	2,102	-52.78	-1.28	4.75	4.18	10.44	101.68	9.53
Pruitt nomination (December 7, 2016)	2,102	-17.91	-1.41	-0.53	-0.22	0.80	17.30	2.49
Cumulative 3-day	2,102	-25.53	-1.61	0.04	0.27	1.93	44.70	3.99
Cumulative 5-day	2,102	-86.18	-3.26	-1.15	-0.76	1.23	45.11	5.08
Cumulative 10-day	2,102	-86.85	-3.60	-0.82	-0.56	2.25	83.74	6.85

Table 4: Climate responsibility, stock returns, and the 2016 climate policy shock (MSCI KLD sample)

This table shows the results of OLS regressions of CAPM-adjusted returns on *Climate responsibility (kld)*, cash ETR, share of foreign revenues, and other control variables (market leverage, log(market cap), revenue growth, and profitability). For firms with missing cash ETR and/or foreign revenues data, we apply a dummy variable adjustment to preserve the sample size. All models also include Fama-French 12-industry fixed effects. Columns 1 through 4 refer to the Trump election and cover the following periods: November 9, 2016 (column 1); November 9 through 11, 2016 (column 2); November 9 through 15, 2016 (column 3); and November 9 through 22, 2016 (column 4). Columns 5 through 8 refer to Pruitt's nomination and cover the following periods: December 7, 2016 (column 5); December 7 through 11, 2016 (column 6); December 7 through 14, 2016 (column 7); and December 7 through 20, 2016 (column 8). The sample includes all Russell 3000 firms covered by MSCI KLD in 2016 for which the climate-specific indicators and the control variables are available. t-statistics based on robust standard errors are reported in parentheses. *** $p < .01$; ** $p < .05$; * $p < .1$.

	Trump's election				Pruitt's nomination			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	CAPM-adjusted returns							
		Cumulative				Cumulative		
Days:	Nov. 9	3 days	5 days	10 days	Dec. 7	3 days	5 days	10 days
Climate responsibility (kld)	0.438*	1.394***	0.847*	0.723	0.274**	0.571***	0.788***	1.072***
	(1.68)	(3.19)	(1.85)	(1.40)	(2.00)	(2.64)	(2.97)	(2.60)
Cash ETR	0.006	0.041***	0.046***	0.059***	0.003	0.009	0.019**	0.040**
	(0.72)	(3.04)	(3.06)	(3.72)	(0.93)	(1.28)	(2.25)	(2.30)
Cash ETR missing	-0.378	-0.972	-1.128	-0.947	0.021	-0.391	-0.590	-0.122
	(-0.97)	(-1.39)	(-1.43)	(-1.16)	(0.11)	(-1.20)	(-1.24)	(-0.18)
Foreign revenues	-0.016***	-0.035***	-0.036***	-0.029***	0.003	0.015***	0.024***	0.018**
	(-3.79)	(-4.58)	(-4.46)	(-3.07)	(1.05)	(3.06)	(4.65)	(2.27)
Foreign revenues missing	-0.442	-0.364	-0.044	0.136	-0.091	-0.117	-0.634**	-0.632
	(-1.56)	(-0.75)	(-0.08)	(0.24)	(-0.70)	(-0.53)	(-2.00)	(-1.41)
Leverage	-1.723***	-3.915***	-3.584***	-2.891***	0.495*	0.200	0.261	0.314
	(-3.60)	(-4.75)	(-4.16)	(-2.95)	(1.93)	(0.50)	(0.49)	(0.44)
Profitability	-0.019***	-0.058***	-0.065***	-0.028	0.024***	0.032***	0.038***	0.023
	(-2.66)	(-3.13)	(-3.91)	(-1.60)	(5.79)	(3.71)	(3.79)	(1.25)
Percent revenue growth	0.000	0.001	0.002	-0.002	-0.001**	-0.002***	-0.002**	-0.001
	(0.59)	(0.53)	(0.80)	(-0.92)	(-2.28)	(-4.00)	(-2.41)	(-1.51)
log(market cap)	-0.584***	-1.872***	-1.645***	-2.211***	0.085**	-0.472***	-0.212**	-0.564***
	(-8.20)	(-15.53)	(-12.64)	(-15.50)	(2.11)	(-6.58)	(-2.53)	(-4.98)
Observations	2,102	2,102	2,102	2,102	2,102	2,102	2,102	2,102
R-squared	.145	.265	.218	.215	.280	.147	.129	.100

Table 5: Climate responsibility, stock returns, and the 2016 climate policy shock (Vigeo Eiris sample)

Panel A reports the results of the OLS regressions of CAPM-adjusted returns on *Climate responsibility (ve)*, *Carbon intensity*, control variables (cash ETR, share of foreign revenues, market leverage, log(market cap), revenue growth, and profitability), and Fama-French 12-industry fixed effects. For firms with missing cash ETR and/or foreign revenue data, we apply a dummy variable adjustment to preserve the sample size. Regressions in panel B replace *Climate responsibility (ve)* with a dummy variable equal to one for firms in the top quartile of *Climate responsibility (ve)* and zero otherwise. Table 4 describes the columns. t-statistics based on robust standard errors are reported in parentheses. *** $p < .01$; ** $p < .05$; * $p < .1$.

	Trump's election				Pruitt's nomination			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	CAPM-adjusted returns							
		Cumulative				Cumulative		
Days:	Nov. 9	3 days	5 days	10 days	Dec. 7	3 days	5 days	10 days
A. Climate responsibility (ve) and Carbon intensity								
Climate responsibility (ve)	-0.009	0.020	0.025	0.023	0.020***	0.030***	0.024***	0.016
	(-0.82)	(1.24)	(1.38)	(1.12)	(4.15)	(4.15)	(2.86)	(1.44)
Carbon intensity	0.548***	0.419**	0.495**	0.654**	-0.014	0.079	-0.059	0.060
	(3.64)	(2.21)	(2.46)	(2.08)	(-0.27)	(0.60)	(-0.36)	(0.38)
Observations	764	764	763	763	761	761	761	761
R-squared	.159	.231	.260	.244	.324	.168	.203	.160
B. Climate responsibility leader (ve) and Carbon intensity								
Climate responsibility leader (ve)	0.165	1.312**	1.260**	1.275*	0.382***	0.676**	0.720**	0.683*
	(0.52)	(2.57)	(2.35)	(1.95)	(2.59)	(2.55)	(2.42)	(1.75)
Carbon intensity	0.548***	0.421**	0.496**	0.656**	-0.013	0.081	-0.057	0.062
	(3.67)	(2.20)	(2.45)	(2.08)	(-0.24)	(0.62)	(-0.35)	(0.39)
Observations	764	764	763	763	761	761	761	761
R-squared	.158	.235	.262	.246	.312	.157	.201	.161
Constant and controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FF12 industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 6: Changes in analysts' earnings forecasts after the 2016 election

This table shows the results of OLS regressions of average earnings forecast revisions from November 9 through December 31, 2016, on firms' climate-related performance and control variables (cash ETR, foreign revenues, log(market cap), revenue growth, market leverage, profitability, and industry). t-statistics based on robust standard errors are reported in parentheses. *** $p < .01$; ** $p < .05$; * $p < .1$.

	(1)	(2)	(3)	(4)
Dependent variable:	Δ EPS forecasts			
Horizon:	FY2016	FY2017	FY2018	FY2019
Carbon intensity	-0.025	0.125*	0.132**	-0.046
	(-0.62)	(1.76)	(2.30)	(-1.33)
Climate responsibility leader (ve)	-0.027	0.041	0.023	0.054
	(-0.72)	(0.49)	(0.50)	(1.14)
Observations	719	729	684	396
R-squared	.045	.075	.102	.035
Controls	Yes	Yes	Yes	Yes
FF12 industry FE	Yes	Yes	Yes	Yes

Table 7: Changes in stock illiquidity, market beta, and volatility after the 2016 election

This table shows the regression results of percentage changes in stock illiquidity (columns 1 and 2), market beta (columns 3 and 4), and return volatility (columns 5 and 6) on *Climate responsibility leader (ve)*, *Carbon intensity*, and controls variables (cash ETR, foreign revenues, size, leverage, revenue growth, profitability, and industry). *Stock illiquidity* is the Amihud (2002) illiquidity measure computed as the average daily ratio of the absolute value of daily return to the dollar volume. *Volatility* is the standard deviation of daily returns. *Market beta* is the estimated coefficient of the CAPM model. The three measures are computed based on daily returns over the pre-event (from October 2015 through September 2016), 2017 (from January 2017 through December 2017), and 2019 (from January 2019 through December 2019), when at least 126 daily returns are available. The percentage changes are trimmed at the 1st and 99th percentiles to control for extreme values. t-statistics based on robust standard errors are reported in parentheses. *** $p <.01$; ** $p < .05$; * $p <.1$.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Δ Illiquidity (%)		Δ Market beta		Δ Volatility (%)	
	2016-2017	2016-2019	2016-2017	2016-2019	2016-2017	2016-2019
Carbon intensity	-0.020**	-0.046*	-0.004	-0.015	0.020	-0.005
	(-2.30)	(-1.85)	(-0.69)	(-1.47)	(1.43)	(-0.32)
Climate responsibility leader (ve)	0.019	0.055	0.010	0.010	0.005	-0.003
	(0.82)	(0.39)	(0.56)	(0.40)	(0.20)	(-0.11)
Observations	748	695	748	695	748	695
R-squared	.067	.056	.175	.132	.280	.218
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
FF12 industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 8: The role of investor horizons in the climate responsibility premium after the 2016 election

This table shows the results of OLS regressions of CAPM-adjusted returns after Trump's election on the interactions of *Climate responsibility leader (ve)* and *Carbon intensity* with *Short-horizon IO* (panel A) and *Long-horizon IO* (panel B), controlling for firm characteristics (cash ETR, foreign revenues, market leverage, log(market cap), revenue growth, and profitability) and Fama-French 12-industry fixed effects. *Short-horizon IO* and *Long-horizon IO* are the percentage of total institutional ownership as of Q3-2016 held by investors in the top and bottom quartiles of portfolio turnover, respectively. Conventional t-statistics based on robust standard errors are reported in parentheses. *** $p<.01$; ** $p<.05$; * $p<.1$.

	(1)	(2)	(3)	(4)
Dependent variable:	CAPM-adjusted returns			
		Cumulative		
Days:	Nov. 9, 2016	3 days	5 days	10 days
A. Effects of short-horizon IO				
Climate responsibility leader (ve) ×	-0.077	-0.164	-0.018	0.116
Short-horizon IO	(-0.88)	(-1.30)	(-0.11)	(0.56)
Carbon intensity ×	0.051***	0.064***	0.077***	0.105***
Short-horizon IO	(3.03)	(2.78)	(3.12)	(2.74)
Climate responsibility leader (ve)	0.385	1.778**	1.033	0.258
	(0.85)	(2.57)	(1.31)	(0.29)
Carbon intensity	0.122	-0.076	-0.161	-0.235
	(0.70)	(-0.39)	(-0.77)	(-0.85)
Short-horizon IO	-0.005	0.019	0.001	0.027
	(-0.27)	(0.55)	(0.01)	(0.60)
Observations	694	694	693	693
R-squared	.193	.265	.284	.287
B. Effects of long-horizon IO				
Climate responsibility leader (ve) ×	0.074**	0.099**	0.091*	0.052
Long-horizon IO	(2.45)	(2.16)	(1.83)	(0.87)
Carbon intensity ×	-0.015*	-0.024**	-0.022**	-0.032**
Long-horizon IO	(-1.87)	(-2.55)	(-2.09)	(-2.05)
Climate responsibility leader (ve)	-4.214**	-4.658*	-4.255	-2.118
	(-2.29)	(-1.68)	(-1.41)	(-0.57)
Carbon intensity	1.235***	1.586***	1.519***	2.197**
	(2.92)	(3.14)	(2.59)	(2.46)
Long-horizon IO	0.017	0.023	0.020	0.016
	(1.17)	(0.96)	(0.79)	(0.60)
Observations	694	694	693	693
R-squared	.198	.270	.285	.279
Firm controls	Yes	Yes	Yes	Yes
FF12 industry FE	Yes	Yes	Yes	Yes

Table 9: Climate performance, stock returns, and the 2020 election
This table shows results of OLS regressions of CAPM-adjusted returns on firms' climate-related variables, cash ETR, share of foreign revenues, and other control variables (market leverage, log(market cap), revenue growth, and profitability). Regressions in panel A investigate the effect of *Climate responsibility (kld)*, while those in panel B the effects of *Climate responsibility leader (ve)* and *Carbon intensity*. Columns 1 and 2 refer to the 1 and 3 days following the 2020 Presidential election (November 4 through 6, 2020). Columns 3 to 6 cover the periods from the first trading day after Biden was announced as a winner (November 9, 2020) through after 10 trading days (November 10, 2020). t-statistics based on robust standard errors are reported in parentheses. *** $p<.01$; ** $p<.05$; * $p<.1$.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	CAPM-adjusted returns					
		Cumulative		Cumulative		
Days:	Nov. 4	3 days	Nov. 9	3 days	5 days	10 days
A. Regressions with MSCI KLD sample						
Climate responsibility (kld)	-0.969***	-1.614***	2.180***	1.067**	2.111***	3.123***
	(-3.29)	(-4.52)	(3.81)	(2.43)	(3.39)	(3.43)
Cash ETR	-0.008	-0.006	-0.046***	-0.048***	-0.065***	-0.073***
	(-1.04)	(-0.53)	(-2.75)	(-3.39)	(-3.35)	(-2.86)
Cash ETR missing	0.564*	0.407	-2.371***	-0.985	-2.160**	-0.298
	(1.79)	(0.75)	(-2.98)	(-1.47)	(-2.40)	(-0.23)
Foreign revenues	-0.021***	0.011	0.031***	0.032***	0.044***	0.054***
	(-5.31)	(1.62)	(3.30)	(3.85)	(3.87)	(3.54)
Foreign revenues missing	-2.013***	-0.748*	2.019***	1.534***	1.782**	1.429
	(-7.07)	(-1.90)	(3.08)	(3.08)	(2.50)	(1.51)
log(market cap)	0.830***	1.028***	-1.760***	-0.904***	-1.798***	-2.875***
	(13.10)	(10.92)	(-12.22)	(-7.97)	(-11.06)	(-11.05)
Market leverage	-0.020***	0.001	0.036**	0.010	0.050***	0.160***
	(-2.86)	(0.14)	(2.10)	(0.64)	(2.61)	(5.58)
Profitability	0.015	0.035**	0.028	-0.009	0.031	0.018
	(1.34)	(2.42)	(1.39)	(-0.48)	(1.45)	(0.63)
Percent revenue growth	0.005*	0.005	-0.008**	-0.005	-0.011**	-0.011*
	(1.82)	(1.14)	(-1.97)	(-1.10)	(-2.38)	(-1.69)
Observations	1,643	1,642	1,643	1,643	1,642	1,641
R-squared	.294	.200	.264	.176	.269	.310
FF12 industry FE	Yes	Yes	Yes	Yes	Yes	Yes
B. Regressions with Vigeo Eiris sample						
Climate responsibility leader (ve)	-0.609	-0.594	2.670***	1.558**	2.346***	3.200***
	(-1.62)	(-1.33)	(3.14)	(2.38)	(2.62)	(2.74)
Carbon intensity	-0.060	-0.073	0.233	0.135	0.098	0.305
	(-0.54)	(-0.63)	(0.66)	(0.56)	(0.28)	(0.83)
Observations	501	500	501	501	501	501
R-squared	.287	.272	.271	.216	.277	.401
Controls	Yes	Yes	Yes	Yes	Yes	Yes
FF12 industry FE	Yes	Yes	Yes	Yes	Yes	Yes